Waterloo Region District School Board

REQUEST FOR TENDER

25-7706-RFT

Glenview Park Secondary School Elevator and Science Laboratory Renovation

ISSUE DATE: March 6, 2025

ELECTRONIC SUBMISSIONS will be received by the Bidding System no later than **2:00 p.m. local time, on March 26, 2025.**

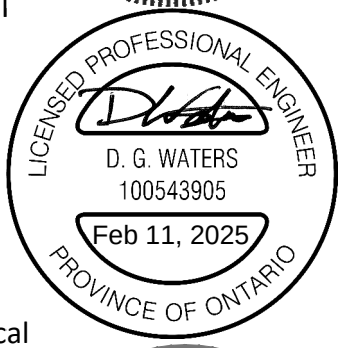
DIVISION 00 – BIDDING AND CONTRACT DOCUMENTS

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. Designated Contact

To contact the Board or ask questions in relation to this Procurement, bidders must initiate the communication electronically through the Bidding System. The Board will not accept any respondent's communications by any other means, except as specifically stated in the Procurement. Bidder's must not communicate in any manner with anyone other than the Designated Contact.

For the purposes of this procurement process, the Designated Contact will be:

Procurement Lead: Ardith Inapan
Title: Buyer
Waterloo Region District School Board
Email: ardith_inapan@wrdsb.ca

2. Consultant

The Board has hired the following architect/consultant to assist in the preparation of this Tender: ABA Architects Inc.

The architect/consultant and any sub consultants are not to be contacted by any interested parties from the bid issue date to the bid award notification. The architect/consultant or any sub consultants will not respond to any direct communication.

The Board 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 Board

3. Blackout Period

A black out 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 Board, or any Board consultants or employees, unless initiated by the Board's Designated Representative, noted above.

4. Communication and Question Protocol

Bidders and their representatives are NOT permitted to contact WRDSB Project Managers/Leads, or agents of the Board; any member of the Board's governing body (such as Board of Trustees, or advisors); any employee, consultant, or agent of the Board's Clients, other than the Designated Contact 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 Board will not be responsible for any verbal statement, instruction, 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 Board shall not be bound by any verbal instruction or information provided by any Board employee or consultant of the Board. 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.

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.

5. Doing Business with the Waterloo Region District School Board

The Waterloo Region District School Board is a provincially funded institution reporting to the Ministry of Education of Ontario and is one of the larger school boards in Ontario, operating 121 school locations and serving approximately 64,000 students in the Region of Waterloo.

The Waterloo Region District School Board's Vendor Registration program is transitioning to a fully integrated online eProcurement tool for bid opportunities through the electronic bidding system: bids&tenders.

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 Board's Administrative Procedures, Section 4000 – Business Services.

The Board utilizes prequalified Roster Lists for specific categories/commodities awarded through a competitive process.

Competitive opportunities including Requests of Prequalification (RFPQ) are posted on the Electronic Bidding System, bids&tenders/wrdsb.

6. 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 Board at any time.

DESCRIPTION	DATE
Issue Date of Tender	March 6, 2025
Non-Mandatory Pre-Bid Site Examination	Date: Thursday, March 13, 2025 Time: 3:00 PM Address: 55 McKay Street, Cambridge Meeting Area: Front Office
Deadline for Questions	March 21, 2025
Closing Date and Time	March 26, 2025, 2:00 pm local time
Anticipated Contract Start / Work begins	Elevator: Upon receipt of Site Plan Approval (anticipated prior to July 1, 2025) Interior Renovations: June 30, 2025
Substantial Completion Date	January 16, 2026 (dependent on completion of elevator)
Ready for Takeover	August 25, 2025 – All interior spaces except A211, A212, Exterior spaces and cafeteria. October 6, 2025 – Rooms A211 & A212 January 9, 2026 – Elevator (pending scheduling from GC, licensed and operational)
Deemed Complete Date	January 30, 2026

7. Pre-Bid Site Examination

Bidders are strongly encouraged to attend the non-mandatory pre-bid site examination and sign the attendance sheet. Date, time and location are provided above in the Anticipated Project Schedule. The Board may not provide another opportunity to visit the site. However, absence from this site meeting will not disqualify any Bidder.

Bidders shall attend the site meeting at their own risk and hold the Board harmless for

any issues or damages arising out of their attendance of the site meeting.

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.

8. Secondary Site Examinations

Bidder 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 and email 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 damages arising out of their attendance of the site meeting.

Bidders not in attendance of a Mandatory Pre-Bid Site Examination meeting will not be provided an opportunity to a secondary stie examination visit.

Bidders must adhere to all communication protocols, as describe in Section 1.0, Sub Section 4. 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.

9. Examination of Bid Documents and Work and Submitting Questions

i. 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.

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

iii. 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.

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

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

vi. 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 Bid Solicitation document, unnecessary restrictions in the terms of reference, or should they be in doubt as to the meaning of any part of this document.

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

10. Electronic Bid Submission Only / Electronic Bidding System

Competitive opportunities including Requests of Prequalification (RFPQ) are posted on the Electronic Bidding System, bids&tenders/wrdsb.

The Bidder must submit their bid through the Bidding System 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.

i. In order 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 and Tenders including but not limited to plan taker contact information, categories, and agency.

ii. All Bids shall be submitted through bids&tenders only. The onus is on the Bidder to ensure all requirements of the Bid Solicitations are submitted.

iii. If the 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

iv. 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 bid solicitation. Only the plan takers will have access to download bid documents, receive addenda email notifications, download addenda and to submit their bid electronically through the Bidding System.

v. The onus is on the Bidder to ensure that the Bid is received in the Bidding System on or before the 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 Bid is received by the Bidding System, not when a Bid is submitted by a Bidder.

vi. 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

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

viii. The Owner reserves the right to accept or reject any or all provisional bid prices submitted, and such prices shall remain in effect for the duration of the Contract. Failure to submit provisional prices where required may result in the Bid being declared non-compliant.

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

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

xi. The Board hereby consent 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.

xii. 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

xiii. There will be no public opening for this Bid.

xiv. 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 Bid Solicitation, they shall decide between them who is to be the Bidder, without any involvement of the Board.

xv. 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 Bid Solicitation document, including Board'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.

xvi. 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.

11. Bid Prices

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

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

iii. HST is extra and shall not be included in Bid prices.

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

v. Quantities may be estimated, and therefore the Board, at its discretion, may purchase more or less of the commodity based on the unit price bid.

vi. 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 nominated subcontractors after the closing of the Bid, must have prior written approval of the Board Contact.

vii. All price(s) submitted shall be a reasonable price for each particular item as determined by the Board 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 Board adversely will be clarified and may be rejected.

viii. Unit prices and/or provisional/supplementary 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 Bid Solicitation document.

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

12. References Not Applicable

Bidders must provide a minimum of three (3) references for work of comparable size and scope that has been successfully completed within the last five (5) years. One (1) reference must be from the WRDSB, if you've done previous work, otherwise one (1) reference must be of a government entity of similar size, scope, and complexity.

References must contain information about your clients including a complete organization name, contact person's names, title, telephone number and/or email address, details of the work provided, start and end dates of the work, and total cost of the work. Bidders cannot use references that pertain to another Vendor/Contractors' work.

The Board reserves the right to contact the clients noted to verify information provided and assess overall client experience. Bidders should ensure that their references are prepared to provide a response if contacted by the Board. If the Board is unable to obtain a satisfactory reference, or if the reference does not respond to the reference call (after Board's best efforts), or if the reference chooses not to comment, the reference will be deemed unsatisfactory, and the Board may ask the Bidder for additional references. Unsatisfactory references may result in the Bidder's submission being rejected.

13. Addenda

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

The Board shall not be bound by any verbal instruction or information provided by any Board employee or consultant of the Board. Only responses provided in an Addendum shall form part of this Bid Solicitation 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 Bid Solicitation Document will be addressed in the form of an Addendum.

It is understood and acknowledged that while the Bid Solicitation 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 Bid Solicitation 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 Board 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.

14. Edit and Withdrawal of Bid Submission

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

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

iii. 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.

15. Irrevocable Period

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

16. 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).

17. 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 Bid Solicitation Document.

ii. Bids that are incomplete, conditional, qualified, or obscure.

iii. Bids that are based upon an unreasonable period of time for completion of the Work.

iv. Bids received from Bidders involved in Claims with either of the Board or banned or on probation with the Board.

v. Bids received from any Bidder deemed to be unskilled or experienced 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.

18. Bid Review

i. All Bids received on or before the Closing Time will be reviewed for compliance based on this Bid Solicitation document. Non-compliant Bids will be rejected. Bids not meeting any of the mandatory requirements included in this Bid Solicitation document will be disqualified. Bidders may be contacted to clarify their submissions.

ii. Should there be any error in extensions, additions or computations, the Board 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 Board that they can comply with the requirements contained within this Bid Solicitation document and that they possess the necessary inventory, equipment, facilities, resources, and staff to perform the work specified in this Bid Solicitation document. Bidders may be required to submit evidence of above in a form acceptable to the Board. Substitution of materials, equipment, or methods different from that outlined in the terms of reference will not be accepted unless provided for within this Bid Solicitation document or with the written approval of the Board.

iv. The Board also reserves the right to examine Bidder's facilities, equipment and visit the subcontractors or sub-consultants proposed and/or Bidder's existing and past clients. The award decision may be revised based on the above.

v. The Board will not be responsible for travel costs if travel is required. No additional charges will be accepted by the Board for any cost incurred by the Bidder or any other party in participating in the Bid evaluations.

vi. The Board 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 Board in its selection. The Board reserves the right to consider all, or any information received from all available sources, whether internally or externally obtained. The Board 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 Board's own experiences with the respective Bidder(s) or any of the subcontractors and sub-consultants proposed in their Bid.

19. Post-Award Meeting

A post-award meeting may be held consisting of the successful Vendor/Contractor, and their key personnel assigned to the contract, the Board's Project Manager/Lead and if applicable the Architect/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.

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 Board.

i. Subject to the reserved rights of the Board and availability of funds, the lowest compliant Bid will be recommended for award.

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

iii. If Applicable, within twenty-four (24) hours, excluding hours occurring during a Saturday, Sunday, or a legal holiday, of receiving a request or intent to award from the Board, 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, Sub Trade Category and if applicable, related Divisions.

iv. Within **seven (7) calendar days** of receiving a request or intent to award from the Board, the Bidder (the "Recommended Bidder") shall provide the following mandatory requirements:

a. Insurance certificate with coverage specified in the Bid Solicitation Document.
b. WSIB clearance certificate valid on the date of award or an exemption letter (if applicable and requested).
c. Non-Disclosure Agreement (NDA) duly signed by the authorized signatory (to be renewed annually). The Board will provide this form.
d. Bonding Requirements, if applicable, as specified in the Bid Solicitation Document.
e. An executed Board issued Form of Agreement, if applicable, and duly signed by the authorized signatory.
f. Any other submittal specified in the Bid Solicitation Document or in the intent to award, as a requirement of award.

g. 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.

v. The documents listed below will be incorporated as deemed necessary by the Board, 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:

a. Board approved change order(s) or Contract / Agreement / CCDC 2 -2020 amendment(s)
b. Purchase Order(s), Contract(s) Agreement(s) / CCDC 2 -2020 executed with the Bidder including exhibits
c. Bid Solicitation document issued by the Board, including addenda, if applicable
d. Bid submitted by the Bidder

21. Post Award

Ministry of Labour Notice of Project confirmation notice to be uploaded in Bids and Tender prior to mobilization and/or prior to first project draw

In addition to all of the Board'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 Board 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.

22. Award Notification

For procurements valued at $121,200 or more, and in accordance with the Broader Public Sector Procurement Directive, once the Board 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 Board 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 and Subcontractors

1.0 General Contractors

1.1 Only invited prequalified General Contractors, as a result of the award of a competitive prequalification process, #23-7430-RFPQ, may submit a bid for this opportunity. Invitations are based on awarded Project Size Categories. Roster approved GCs can only bid on the project size categories based on the award.

1.2 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 Board and cannot be changed without prior written approval from the Board.

2.0 Subcontractors/Subconsultants

2.1. Refer to specification sections for products, suppliers and installers that will be required.

2.2. The Subcontractor/Subconsultant list is not required at time of bid submission.

2.3. The Subcontractor/Subconsultant list is mandatory after the bid closing date from the Recommended Bidder within twenty-four (24) hours, excluding hours occurring during a Saturday, Sunday, or a legal holiday, of receiving a request or intent to award from the Board.

2.4. The Bidder (the "Recommended Bidder") shall provide a listing in a Board approved formatted list of Subcontractor/Subconsultant that it proposes to use for all Work described in this Procurement including the specification sections, as per the following:

2.5.1 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.

2.5.2 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.

2.5.3 The Owner reserves the right to reject any nominated Subcontractor/Subconsultant or supplier, based on the following but not limited to unsatisfactory past performance, suspended/removed from doing business with the Board and/or outstanding/unresolved corrective action notice issued by the Owner to the Subcontractor/Subconsultant within the last three (3) years.

2.5.4 The Owner 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.

2.5.5 The Board reserves the right to examine Bidder's facilities, equipment and visit the Subcontractor/Subconsultant's proposed.

2.5.6 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.

2.5.7 Where a bidder lists "own forces" in place of a Subcontractor/Subconsultant, the bidder shall carry out such item of the Work with its own forces.

2.5.8 Where "own forces" have been listed by a bidder, the Owner 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.

END OF SECTION

00 21 15 – Scope of Work

ABA Architects Inc. was solicited to complete the design and act as the Prime Consultant for Glenview Park Secondary School Elevator and Science Laboratory Renovation. The renovation includes, but is not limited to the upgrade of non-ventilated teaching spaces; update the science wing HVAC and ventilation system, with an updated ceiling including fire spray to the underside of the deck in classrooms: A202 (Physics), A204 (Preparation Room), A206 (Biology), A208 (Preparation Room), A210 (Chemistry Lab), A212 (Chemistry Lab), A214a (Kiln), A214 (Storage), A216 (Art), A218 (Art), A217 (Sewing/Fashion Arts), A215 (Classroom), A213 (Business), A211 (Biology Lab), A209 (Computers), A207 (Dept Head), A205 (Art & Marketing) , N200 (Dark Room), and Corridor A. Renovation of two (2) existing classrooms into Science Classrooms with built-in millwork and sinks, rework of the electrical panel and the classroom control panel. Provide a new 2 storey elevator addition, with an elevator machine room with access from the Cafeteria. HVAC upgrades will also require structural work to existing roof to carry new loading of units. Refer to all documents for complete scope of work. Schedule and delivery are clearly indicated on contract documents. All student/staff/teacher areas that are accessible must be completed at noted deadlines, and have occupancy granted. All work occurring in side occupied spaces between September 2025 and June 2026 is to be completed after hours, or in hoarded areas as indicated in Contract Documents. All after hours is to be included in the overall contract cost.

END OF SECTION

00 31 34 – Subsurface Investigation Report – Not Applicable

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

.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 as 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

00 41 13A – Asset and Warranty Card

WRDSB PROJECT ASSET & WARRANTY CARD

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		Tech 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:

To be filled out by Consultant				*To be filled out by Contractor*				
IDENTIFIER	ASSET	LOCATION (incl. Rm. No.)	*REMOVED (R), OR NEW (N)*	CONTRACTOR	MANUFACTURER	MODEL	SERIAL NUMBER	WARRANTY END DATE
Boiler 2	*Condensing Boiler*	*Boiler Rm. B005*	*R*	*Bob's Mechanical*	*Viessman*	*Vitocrossal 300 CA3B*	*1234x5678y90*	*Jan. 1, 2025*
HVAC 7	*New RTU*	*Roof D*	*N*	*Bob's Mechanical*	*Daiken*	*DPS020A*	*ABCD1EFGH2IJ*	*Jan. 1, 2025*
n/a	*Gym Partition*	*Gyms 122/123*	*R*	*Extreme Partitions*	*Hufcor*	*933EC*	*n/a*	*Jun. 30, 2028*

WRDSB Project Asset & Warranty Card

Project Name: _____

School / Location: _____

Date: _____

To be filled out by Consultant				*To be filled out by Contractor*				
IDENTIFIER	ASSET	LOCATION (include Room No.)	ASSET REMOVED (R) OR NEW (N)	CONTRACTOR	MANUFACTURER	MODEL	SERIAL NUMBER	WARRANTY END DATE

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 – Standard Terms and Conditions

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 Board in writing. This includes, without limitations, terms in publications, web-site, sales invoice, delivery document as well as those commonly applied by the Bidder. Board'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 Vendor/Contractor makes an assignment for the benefit of creditors, or becomes bankrupt or insolvent, or makes a proposal to its creditors, the Contract with the Vendor/Contractor shall immediately be terminated, and the Board shall be entitled to enter into an agreement with another party without the consent of the Vendor/Contractor.

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 Bid Solicitation document. In no case shall the invoicing for the entire Work performed exceed the Total Price, unless additional Work is ordered by the Board in writing. The unit prices as well as provisional pricing shall be used to invoice the additional or provisional work, as required by the Board. 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 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 (the '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 Vendor/Contractor 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 Bid Solicitation 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 Board.

For bid amounts where Bonding is not requested, the Awarded Bidder agrees to pay to the Board 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 Bid Solicitation 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 successful Bidder 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 (the '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 successful Bidder fails to provide a performance bond and/or labour and materials bond when requested, the Board may declare the bid deposit forfeited and the Bidder will be held responsible for any increased costs or damages incurred by the Board. Any Bidder who fails to provide all required documents within the timelines provided, or otherwise fails to enter into an agreement with the Board upon notice of being the successful Bidder may be subject to future bidding constraints by the Board.

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 successful Bidder 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 Board will not knowingly purchase goods and/or services from Vendor/Contractors who operate in contravention of local and international laws. If a product and/or service supplied to the Board is discovered to be in contravention, the Board reserves the right to rectify the issue with the Vendor/Contractor, including the cancellation of the contract.

The Board expects that all employees and Vendor/Contractors act within the parameters of the in Administration Procedure 4360 PRINCIPLES OF BUSINESS CONDUCT FOR BOARD EMPLOYEES. Click here to access the Board's Administrative Procedures, Section 4000 – Business Services.

6. Code of Conduct for Vendors/Contractors

These Guidelines cover any vendor, contractor, supplier, 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 contractor's employees, sub-contractors, agents, consultants, and others on site in connection with the contractor's work or at the vendor/contractor's express or implied invitation.

i. **Courtesy and Respect**: all vendor/contractors and their employees must conduct themselves in a manner that is lawful, courteous, businesslike, and respectful of all students, staff, faculty, guests, or visitors.

ii. **Language and Behavior**: vendors/contractors 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 contractor or contractor's employee is prohibited. Offenders will be removed from WRDSB property and/or reported to the local Police Department.

iv. **Smoking**: Contractors and their employees are not permitted to smoke on WRDSB property, in or near any buildings.

v. **Fraternization**: Vendor/Contractors and their employees may not fraternize or socialize with WRDSB students or employees.

vi. **Appearance**: Vendor/Contractors and their employees are required to wear appropriate work wear, hard hats and safety footwear, as the case may be, 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. **Reporting**: The Vendor/Contractor 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 Vendor/Contractor is responsible for its employees, agents, consultants and guests. If prohibited conduct does occur, the vendor/contractor 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

Vendor/Contractors shall abide by all applicable provincial and federal laws, as well as Board Policies. Some of the applicable laws are highlighted below for information purposes only. In case of any discrepancy between this Bid Solicitation 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. Broader Public Sector Accountability Act, 2010
ii. Building Ontario Businesses Initiative Act, 2022
iii. Construction Act
iv. Architect Act
v. Canada Revenue Agency (CRA) regulations
vi. Accessibility for Ontarians with Disabilities Act (AODA)

vii. Workplace Safety and Insurance Act (WSIB)
viii. Occupational Health and Safety Act
ix. Trade Agreements (CETA/CFTA)
x. Education Act
xi. Fighting Against Forced Labour and Child Labour in Supply Chains Act
xii. WRDBS Procurement Services Policies website
xiii. WRDSB Policies and Procedures

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

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

The successful Bidder(s) will be required to comply with all applicable federal, provincial laws as well as Board 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 Board, upon request, periodic reports and evidences confirming such compliance.
By supplying the goods or equipment and/or providing services, the Vendor warrants that the goods or equipment supplied, and services provided to the Board 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 and Municipal Freedom of Information and Protection of Privacy Act

All information and documentation provided by the Board or to the Board in connection with this Procurement, before or after the issuance of this Procurement is the sole property of the Board 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 Board 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 Board to advise or assist with the Bid process, including the evaluation of Bid submissions.

Bidders should be advised 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 Board, the Bid prices submitted and agreed to under contract with the Board 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.

9. Confirmation to Proceed

No work shall commence until the Board has issued a purchase order and/or contract, if applicable to the successful Bidder. 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 Successful Bidder and the Board. For payment purposes, a Purchase Order shall be generated and issued to the Successful Bidder. The Purchase Order number must appear on all invoices in order 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, sub-consultants and suppliers also have no conflict with respect to other work and/or other clients.

The Vendor/Contractor, Subcontractors and 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 Vendor/Contractor 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 Vendor/Contractor 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 Vendor/Contractor.

The Vendor/Contractor 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 Vendor/Contractor and its Subcontractors and Suppliers. Consistent with this fundamental term of the Contract, the Vendor/Contractor 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 Vendor/Contractor, where such claim is, in whole or in part, in respect of a disputed claim by the Subcontractor or Supplier against the Vendor/Contractor, where the payment to the Subcontractor or Supplier by the Vendor/Contractor is agreed to be conditional or contingent on the ability to recover those amounts or a portion thereof from the Owner, failing which the Vendor/Contractor shall be saved harmless from all or a portion of those claims. The Vendor/Contractor acknowledges that any such agreement would undermine the required arm's-length relationship and constitute a conflict of interest. For greater certainty, the Vendor/Contractor shall only be entitled to advance claims against the Owner for amounts pertaining to Subcontractor or Supplier claims where the Vendor/Contractor 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 Vendor/Contractor has been found liable for those claims.

A breach by the Vendor/Contractor, any of the Subcontractors, 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

The Board must comply with Ontario Regulation 521/01 (Collection of Personal Information) of the Education Act with respect to criminal background checks and offence declarations.

If required by the Board, the Vendor/Contractor will provide to the Board, or designate, a Criminal Background check for pertinent individuals covering offences under the

Criminal Code, the Controlled Drugs and Substances Act, and any other offences which would be revealed by a search of the automated Criminal Records Retrieval System.

An Offence Declaration on a Board-approved form for every employee of the Vendor/Contractor who may come in direct contact with Board staff and/or students on a regular basis at any Board site prior to the occurrence and on or before September 1 each year thereafter may be required. Updated Offence Declarations may be required annually. The Board will determine in its sole discretion whether this is a requirement.

Termination of contracts may be the result of non-compliance to this requirement.

13. Damage Responsibility of Contractor/Vendor

The Vendor/Contractor, 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 Vendor/Contractor 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 Vendor/Contractor'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 Vendor/Contractor shall indemnify and save harmless the Board 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 Board Representative the Vendor/Contractor 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 Vendor/Contractor is responsible under the Contract, the Board, following notice in writing to the Vendor/Contractor of his intention so to do, may withhold payment of any monies due to the Vendor/Contractor under this or any other Contract until the Vendor/Contractor 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 Vendor/Contractor shall notify the Board representative the same working day of any service disruption or damage and the Vendor/Contractor will immediately

notify the utility company to initiate repair. The Vendor/Contractor 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 Vendor/Contractor and at the Vendor/Contractor'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 Board representative. All repairs and replacements will be approved by a Board representative prior to final payment.

15. Debriefing Requests

For procurements valued at $100,000 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 Board Contact listed in this Bid Solicitation Document in writing with their request within sixty (60) calendar days of the award notification.

16. Default

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

The Vendor/Contractor 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 Vendor/Contractor 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. Costing 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 board will not accept or consider any "delay claim" requests for delayed deliverables outlined in the tender documents.

18. Designated Substances

The Occupational Health and Safety Act of Ontario (OHSA) allows 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 MTE Consultants Inc. 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 Vendor/Contractor 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 Board Contact.

All asbestos work must be conducted by Vendor/Contractors approved by the Board, 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, Vendor/Contractors must be certified as Asbestos Abatement Workers AAW (Trade code 253W) and Asbestos Abatement Supervisors AAS (Trade code 253S) by The Ministry of Training, Colleges and Universities 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 Vendor/Contractor 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 Board 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

Vendor/Contractor 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 Vendor/Contractor 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 Vendor/Contractor 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. responsible for obtaining its own independent financial, legal, accounting, and technical advice with respect to any information included in the Bid Solicitation Document or in any data, materials, or documents provided or required by the Board.

19. 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 Board'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 Vendor/Contractor or the Board 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.

20. Electrical Safety Requirements

All electrical equipment and components must bear a C.S.A. or Electrical Safety Association (E.S.A.) label.

21. Emergency and Maintenance

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

For the purpose of emergency and maintenance measures, the name, address, and telephone number of a responsible official of the contracting firm shall be given to the Board'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 Board in the event emergency or maintenance measures are required, regardless of the fact that the emergency or requirement of maintenance may

have been caused by the Vendor/Contractor's negligence, Act of God, or any cause whatsoever.

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

22. Equivalent or Brand Name

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.

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 Board in the form of an Addendum. It is the Bidder's responsibility to demonstrate that the item meets the specifications.

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.

The request must include enough detail to determine equivalency by comparing the Board's specifications to the alternate product. It will not be the Board's responsibility to perform this comparison.

The Board/ Consultant may, depending on the nature of the product request site visits within a reasonable distance (preferable within 100 km of the Board) 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.

The Board/Consultant will endeavor to complete a review and make a decision prior to the Closing Date, and, if required, the Board 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 particular Procurement.

If the Board is willing to consider the product with its differences, it will be communicated in the form of an Addendum prior to the Closing Date.

The cost of any testing requirements to establish acceptable equivalent or comparable products will be borne by the Bidder, unless otherwise stated by the Board.

23. Evidence of Quality

It is the Bidder's responsibility to prove their product/service quality meets the Board's requirements and Bidders may be required to submit evidence in a form acceptable to the Board. Substitution of materials equipment or methods different from that outlined

in the specifications / terms of reference will not be accepted unless provided for within the Bid Solicitation document or without the written approval of the Board.

24. 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 Vendor/Contractor 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 Contract Time attributable to the Force Majeure event, the Owner and the Vendor/Contractor 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 Board 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.

25. 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 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.
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.

25.1 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 School Board'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 School Board'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.

26. Incurred Costs

The Board 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.

27. Indemnification

The Bidder will indemnify and save harmless and defend the Board, and their respective elected officials, officers, employees, a

gents 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.

28. Insurance Provisions

If selected, it is the responsibility of the Vendor/Contractor 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 Vendor/Contractor shall insure its undertaking, business, and equipment under the following coverage to protect and indemnify and save harmless the Board:

i. **General Liability Insurance:** The Vendor/Contractor shall maintain liability insurance acceptable to the Board throughout the term of this Agreement from the date of commencement of work until one (1) year from the date of substantial performance of work. Liability coverage shall be provided for completed operations hazards from the date of substantial performance of the work, as set out in the certificate of substantial performance of work, on an ongoing basis for a period of 6 years following substantial performance of work. Coverage shall consist of a comprehensive policy of public liability and property damage insurance, with all applicable coverage extensions/ endorsements, in an amount of not less than $5,000,000 per occurrence. Such insurance shall name the **Waterloo Region District School Board** and any other person or party identified in the contract documents, as an **additional insured** with a cross liability endorsement and severability of interests' provision. 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. A combination of primary coverage plus umbrella or excess liability insurance may be used.

ii. **Owned and Non-Owned Automobile Liability Insurance:** The Vendor/Contractor shall maintain liability insurance on all Owned, Non-Owned and Leased Automobiles used in the performance of this work to a limit of $2,000,000 per occurrence throughout the term of this Agreement from the date of commencement of work and until one (1) year after the date of substantial performance of work.

iii. **If applicable, 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 Board and shall not allow subrogation claims by the Insurer against the Board.

iv. **If applicable**, 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 to, while stored at a temporary location, and awaiting installation at the work site.

v. **If applicable**, the General Contractor shall **ensure** its professional consultants, architects, landscape architects, planners, and engineers 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 $1,000,000 per claim providing coverage for acts, errors and omissions arising from their professional services performed under this Agreement. 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 Board prior to the completion of the project and in accordance with the provisions stated above.

vi. **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 condition during construction. Coverage shall be in an amount of not less than $5,000,000 per claim or per occurrence, or such greater amount as the Board may from time to time require, naming the Board 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. **Provisions:** Prior to the commencement of work, the General Contractor 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 Board.

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 Board and any other person insured under the policy and be primary insurance in response to claims. Any insurance or self-insurance maintained by the Board 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 Board under this Agreement.

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

viii. **Third Party Claims Process:**

a. The Board's claims process for Third Party claims is to refer the claimant directly to the Vendor/Contractor and to leave the resolution of the claim with the Vendor/Contractor. This applies regardless of whether or not it is an insured loss.

b. As the Board has a responsibility to the taxpayers, we must ensure that claimants are dealt with in a fair and efficient manner. Claims reported to the Vendor/Contractor, either directly by a third party or through the Board shall be promptly investigated by the Vendor/Contractor. The Vendor/Contractor shall contact the third party claimant within 48 hours of

receipt of notice of a claim. The Vendor/Contractor shall initiate an investigation of the claim immediately upon notice, and advise the third party claimant in writing, with a copy to the Board, of its position regarding the claim within 21 calendar days of the notice. The Vendor/Contractor 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 Vendor/Contractor shall immediately report the claim to its Insurer for further review. (Insurer for this purpose is defined as either the Claims Department of the Vendor/Contractor's Insurance Company or the Claims Administrator at the Vendor/Contractor's Insurance Broker.) The Vendor/Contractor's Insurer upon receipt of this claim shall advise the third party claimant by letter, with a copy to the Board, that it is now investigating the claim. When a final position on the claim has been determined, the Vendor/Contractor's Insurer shall advise the third party claimant by letter, with a copy to the Board. Failure to follow this procedure shall permit the Board to investigate and resolve any such claims.

d. Nothing herein shall limit the right of the Board to investigate and resolve any such claims notwithstanding the response of the Vendor/Contractor and/or its Insurer and to seek indemnification from the Vendor/Contractor or to exercise any other rights under the Contract.

e. The Board may, without breaching this contract, retain from the funds owing to the Vendor/Contractor an amount that, as between the Board and the Vendor/Contractor, is equal to the balance in the Board's favour of all outstanding debts, claims or damages, whether or not related to this contract.

29. Invoice Requirements, Proper Invoice and Payment Terms

Except for Credit Card payments, all invoices shall be sent to finance-ap@wrdsb.ca for payment at the completion of the Work or after receipt of goods, unless otherwise stated.

29.1 In advance of invoicing, upon request, contracted Vendors will provide:

i. necessary company information to set up a WRDSB account and
ii. banking information if they wish to receive payment by Electronic Funds Transfer (EFT).

29.2 Requests to change company information, such as a name change due to a merger or acquisition, must be submitted in writing accompanied with a legal document/letter signed by a lawyer on the law firm's letterhead.

29.3 Invoices, not subject to the Construction Act, must contain the following information, where applicable, in order to be deemed complete:

i. Purchase Order Number
ii. Work Order Number
iii. Invoice Date

iv. Unique Invoice Number
v. Vendor name and address
vi. Contract reference (RFT #, RFQ# etc.)
vii. A description, including quantity where appropriate, month of service for ongoing contracts, and location of work
viii. The amount payable for the services or materials that were supplied, including unit price (where applicable)
ix. HST amount shown as a separate line item
x. Payment Terms
xi. Board Project Lead/ Contact and
xii. Confirmation of completion of order and all Work as described in this Bid Solicitation Document.

29.4 Construction Act – Proper Invoice

The Board will pay such invoice within twenty-eight (28) calendar days of the Board's receipt of such proper invoice if the work has been performed to the satisfaction of the Board For Work that is governed by the provisions of the Construction Act and the Regulations thereto, the successful Bidder 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 Vendor/Contractor'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 applied for 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 Board in the Contract.
viii. the invoice number and if applicable, the revision number.
ix. the Vendor/Contractor'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.

29.5 Payment Terms

The payment terms shall be net twenty-eight days (28) days after receipt of proper invoice where the Construction Act is applicable, unless otherwise agreed by the Board in writing. All other payment terms will reflect Net 30. 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 Board. The Board will not pay any interest, penalty, or late fee for delayed payments. The Board preferred payment method is Credit Card or EFT, however alternate payment methods may be approved. Vendors are required to invoice promptly, without delay.

30. Licenses and Permits

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

31. Locates, if applicable

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

The successful Bidder will obtain all utility locates in advance of work and all cost(s) associated with obtaining the utility locates will be the Vendor/Contractor's responsibility.

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

32. 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 successful Bidder at the successful Bidder's expense.

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

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

34. Mathematical Errors (Unit Prices Prevail)

Should there be any error in extensions, additions or computations, the Board 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.

35. No Branding

The Vendor/Contractor 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 Board.

36. No Collusion

Bidders 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 for the same Work and shall be fair in all respects and shall be without collusion or fraud.

37. No Lobbying

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

i. any elected or appointed officer.
ii. any staff of the Board except the Board Contact as identified in the Bid Solicitation Document; or
iii. any other person connected in any way with the procurement.

38. 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 Board owned properties. Furthermore, most Board 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.

39. Non-Assignment

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

The Vendor/Contractor shall not change its corporate name without the prior written approval of the Board.

40. Non-Disclosure Agreement (NDA)

The Board 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 Board procedure AP4790. Prior to any sharing of Board personal, sensitive, or confidential information, the Vendor will be subject to further privacy and security reviews as required. This agreement will be renewed on an annual basis.

41. 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 Board 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 Board agree as follows.

i. Except as set out in paragraph (b) below, the Bidder hereby assigns and agrees to assign to the Board 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 Board 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 Vendor/Contractor agrees to always cooperate fully, and will cause its

Personnel to cooperate fully at all times, with respect to signing such documents and doing such acts and other things reasonably requested by the Board to confirm the transfer of ownership rights in the Deliverables.

42. Patent, Copyright and Other Proprietary Rights

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

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).

43. Performance

i. Where the Vendor/Contractor is in default in carrying out any of its obligations under the contract, the Board may issue a verbal warning outlining the deficiency in supply or other aspects of performance and requiring the Vendor/Contractor to correct those deficiencies within such period of time as stated.
ii. If the deficiency is not corrected within the time specified, or there is a further instance of deficient performance, the Board may issue a written notice to the Vendor/Contractor, identifying the deficiency in performance and setting a final date or time period for its correction.
iii. If corrective steps are not taken by the final date or within that time, the Board 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 Vendor/Contractor shall have no right to perform the services contemplated under this agreement beyond the time when such services become unsatisfactory to the Board; and in the event that Vendor/Contractor 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 Vendor/Contractor 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 Board. The evaluation report shall be reviewed with Procurement Services, and a copy of the completed evaluation forwarded to the Vendor for their records. Dependent on the evaluation scoring, the Board may request a corrective action plan

and/or project size/value may be affected on future bid opportunities for your company.

44. Permits and Licenses

Unless stated otherwise, the Vendor/Contractor 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 the Board upon request.

45. Proceedings Against the Board

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 Board and the Bidder. The Board may reject any Bid in the event of potential, current, pending, or threatened litigation, arbitration, alternative dispute resolution or disputes involving the Board and the Bidder.

46. Protection of Board Assets

The successful Bidder (the contractor / subcontractor) shall be informed of and protect all Board assets including existing structures and vehicles, to the satisfaction of the Board. Any damage shall be reported to the Board and subsequently repaired and/or replaced by the Vendor/Contractor, at their expense, to the satisfaction of the Board. The Vendor/Contractor shall not cause any inconvenience to Board operations, staff, public or users of the Board facilities, within reason. Communication between the successful Vendor/Contractor and the school (or Board representative if school contact is not available) must be timely and effective to ensure all stakeholders are considered / aware of work to be completed.

47. Public Health Safety Protocol

Best practices include but not limited to wearing a medical grade mask and maintaining physical distancing (2m/6.5ft).

Recommended practices are subject to change at any time For information and updates, refer to the following resources and website: Waterloo Region District School Board and Regional of Waterloo Public Health Services

48. Records, Inspection, Audits

The Board will have the right, upon reasonable notice, to full access to the accounts and records of the Vendor/Contractor in respect of the goods, services and equipment provided by it under the Contract, for the purposes of inspection and/or audit. The Vendor/Contractor 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.

49. Reserved Rights of the Board

The Board 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, or claims by or against or otherwise involving either of the Board 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 Supplementary pricing.
v. discuss with any Bidders different or additional terms to those contemplated in this Bid Solicitation 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. 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.
x. 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 Bid Solicitation Document,
    c. with inadequate credentials or due to unsatisfactory past performance,
xi. reject Bid(s) from Bidder who has engaged in lobbying or has contravened any of the terms of the Bid Solicitation Document.
xii. 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 Board exercising its clarification rights under the procurement process, or
    c. other relevant information that arises during the procurement process.
xiii. choose to reject a Bid if only a single Bid is received and cancel the bidding process or enter into direct negotiations with the sole Bidder.
xiv. accept a Bid other than the lowest or highest scoring and/or to not accept any Bid for any reason whatsoever.
xv. award the contract as split-order, lump sum or individual-item basis, or such combination as shall best serve the interests of the Board
xvi. 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.
xvii. no longer consider a Bidder if a satisfactory outcome is not reached as part of negotiation, as determined by the Board in their sole discretion and move to the next highest ranked Bid in such event.
xviii. select a Bidder other than the Bidder whose Bid reflects the lowest cost to the

Board and/or award the Contract to any Bidder.

xix. award any business/Work described in this Bid Solicitation to more than one (1) Bidder.

xx. not award the Contract if the costs of completing the Work exceed budget funding; or

xxi. do not respond to all requirements or do not represent fair market value or where necessary internal approvals are not obtained.

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

50. Responsibilities of the Vendor

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

The Vendor shall:

i. perform the Contract in accordance with the specifications, terms and conditions under which it is awarded.

ii. act in a professional manner at all times when dealing with Board staff, with the public, and while working on site.

iii. not, except with the consent of the Board 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 Board be used for, or in connection with, any advertising or promotional purpose of the Vendor.

iv. treat information gained while working with the Board confidentially and not use it for any other project and return it to the Board 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).

51. 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 Bid Solicitation 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 subcontractors, sub-consultants, 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 Bid Solicitation Document including any addenda.

iv. In the event of discrepancies between the maps, drawings, reports, and the specifications with regard to 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 of 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 carry out 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.

52. 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 Board will not be responsible for damages or extra work caused or occasioned by the Vendor/Contractor relying on this or any other information or records.

Before starting work, the Vendor/Contractor 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 Vendor/Contractor themself, the costs involved shall be borne by the Vendor/Contractor. The Vendor/Contractor will be responsible for any fees that may be associated with these services.

53. Site Inspection and Control

A representative of the Board (appointed by the Board) 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 Vendor/Contractor in written form

54. Site Investigation

Bidders shall not rely solely upon information furnished by the Board 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.

55. 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 carried out by skilled workers acceptable to the Board Representative, under the liability of the Vendor/Contractor.

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

56. Site Traffic/Pedestrian Safety

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

57. Site Use and Traffic Control

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

The Vendor/Contractor 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 Vendor/Contractor 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 Vendor/Contractor shall regularly inspect the surface condition of these streets and promptly dispose of all the debris.

Should the Vendor/Contractor be unable to carry out the required remedial measures, the Board may carry out the necessary maintenance and the costs for the work shall be deducted from payments due to the Vendor/Contractor.

The Vendor/Contractor shall, at his own expense and to the satisfaction of the Board, provide all vehicular traffic control equipment, 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 Vendor/Contractor 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 Vendor/Contractor must be included in the quotation and included with the bid price.

The Vendor/Contractor 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.

58. 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 Bid Solicitation Document.

59. Sustainable Purchasing

The procurement needs of the Board 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 shall include the consideration of many environmental tangible and intangible factors when determining the total life-cycle costs and environmental impact.

60. Termination

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

i. The Board may terminate the contract without further notice, and exercise its rights to the Contract security provided by the Vendor/Contractor.
ii. The Board may withhold any payment due to the Vendor/Contractor hereunder until the Vendor/Contractor has remedied its failure.
iii. The Board may engage the services of another Bidder to remedy the Vendor/Contractor's failure, and obtain reimbursement therefore from the Vendor/Contractor. The said reimbursement may be obtained either through deduction from any amounts owing to the Vendor/Contractor hereunder, or through any other legal means available to the Board; or
iv. The Board may assert any other remedy available to it in law or equity.

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

61. Termination for Convenience

The Board may terminate the Contract, in whole or in part, whenever the Board determine that such termination is in the best interests of the Board without showing cause, upon providing written notice to the Vendor/Contractor. The Board shall pay all reasonable costs incurred by the Vendor/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 Board. Payment shall be in accordance with prices as per Contract. However, in no event shall the Vendor/Contractor be paid an amount, which exceeds the Total Bid Price. The Vendor/Contractor will not be reimbursed

for any profits which may have been anticipated but which have not been earned up to the date of termination.

62. Termination for Lack of Funding

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

63. Tools and Equipment

All equipment and methods used to carry out 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 Board 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 Board entering into an agreement with the Vendor/Contractor, or at any time during the Contract, the Board may, at their discretion, request an inspection of the equipment proposed for use.

It is the responsibility of the Vendor/Contractor, 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 timeline terms of this tender. Failure to provide alternative equipment within timeline expectations specified within this tender, may result in termination of the contract. It is the responsibility of the Vendor/Contractor to ensure work continues and deadlines are met, despite any unforeseen interruption as a result of equipment failure.

It is the Vendor/Contractor's responsibility to ensure that the equipment and the operator, are licensed in accordance with the Ministry of Transportation. The Board may, at their discretion, require the Vendor/Contractor 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 Vendor/Contractor 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 Board shall apply.

64. Usage Reports

The Board, at no additional cost, may request usage reports to be provided annually or upon request.

65. Variation of Bid Prices

No variation in the Total Price, unit prices and/or provisional 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.

66. Volume and Exclusivity

The Board makes no guarantee of value or volume of work to be assigned to the Successful Bidder. Any agreement executed with the Successful Bidder may not be an exclusive contract for the provision of the described goods/services.

67. Waiver

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

68. Warranty and Maintenance

The Vendor/Contractor, 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 Vendor/Contractor is responsible for all required maintenance complete with materials and labour during the warranty period.

69. Work Continuity

The Vendor/Contractor shall take adequate care to protect the Work, the Board'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 Vendor/Contractor, its subcontractors, suppliers, agents, employees, officers, directors, and all other persons and other entities for whose acts the Vendor/Contractor may be liable or for whom it is responsible in law and their respective officers, directors, agents and employees.

The Vendor/Contractor 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, Board equipment, public assets or private property during the Work shall be the responsibility of the Vendor/Contractor.

70. Work Requirements

The Vendor/Contractor shall perform entire work with minimal to no disturbance to the routine operations of the respective facility. Further, the Vendor/Contractor shall ensure safety of WRDSB assets, students, staff as well as public at all times.

71. Workplace Safety Insurance Board (WSIB) Certificate

The Board requires all Vendor/Contractors 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 Bid Solicitation, the recommended Bidder(s) make available to the Board a copy of certificates of good standing with the Workplace Safety and Insurance Board ("WSIB Certificates") stating that the vendor/contractor/consultant and all of its sub-contractors/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 shall be uploaded through the Bidding System within 72 hours of the expiration or replacement of the current certificate, without demand by the Board.

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	Amend Article A-1.3 by deleting all of the words after *"Contract Documents"* and replace them with the following" "attain .1 *Substantial Performance of the Work* by the 21st day of August in the year 2026. .2 (if applicable) *Occupancy* by the 28th day of August in the year 2026, and .3 *Ready-for-Takeover* by the 28th day of August in the year 2026."
SC1.1		

ARTICLE A-3 – CONTRACT DOCUMENTS

SC2.1	A-3.1	Add the following documents to the list of *Contract Documents* 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 • *Drawings* • *Specifications* • 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	Delete Article A-4.4 and replace it with the following: "4.4 The *Contract Price* shall remain fixed for the duration of the *Contract Time*, subject only to adjustments as provided for in the *Contract Documents*. For certainty, and without limiting the general application of the preceding sentence, the *Contractor* assumes all risks in connection with cost increases for overhead, *Products, Labour*, and *Construction Equipment* prescribed by the *Contract Documents* for the performance of the *Work*, and the *Contractor* assumes all responsibility for liabilities and additional costs that may arise as a result of the *Contractor's* inclusion of any *Product, Construction Equipment, Supplier*, or *Subcontractor* in its calculation of the *Contract Price*."

ARTICLE A-5 – PAYMENT

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

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

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

SC3.1	A-9	Add new ARTICLE A-9 CONFLICT OF INTEREST as follows: "**ARTICLE A-9 CONFLICT OF INTEREST** 9.1 The *Contractor*, *Subcontractors* and *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 *Contractor* acknowledges and agrees that a conflict of interest, as described in this Article A-9, includes, but is not limited to, the use of *Confidential Information* where the *Owner* has not specifically authorized such use. 9.2 The *Contractor* 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 *Contractor*. 9.3 The *Contractor* 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* under the *Contract*. 9.4 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 *Contractor* and its *Subcontractors and Suppliers*. Consistent with this fundamental term of the *Contract*, the *Contractor* 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 *Contractor*, where such claim is, in whole or in part, in respect of a disputed claim by the *Subcontractor or Supplier* against the *Contractor*, where the payment to the *Subcontractor or Supplier* by the *Contractor* is agreed to be conditional or contingent on the ability to recover those amounts or a portion thereof from the *Owner*, failing which the *Contractor* shall be saved harmless from all or a portion of those claims. The *Contractor* acknowledges that any such agreement would undermine the required arm's-length relationship and constitute a conflict of interest. For greater certainty, the *Contractor* shall only be entitled to advance claims against the *Owner* for amounts pertaining to *Subcontractor or Supplier* claims where the *Contractor* 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 *Contractor* 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 *Contractor*, any of the *Subcontractors*, 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."

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

SC6.1	Article A-10	Add 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 *Contractor* was selected by the *Owner* for this *Contract* is the *Contractor's* representation and covenant that it will attain *Substantial Performance, Occupancy (*if applicable), and *Ready-for-Takeover* within the *Contract Time* stated in Article A-1 of this *Contract*. 10.2 The *Contractor* acknowledges and agrees that it is responsible to marshal its resources and those of its *Subcontractors and Suppliers* in a manner which will permit timely attainment of *Substantial Performance, Occupancy (*if applicable), and *Ready-for-Takeover*. The *Contractor* agrees that time is of the essence of this *Contract*." 10.3 The Contractor shall pay to the Owner compensation for all additional costs and damages borne by the Board to cover costs incurred due to delay beyond contract timelines, until Ready-for-Takeover is achieved and certified pursuant to the terms of the Contract. Liquidated damages will be assessed as incurred and amounts will be payable directly to the Board. Additional costs may include, but are not limited to: temporary classrooms, temporary washrooms, additional staff, etc.
SC6.2		

DEFINITIONS

Revisions to Existing Definitions		
SC5.1	Consultant	Amend the definition of "Consultant" by adding the following to the end of the definition: "For the purposes of the *Contract*, the terms "*Consultant"*, "*Architect*" and "*Engineer*" shall be considered synonymous."
SC5.2	Payment Legislation/Construction Act	Delete the Definition of *Payment Legislation* and replace it with "Construction Act" as follows: "**Construction Act** *Construction Act* means the *Construction Act*, 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 *Contract*. For certainty, the first procurement process for the *Project* (*i.e*., the "improvement" as that term is defined in the *Construction Act*) commenced on or after October 1, 2019."
SC5.3	Ready-for-Takeover	Amend the Definition of *Ready-for-Takeover* by deleting all the words after "as verified" and replacing them with "and approved by the *Owner*."
New Definitions		
	Adjudication	Add the following definition: "**Adjudication** *Adjudication* means construction dispute interim adjudication as defined under the *Construction Act*."
	Close-Out Documentation	Add the following new definition: "**Close-Out Documentation** *Close-Out Documentation* has the meaning given to it under GC 5.4.2."
	Confidential Information	Add the following definition: "**Confidential Information** *Confidential Information* means all the information or material of the *Owner* 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 *Contractor* at any time, but *Confidential Information* shall not include information that: .1 is or becomes generally available to the public without fault or breach on the part of the *Contractor*, including without limitation breach of any duty of confidentiality owed by the *Contractor* to the *Owner* or to any third party, but only after that information becomes generally available to the public; .2 the *Contractor* can demonstrate to have been rightfully obtained by the *Contractor* from a third party who had the right to transfer or disclose it to the *Contractor* free of any obligation of confidence;

		.3 the *Contractor* can demonstrate to have been rightfully known to or in the possession of the *Contractor* at the time of disclosure, free of any obligation of confidence; or .4 is independently developed by the *Contractor* without use of any *Confidential Information*."
	Construction Schedule	Add the following definition: "**Construction Schedule** *Construction Schedule* means the schedule for the performance of the *Work* provided by the *Contractor*, and approved by the *Owner*, pursuant to GC 3.4.1, including any amendments to the *Construction Schedule* made pursuant to the *Contract Documents*."
	Construction Schedule Update	Add the following definition: "**Construction Schedule Update** *Construction Schedule Update* means an update to the *Construction Schedule* by the *Contractor* using Microsoft Project (or other approved scheduling software) that accurately depicts the progress of the *Work* relative to the critical path established in the *Construction Schedule* approved in GC 3.5.1 (or any approved successor *Construction Schedule*), aligns with the currently approved date for *Substantial Performance of the Work*, 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 *Work* relative to the last *Construction Schedule Update,* and includes the following minimum deliverables: (a) a record version of the updated *Construction Schedule* in .pdf format; (b) an editable copy of the updated original digital file of the *Construction Schedule* (*e.g.*, .mpp format files for Microsoft Project)."
	Deficiency Holdback	Add 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	Add the following definition: "**Direct Costs** *Direct Costs* 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	Add the following definition: "**EFT** *EFT* has the definition given to it under GC 5.3.2."

	Excess Soil	Add the following definition: "**Excess Soil** *Excess Soil* means "excess soil" as that term is defined under section 3 of the *Excess Soil Regulation*."
	Excess Soil Regulation	Add the following Definition: "**Excess Soil Regulation** *Excess Soil Regulation* means O. Reg. 406/19: On-Site and Excess Soil Management to the *Environmental Protection Act,* R.S.O. 1990, c. E.19."
	Final Pre-Invoice Submission Meeting	Add the following ne definition: "**Final Pre-Invoice Submission Meeting** *Final Pre-Invoice Submission Meeting* has the meaning given to it in GC 5.5.1."
	Force Majeure	Add the following definition: "**Force Majeure** *Force Majeure* means 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 licences, 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)."
	Install	Add the following definition: "**Install** *Install* means install and connect. *Install* has this meaning whether or not the first letter is capitalized."
	Labour Dispute	Add the following definition: "**Labour Dispute** *Labour Dispute* 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 *Work*."
	Notice of Non-Payment	Add the following definition:

		"**Notice of Non-Payment** *Notice of Non-Payment* means a notice of non-payment of holdback (Form 6) or a notice of non-payment (Form 1.1) under the *Act*, as applicable to the circumstances."
	OHSA	Add the following definition: "**OHSA** *OHSA* means the *Occupational Health and Safety Act*, R.S.O. 1990, c. O.1, as amended, including all regulations thereto."
	Overhead	Add the following definition: "**Overhead** *Overhead* 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 *Place of the Work*; 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	Add the following definition: "**Payment Period** *Payment Period* has the definition given to it under GC 5.2.1."
	Pre-Invoice Submission Meeting	Add the following definition: "**Pre-Invoice Submission Meeting** *Pre-Invoice Submission Meeting* has the definition given to it under GC 5.2.1."
	Proper Invoice	Add the following definition: "**Proper Invoice** *Proper Invoice* means a "proper invoice" as that term is defined in Section 6.1 of the *Act*, including the minimum requirements set out in Appendix "1" of the Supplementary Conditions."
	Proper Invoice Submission Date	Add the following definition: "**Proper Invoice Submission Date** *Proper Invoice Submission Date* has the definition given to it under GC 5.2.2.1."
	Request for Information (RFI)	Add the following definition: "**Request for Information (RFI)** *Request for Information* or *RFI* means written documentation sent by the *Contractor* to the *Owner* or to the *Owner's* representative or the *Consultant* requesting written clarification(s) and/or interpretation(s) of the *Drawings* and/or *Specifications*, *Contract* requirements and/or other pertinent information required to complete the *Work* of the *Contract* without applying for a change or changes to the *Work*."

	Restricted Period	Add the following definition: "**Restricted Period** *Restricted Period* 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 *Contract*."

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	Delete GC 1.1.3 in its entirety and replace it with the following: "1.1.3 The *Contractor* shall review the *Contract Documents* and shall report promptly to the *Consultant* any error, inconsistency, or omission the *Contractor* may discover. Such review by the *Contractor* 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 *Contractor* does not assume any responsibility to the *Owner* or to the *Consultant* for the accuracy of the *Contract Documents*. Provided it has exercised the degree of care and skill described in this GC 1.1.3, the *Contractor* shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the *Contract Documents*, which the *Contractor* could not reasonably have discovered through the exercise of the required standard of care."
SC5.2	1.1.4	Delete GC 1.1.4 in its entirety and replace 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 *Contractor* is not responsible for errors, omissions or inconsistencies in the *Contract Documents*. If there are errors, omissions or inconsistencies discovered by or made known to the *Contractor* as part of its review under GC 1.1.3 or at any time during the performance of the *Work*, the *Contractor* shall immediately notify the *Consultant*, and request instructions, a *Supplemental Instruction*, *Change Order*, or *Change Directive*, as the case may require, and shall not proceed with the *Work* affected until the *Contractor* has received corrected or additional information from the *Consultant*. The *Contractor* shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the *Contract Documents*, which the *Contractor* could not reasonably have discovered through the exercise of care and skill described in GC 3.13."
	1.1.5.1	Delete GC 1.1.5.1 and replace 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 *Specifications*

		.6 technical *Specifications;* .7 material and finishing schedules; and .8 the *Drawings*.
	1.1.5.5	Delete GC 1.1.5.5 and replace with the following: ".5 Noted materials and annotations on the *Drawings* shall govern over the graphic representation of the *Drawings.*"
	1.1.5.6 to 1.1.5.8	Add 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 *Drawings.* .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 *Consultant* or its sub-*Consultants* are to remain with each of the applicable drawing disciplines. .8 Should reference standards contained in the *Specifications* conflict with the *Specifications*, the *Specifications* shall govern. Should reference standards and *Specifications* conflict with each other or if certain requirements of the *Specifications* conflict with other requirements of the *Specifications*, the more stringent requirements shall govern."
	1.1.9	Add the following to the end of GC 1.1.9: "The *Specifications* 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 *Contract Documents* will be construed to place responsibility on the *Owner* or the *Consultant* to settle disputes among the *Subcontractors* and *Suppliers* with respect to such divisions. The *Drawings* are, in part, diagrammatic and are intended to convey the scope of the *Work* and indicate general and appropriate locations, arrangements and sizes of fixtures, equipment, outlets and other elements. The *Contractor* shall obtain more accurate information about the locations, arrangements and sizes from study and coordination of the *Drawings,* including *Shop Drawings* and shall become familiar with conditions and spaces affecting those matters before proceeding with the *Work.* Where site conditions require reasonable minor changes where the change requires only the additional labour two hours or less, the *Contractor* shall make such changes at no additional cost to the *Owner.* Similarly, where known conditions or existing conditions interfere with new installation and require relocation, the *Contractor* shall include such relocation in the *Work.* The *Contractor* 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 *Contract Documents*, wherever located and whenever issued, which compile information of similar content and may consist of drawings, tables and/or lists."
	1.1.13	Add new paragraphs 1.1.13 as follows: 1.1.13 The *Contractor* shall keep one copy of the current *Contract Documents*, *Supplemental Instructions*, contemplated *Change Orders*, *Change Orders*, *Change Directives*, cash allowance disbursement authorizations, reviewed *Shop Drawings*, submittals, reports and records of meeting at the *Place of the Work*, in good order and available to the *Owner* and *Consultant*."

GC 1.3 RIGHTS AND REMEDIES

SC6.1	1.3.2	In paragraph 1.3.2 delete the word "No" from the beginning of the paragraph and replace 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	Add new GC 1.5 – EXAMINATION OF DOCUMENTS AND SITE as follows: "**GC 1.5 EXAMINATION OF DOCUMENTS AND SITE** 1.5.1 The *Contractor* declares and represents that in tendering for the *Work*, and in entering into a Contract with the *Owner* for the performance of the *Work*, it has investigated for itself the character of the *Work t*o be done, based on information generally available from a visit to the *Place of the Work* 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 *Contract Price* all reasonably known impacts and restrictions arising from the COVID-19 pandemic, including without limitation corresponding legislative changes that may impact performance of the *Project*, various weather conditions that may affect the *Work*, the availability of supplies and labour or other conditions or risks that the *Contractor* knew about or reasonably ought to have known about prior to the date of the *Contract.* The *Contractor* has assumed and does hereby assume all risk of known conditions now existing or arising in the course of the *Work* which might or could make the Work, or any items thereof more expensive in character, more onerous to fulfill than was contemplated or known when the tender was made or the *Contract* signed. 1.5.2 The *Contractor* also declares that prior to commencement of the *Work*, where in tendering for the *Work* and in entering into this *Contract*, the *Contractor* relied upon information furnished by the *Owner* or any of its agents or servants respecting the nature or confirmation of the ground at the site of the Work, the Contractor shall review to the standard specified in GC 3.14.1, the accuracy of the information furnished by the *Owner*. If a condition is materially different than what is stated in the information furnished by the *Owner*, the *Contractor* shall, no later than five (5) *Working Days* after the first observation of such condition(s), deliver to the *Owner* and to the *Consultant* a *Notice in Writing* specifying the materially different condition and the *Contractor* shall not proceed with the affected part of the Work until receiving written direction from the *Owner* or the *Consultant*. Where the *Contractor* fails to provide prompt *Notice in Writing* in accordance with this GC 1.5.2, the *Contractor* expressly waives and releases the *Owner* from all claims with respect to the said information with respect to the *Work*.

PART 2 ADMINISTRATION OF THE CONTRACT

GC 2.2 ROLE OF THE CONSULTANT

SC11.1	2.2.5	Delete paragraph 2.2.4 and replace it with the following: "2.2.4 Upon receipt of an application for payment that satisfies the requirement of a *Proper Invoice*, based on the *Consultant's* observations and evaluation of the *Contractor's* application for payment, the *Consultant* will determine the amounts owing to the *Contractor* under the *Contract* 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 *Consultant* determines that the amount payable to the *Contractor* differs from the amount stated in a *Proper*

		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."
	2.2.6	In the first sentence of paragraph 2.2.6, delete the words "Except with respect to GC 5.1 – FINANCING INFORMATION REQUIRED OF THE OWNER".
	2.2.12	At paragraph 2.2.12, insert 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	Amend paragraph 2.3.2 by adding the words "and *Owner*" after the words "*Consultant*" in the second and third lines.
	2.3.3	Delete paragraph 2.3.3 in its entirety and replace 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 add 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*", add "or the *Owner*".
	2.3.8	Add 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	Amend 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	Add 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	Delete paragraph 2.4.2 in its entirety and replace it with the following: "2.4.2 The *Contractor* shall promptly pay the *Owner* for costs incurred by the *Owner*, the *Owner's* own forces or the *Owner's* other contractors, for work destroyed or damaged or any alterations necessitated by the *Contractor's* removal, replacement or re-execution of defective work."
	2.4.4	Add new paragraph 2.4.4 as follows: "2.4.4 Neither acceptance of the *Work* by the *Consultant* or the *Owner*, nor any failure by the *Consultant* or the *Owner* to identify, observe or warn of defective *Work* or any deficiency in the *Work* shall relieve the *Contractor* from the sole responsibility for rectifying such defect or deficiency at the *Contractor's* 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 inserting the words "Construction Schedule" after the word "sequences".
SC12.2	3.1.3 & 3.1.4	Add new paragraphs 3.1.3 and 3.1.4 as follows: "3.1.3 Prior to commencing individual procurement, fabrication and construction activities, the *Contractor* shall verify at the *Place of the Work*, all relevant measurements and levels necessary for proper and complete fabrication, assembly and installation of the *Work* and shall further carefully compare such field measurements and conditions with the requirements of the *Contract Documents*. Where dimensions are not included or exact locations are not apparent, the *Contractor* shall immediately notify the *Consultant* in writing and obtain written instructions from the *Consultant* before proceedings with any part of the affected *Work*. 3.1.4 Notwithstanding the provisions of paragraphs 3.1.1 and 3.1.2, the *Owner* 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 *Contractor* to fulfill its contractual obligations."

GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

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

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 *Consultant*".

GC 3.4 CONSTRUCTION SCHEDULE

SC17.1	3.4.1	Delete GC 3.4.1 in its entirety and replace it with the following: "3.4.1 The *Contractor* shall: 1 within five (5) calendar days of receiving written confirmation of the award of the *Contract*, prepare and submit to the *Owner* and the *Consultant* for their review and approval, a construction schedule in the format indicated below that indicates the timing of the activities of the *Work* and provides sufficient detail of the critical events and their inter-relationship to demonstrate the *Work* will be performed in conformity with the *Contract Time* and in accordance with the *Contract Documents.* Such schedule is to include a delivery schedule for *Products* whose delivery is critical to the schedule for the *Work* or are required by the *Contract* to be included in a *Products* delivery schedule. The *Contractor* shall employ construction scheduling software, being the latest version of "Microsoft Project"*,* that permits the progress of the *Work* to be monitored in relation to the critical path established in the schedule. The *Contractor* 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 *Owner* and the *Consultant*, the construction schedule submitted by the *Contractor* 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 *Construction Schedule* or revised construction schedule accepted by the *Owner* pursuant to GC 3.4 CONSTRUCTION SCHEDULE, which includes without limitation, the *Contractor*'s use of all possible and, if necessary, extraordinary measures, to bring the progress of the *Work* into compliance with the *Construction Schedule*, such as (i) increasing the presence of its own forces at the *Place of the Work*; (ii) directing any *Subcontractors* or *Suppliers* to increase their labour forces and equipment; (iii) working overtime and extra shifts; and (iv) providing any additional supervision and coordination of the *Project*, all at the *Contractor's* 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 *Work* on a weekly basis relative to the baseline *Construction Schedule*, or any revised *Construction Schedule* accepted by the *Owner* pursuant to GC 3.4 CONSTRUCTION SCHEDULE, deliver a *Construction Schedule Update* to the *Consultant* and *Owner* with each application for payment, at a minimum, or as may be reasonably required by the *Consultant* and advise the *Consultant* and the *Owner* 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 *Contractor* forms the opinion that the slippage in schedule reported in paragraph 3.4.1.3

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

GC 3.5 SUPERVISION

SC17.1	3.5.1	Delete GC 3.5.1 and replace it with the following: "3.5.1 The *Contractor* shall employ a competent full-time superintendent, acceptable to the *Owner* and *Consultant*, who shall be in full time attendance at the *Place of the Work* while the *Work* is being performed. The superintendent shall not be changed by the *Contractor* without valid reason which shall be provided in writing and shall not be changed without prior consultation with and agreement by the Owner and the *Consultant*. The *Contractor* shall replace the superintendent within 7 *Working Days* of the *Owner's* written notification, if the superintendent's performance is not acceptable to the *Owner*. The *Contractor* shall provide the *Owner* and the *Consultant* 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	Delete GC 3.5.2 and replace it with the following: "3.5.2 The superintendent, and any project manager appointed by the *Contractor*, shall represent the *Contractor* at the *Place of the Work* and shall have full authority to act on written instructions given by the *Consultant* and/or the *Owner*. Instructions given to the

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

GC 3.6 SUBCONTRACTORS AND SUPPLIERS

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

		3.6.8 The *Consultant* or the *Owner*, acting reasonably, may from time to time require the *Contractor* to remove from the *Project* any personnel of the *Contractor*, including project managers, superintendents or *Subcontractors*. Such persons shall be replaced by the *Contractor* in a timely fashion to the satisfaction of the *Consultant* or the *Owner*, as the case may be, at no cost to the *Owner*. 3.6.9 Where provided in the *Contract*, the *Owner* may assign to the *Contractor*, and the *Contractor* agrees to accept, any contract procured by the *Owner* for *Work* or services required on the *Project* that has been pre-tendered or pre-negotiated by the *Owner*, and upon such assignment, the *Owner* shall have no further liability to any party for such contract. 3.6.10 The *Contractor* covenants that each subcontract or supply contract which the *Contractor* enters into for the purpose of performing the *Work* shall expressly provide for the assignment thereof to the *Owner* (at the option of the *Owner*) and the assumption by the *Owner* of the obligations of the *Contractor* thereunder, upon the termination of the *Contract* and upon written notice by the *Owner* to the other parties to such subcontracts or supply contracts, without the imposition of further terms or conditions; provided, however, that until the *Owner* has given such notice, nothing herein contained shall be deemed to create any contractual or other liability upon the *Owner* for the performance of obligations under such subcontracts or supply contracts and the *Contractor* 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	Amend paragraph 3.7.1 by adding the words, "…, agents, *Subcontractors* and *Suppliers*…" after the word "employees" in the first line.
SC19.2	3.7.2	Delete paragraph 3.7.2 and substitute with the following: "3.7.2 *Products* 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 *Place of the Work*, unless otherwise specified. *Products* which are not specified shall be of a quality consistent with those specified and their use acceptable to the *Consultant*. *Products* brought on to the *Place of the Work* by the *Contractor* shall be deemed to be the property of the *Owner*, but the *Owner* shall be under no liability for loss thereof or damage thereto arising from any cause whatsoever. The said *Products* shall be at the sole risk of the *Contractor*. Workmanship shall be, in every respect, first class and the *Work* shall be performed in accordance with the best modern industry practice."
	3.7.4 to 3.7.8	Add 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 *Notice in Writing* from the *Owner,* the *Contractor* shall immediately remove from the *Place of the Work*, tradesmen and labourers or anyone whose conduct jeopardizes the safety of the *Owner's* operations or who are considered by the *Owner* or the *Consultant* to be unskilled or otherwise objectionable. Immediately upon receipt of the request, the *Contractor* shall make arrangements to appoint an acceptable replacement.

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

GC 3.8 SHOP DRAWINGS

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

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

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

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

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

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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 *Contractor* shall perform the cutting and remedial work required to make the affected parts of the *Work* come together properly. Such cutting and remedial work shall be performed by specialists familiar with the *Products* affected and shall be performed in a manner to neither damage nor endanger the *Work*. 3.10.2 The *Contractor* shall coordinate the *Work* to ensure all cutting and remedial work required is kept to a minimum. 3.10.3 Unless specifically stated otherwise in the *Specifications*, the *Contractor* shall do all cutting and making good necessary for the proper installation and performance of the *Work.* 3.10.4 To avoid unnecessary cutting, the *Contractor* shall lay out its work and advise the *Subcontractors,* 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 *Contractor* shall maintain the *Work* in a safe and tidy condition and free from the accumulation of waste products and debris, other than that caused by the *Owner*, other contractors or their employees. The *Contractor* shall remove accumulated waste and debris at least once a week as a minimum or as required by the nature of the *Work*. 3.11.2 Before applying for *Substantial Performance of the Work*, the *Contractor* shall remove waste products and debris, other than that resulting from the work of the *Owner*, other contractors or their employees, and shall leave the *Place of the Work* clean and suitable for use or occupancy by the *Owner*. The *Contractor* shall remove products, tools, materials, *Construction Equipment,* and *Temporary Work* not required for the performance of the remaining work.

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

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

SC25.1	GC 3.12	Add new GC 3.12 – EXCESS SOIL MANAGEMENT as follows: "**GC 3.12 EXCESS SOIL MANAGEMENT** 3.12.1 The *Contractor* shall be solely responsible for the proper management of all *Excess Soil* at the *Place of the Work* and for performance of the *Work* in compliance with the rules, regulations and practices required by the *Excess Soil Regulation* until such time as *Ready-for-Takeover* is achieved. Without restricting the generality of the previous sentence, the *Contractor*'s responsibility under this GC 3.12 includes the designation, transportation, tracking, temporary and/or final placement, record keeping, and reporting of all *Excess Soil* in connection with the Work all in compliance with the *Excess Soil Regulation*. 3.12.3 The *Contractor* shall indemnify and save harmless the *Owner*, 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 *Contractor*, or those for whom it is responsible at law, under the *Excess Soil Regulation*, 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 *Owner* is not covered by insurance."

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

SC25.1	3.13	Add 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 *Contract*, the *Contractor* 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 *Contractor* acknowledges and agrees that throughout the *Contract,* the performance of the *Contractor's* obligations, duties and responsibilities shall be interpreted in accordance with this standard. The *Contractor* shall exercise the same standard of care, skill and diligence in respect of any *Products*, personnel or procedures which it may recommend to the *Owner* or employ on the *Project*. 3.13.2 The *Contractor* further represents, covenants and warrants to the *Owner* that: .1 the personnel it assigns to the *Project* are appropriately experienced; .2 it has a sufficient staff of qualified and competent personnel to replace any of its appointed representatives, subject to the *Owner's* 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 *Contractor* to perform its work under the *Contract*."

PART 4 ALLOWANCES

GC 4.1 CASH ALLOWANCES

SC27.1	4.1.3	In GC 4.1.3 delete the words "through the *Consultant*" and replace them with "in writing."
	4.1.4	Delete GC 4.1.4 in its entirety and replace it with the following: "4.1.4 Where the actual cost of the *Work* under any cash allowance exceeds the amount of the allowance, any unexpended amounts from other cash allowances shall be reallocated, by the *Consultant* at the *Owner*'s direction, to cover the shortfall, and, in that case, there shall be no additional amount added to the *Contract Price* for overhead and profit. Only where the actual cost of the *Work* under all cash allowances exceeds the total amount of all cash allowances shall the *Contractor* be compensated for the excess incurred and substantiated, plus an amount for overhead and profit on the excess only, as set out in the *Contract Documents.*"
	4.1.7	Delete GC 4.1.7 in its entirety and replace 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 *Contract Price* by *Change Order* without any adjustment for the *Contractor's* overhead and profit on such amount."
	4.1.8 and 4.1.9	Add new GC 4.1.8 and 4.1.9 as follows: "4.1.8 The *Owner* reserves the right to call, or to have the *Contractor* call, for competitive bids for portions of the *Work* to be paid for from cash allowances. 4.1.9 Cash allowances cover the net cost to the *Contractor* of services, *Products*, *Construction Equipment*, freight, unloading, handling, storage, installation, provincial sales tax, and other authorized expenses incurred in performing any *Work* stipulated under the cash allowances but does not include any *Value Added Taxes* payable by the *Owner* and the *Contractor."*

PART 5 PAYMENT

GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

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

GC 5.2 APPLICATIONS FOR PAYMENT

SC29.1	5.2.1	Delete GC 5.2.1 and replace it with the following: "5.2.1 Upon execution of the *Contract*, and in any event prior to the *Contractor* submitting its first application for payment, the *Owner* shall issue a purchase order to the *Contractor* for the performance of the *Contract*. 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 *Contract* (each a "**Payment Period**"). Within 3 calendar days of the end of each *Payment Period*, the *Contractor* will submit a draft application for payment to the *Owner* and the *Consultant*. Upon receipt of the draft application for payment, and within 7 calendar days, a representative of each of the *Contractor*, *Owner*, and the *Consultant* shall attend a meeting to discuss and review the work completed during the *Payment Period*, including quantities, if applicable (the "**Pre-Invoice Submission Meeting**"). In the event that the scheduled date for the *Pre-Invoice Submission Meeting* is not a *Working Day*, the *Pre-Invoice Submission Meeting* shall occur on the next *Working Day*. The *Contractor* shall bring with it to the *Pre-Invoice Submission Meeting* the following: .1 a copy of the draft application for payment; .2 any documents the *Contractor* is required to bring to the *Pre-Invoice Submission Meeting* as stipulated in the *Contract Documents* or as reasonably requested by the *Owner*; and

		.3 any other documents reasonably requested, in advance, by the *Owner* or the *Consultant*."
SC29.2	5.2.2	Delete GC 5.2.2 in its entirety and replace 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 *Pre-Invoice Submission Meeting*, the *Contractor* shall deliver its application for payment to the *Owner* and to the *Consultant* for *Work* performed during the *Payment Period* ("**Proper Invoice Submission Date**") subject to the following: .1 If the fifth calendar day following the *Pre-Invoice Submission Meeting*, to which an invoice relates falls on a day that is not a *Working Day*, the *Proper Invoice Submission Date* shall be deemed to fall on the next *Working Day*. .2 The application for payment must be delivered to the *Owner* and to the *Consultant* in the same manner as a *Notice in Writing* during the hours of 9:00 am to 4:00pm (EST) on the *Proper Invoice Submission Date*. Delivery to the *Owner* 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 *Proper Invoice Submission Date*, the application for payment will not be considered or reviewed by the *Owner* and *Consultant* until the next *Proper Invoice Submission Date.* Notwithstanding the foregoing, the *Owner* in its sole and absolute discretion may elect to accept an application for payment submitted after 4:00 p.m. on the applicable *Proper Invoice Submission Date*; however, such acceptance shall not be construed as a waiver of any of its rights or waive or release the *Contractor*'s 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 *Owner* prior to the *Proper Invoice Submission Date*. .5 All applications for payment shall include all of the requirements for a *Proper Invoice* prescribed by the *Construction Act* and this *Contract* and be dated the last day of the applicable *Payment Period*;"
SC29.3	5.2.3	Delete GC 5.2.3 and replace it with the following: "5.2.3 The amount claimed shall be for the value, proportionate to the amount of the *Contract*, of *Work* performed and *Products* delivered and incorporated into the *Work* as of the last date of the applicable *Payment Period*. Materials may also be deemed to be supplied to an improvement, for payment purposes, when, in the *Owner's* opinion, they are placed and properly secured on the land on which the improvement is made, or placed upon land designated by the *Owner* or agent of the *Owner*, 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 *Products* delivered to the *Place of the Work* unless the *Products* are free and clear of all security interests, liens, and other claims of third parties."
SC29.4	5.2.4	After the word "*Consultant*" in GC 5.2.4 add the words "and the *Owner*"
SC29.5	5.2.5	After the word "*Consultant*" in GC 5.2.5 add the words "or the *Owner*".
SC29.6	5.2.9	Add new 5.2.9 as follows: "5.2.9 The *Contractor* shall prepare and maintain current as-built drawings which shall consist of the *Drawings* and *Specifications* revised by the *Contractor* during the *Work*, showing changes to the *Drawings* and *Specifications*, which current as-built drawings shall be maintained by the *Contractor* and made available to the *Consultant* for review with each application for progress payment. The *Consultant* shall recommend to the *Owner* that the *Owner* 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	Delete GC 5.3.1 in its entirety, including all subparagraphs thereunder, and replace it with the following: "5.3.1 After receipt by the *Owner* and the *Consultant* of an application for payment submitted by the *Contractor* in accordance with GC 5.2 - APPLICATIONS FOR PAYMENT: .1 the *Consultant* will either: (a) issue to the *Owner* with a copy to the *Contractor*, a progress payment certificate in the amount applied for by the *Contractor* in the *Proper Invoice*, or (b) issue to the *Owner*, with a copy to the *Contractor*, a certificate for payment for an amount determined by the *Consultant* to be properly due to the *Contractor* after applying any credits, withheld amounts, or other set-offs which the *Consultant* has determined that the *Owner* is entitled to notwithstanding any notice of dispute or disagreement that the *Contractor* may have served, along with the *Consultant's* reasons why an amount other than what is claimed in the *Proper Invoice* is properly due to the *Contractor*, which finding the *Owner* may accept or amend prior to the *Owner* issuing a *Notice of Non-Payment*, if any, in accordance with GC 5.3.2; .2 the *Owner* shall make payment to the *Contractor* 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 *Owner's Notice of Non-Payment* issued pursuant to GC 5.3.3,

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

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

GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK- AND PAYMENT OF HOLDBACK

SC32.1	GC 5.4	Delete GC 5.4 – SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK in its entirety and replace it with the following: "**GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK** 5.4.1 When the *Contractor* considers that *Substantial Performance of the Work* has been achieved, the *Contractor* shall prepare and submit to the *Consultant* and the *Owner* a comprehensive deficiency list of items to be completed or corrected, including any incomplete *Close-Out Documentation*, and apply for a review by the *Consultant* and the *Owner* to establish *Substantial Performance of the Work*. Failure to include an item on the list does not alter the responsibility of the *Contractor* to complete the *Contract*. 5.4.2 Prior to, or as part of its written application for *Substantial Performance of the Work* the *Contractor* shall submit to the *Consultant* submit to the *Consultant* all closeout documentation required by the *Contract Documents*, 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 *Specifications*; .9 *Shop Drawings*; .10 coordination drawings; .11 testing and balancing results and reports; .12 *Commissioning* and quality assurance documentation; .13 distribution system diagrams;

		.14 spare parts; .15 samples; .16 existing reports and correspondence from authorities having jurisdiction in the *Place of the Work*; .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 *Contract.* 5.4.3 The *Consultant* will review the *Work* to verify the validity of the application and shall promptly, and in any event, no later than 30 calendar days after receipt of the *Contractor's* complete deficiency list and application: .1 prepare a final deficiency list incorporating all items to be completed or corrected, including any incomplete or unsubmitted *Close-Out Documentation*. 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 *Consultant's* draft verification and shall be reviewed with the *Owner* prior to the *Consultant* 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 *Consultant* shall advise the *Contractor* in writing that the *Work* or the designated portion of the *Work* is not substantially performed and give reasons why, or (b) the *Consultant* shall state the date of *Substantial Performance of the Work* in a certificate and issue a copy of that certificate to each the *Owner* and the *Contractor.* 5.4.4 Following the issuance of the certificate of *Substantial Performance of the Work* referenced in subparagraph 5.4.3.2(b): .1 The Contractor shall publish, in a construction trade newspaper in the area of the location of the Work, a copy of the certificate of S*ubstantial Performance of the Work* referred to in GC 5.4.2.2(b) within seven (7) calendar days of receiving a copy of the certificate signed by the *Consultant*, and the *Contractor* shall provide suitable evidence of the publication to the *Consultant* and the *Owner*. If the Contractor fails to publish such notice, the Owner shall be at liberty to publish said certificate and back-charge the Contractor its reasonable costs for doing so; .2 The *Contractor* shall complete the *Work* within forty (40) calendar days of the date certified as the date of *Substantial Performance of the Work*; .3 Notwithstanding any other provisions of the *Contract,* no payments will be processed between *Substantial Performance of the Work* and *Ready-for-Takeover*; .4 The *Owner* reserves the right to contract out any or all unfinished *Work* if it has not been completed within forty (40) days of *Substantial Performance of the Work* 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 *Owner* of completing the *Work* including *Owner* and *Consultant* wages and materials shall be deducted from the *Contract Price.* 5.4.5 After publication of the certificate of the *Substantial Performance of the Work*, and provided that the *Contractor* has completed performance of the *Work* within the 40 calendar days following certification of *Substantial Performance of the Work*, the *Contractor* may submit an application for payment of the outstanding *Construction Act* 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 *Contractor* has not received any written notices of lien or any claims for liens from any *Subcontractor* or *Supplier*. 5.4.6 The *Construction Act* holdback amount shall become due and payable the day immediately following the expiration of the holdback period prescribed by the *Construction Act* (in most cases being the 61st calendar day following the publication of the certificate of *Substantial Performance of the Work* 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 *Project* that has not been satisfied, discharged or otherwise provided for in accordance with the *Construction Act*; .2 receipt by the *Owner* of a written notice of lien that has not been satisfied, discharged or otherwise provided for in accordance with the *Construction Act*; or .3 prior to the expiry of 40 calendar days following the publication of the certificate of *Substantial Performance of the Work,* the *Owner* publishes a *Notice of Non-Payment* of holdback in accordance with the *Construction Act* (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 *Work*. 5.4.7 Notwithstanding the *Owner's* obligation to make payment of the holdback amount in accordance with GC 5.4.6, the processing of such payment remains subject to the *Owner's* internal *EFT* timing limitations. The *Owner* covenants, and the *Contractor* agrees, that payment of the holdback shall be made by *EFT* at the first opportunity during the *Owner's* normal processing of *EFTs* upon the holdback becoming due in accordance with GC 5.4.6..

GC 5.5 FINAL PAYMENT

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

to the requirement in GC 5.2.1 (the "***Final Pre-Invoice Submission Meeting***"), the *Contractor* may submit an application for final payment to the *Owner* and to the *Consultant*, 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 *Consultant* or written confirmation from the *Owner* that the deficiencies or incomplete *Work* waived by the *Owner* pursuant to GC 12.1.2 have been fully rectified as of the date of the *Contractor's* application for final payment, and/or (b) written confirmation, signed by the *Owner* and the *Contractor,* that the *Contract Price* has been reduced by a specified amount in exchange for the *Owner* releasing the *Contractor* of its obligation to rectify the certain outstanding deficiencies and/or incomplete *Work* waived by the *Owner* pursuant to GC 12.1.2, as detailed in such written confirmation.

5.5.2 No later than 5 calendar days prior to the *Final Pre-Invoice Submission Meeting*, the *Contractor* will, if not already provided, submit to the *Consultant* all *Close-Out Documentation*.

5.5.3 Delivery of all *Close-Out Documentation* is a requirement for the *Proper Invoice* for final payment.

5.5.4 After receipt by the *Owner* and the *Consultant* of an application for payment submitted by the *Contractor* that is a *Proper Invoice* and by no later than 10 calendar days after the receipt of the *Proper Invoice*:

.1 the *Consultant* will either:

(a) issue to the *Owner* with a copy to the *Contractor*, a progress payment certificate in the amount applied for by the *Contractor* in the *Proper Invoice*, or

(b) deliver a finding to the *Owner* with reasons why an amount other than what is claimed in the *Proper Invoice* is properly due to the *Contractor*, which finding the *Owner* may accept or amend prior to issuing a *Notice of Non-Payment* (Form 1.1), if any, in accordance with GC 5.5.2;

.2 the *Owner* shall make payment to the *Contractor* 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 *Owner's Notice of Non-Payment* issued pursuant to GC 5.5.5,

on the 28th calendar day after receipt of a *Proper Invoice*, unless such 28th calendar day lands on a day that is other than a *Working Day*, in which case payment shall be made on the next *Working Day* after such 28th day.

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

GC 5.6 DEFERRED WORK

SC33.1	5.6.1	Delete paragraph 5.6.1 and replace with the following: "5.6.1 If because of conditions reasonably beyond the control of the *Contractor*, there are items of work that cannot be performed, payment in full for that portion of the *Work* which has been performed as certified by the *Consultant* shall not be withheld or delayed by the *Owner* on account thereof, but the *Owner* may withhold, subject to its requirement to issue a *Notice of Non-Payment* under the *Construction Act*, until the remaining portion of the *Work* is finished, only such an amount that the *Consultant* 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	Add new GC 5.8 – DEFICIENCY HOLDBACK as follows: "**GC 5.8 DEFICIENCY HOLDBACK** 5.8.1 Notwithstanding any provisions contained in the *Contract Documents* concerning certification and release of monies to the *Contractor*, the *Owner* reserves the right to retain a *Deficiency Holdback*, In addition to the Construction Act holdback. The *Deficiency*

		Holdback in the value of 2% shall be applied against the total Contract value and shall be applied to each progress payment. The *Deficiency Holdback* 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 *Close-Out Documentation* not submitted in advance of or as part of the *Contractor's* application for *Substantial Performance of the Work*, 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 *Close-Out Documentation*, as determined by the *Consultant*, until such time as the applicable *Close-Out Documentation* 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 *Place of the Work* issued in accordance with the *Construction Act*, and less any amounts disputed under an *Owner*'s *Notice of Non-Payment* (Form 1.1)."

PART 6 CHANGES IN THE WORK

GC 6.1 OWNER'S RIGHT TO MAKE CHANGES

SC37.1	6.1.2	Add 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 *Contract Price* and/or *Contract Time* 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 *Work* and no claims that the *Owner* has been unjustly enriched by any alteration or addition to the *Work*, whether in fact there is any such unjust enrichment or not, shall be the basis of a claim for additional payment under this *Contract,* an increase to the *Contract Price*, or a claim for any extension of the *Contract Time*."
	6.1.3 to 6.1.8	Add 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 *Subcontractor and Supplier* coordination are included in the *Contract Price* and the *Contractor* shall be precluded from making any claim for a change in the *Contract Price* as a result of such changes. 6.1.4 Labour costs shall be actual, prevailing rates at the *Place of the Work* paid to workers, plus statutory charges on labour including WSIB, unemployment insurance, Canada pension,

		vacation pay, hospitalization and medical insurance. The *Contractor* shall provide these rates, when requested by the *Consultant*, for review and/or agreement. 6.1.5 Quotations for changes to the *Work* shall only include *Direct Costs* and be accompanied by itemized breakdowns together with detailed, substantiating quotations or cost vouchers from *Subcontractors* and *Suppliers,* submitted in a format acceptable to the *Consultant* and shall include any *Direct Costs* associated with extensions in *Contract Time.* 6.1.6 When both additions and deletions covering related *Work* or substitutions are involved in a change to the *Work*, payment, including *Overhead* and profit, shall be calculated on the basis of the net difference, if any, with respect to that change in the *Work*. 6.1.7 Changes to the contract shall be quoted to permit the work to be executed within the *Contract Time* unless approved by the *Consultant* and the *Owner.* 6.1.8 No extension to the *Contract Time* shall be granted for changes in the *Work* unless the *Contractor* can clearly demonstrate that such changes significantly alter the overall construction schedule submitted at the commencement of the *Work.* Extensions of *Contract Time* and all associated costs, if approved, shall be included in the relevant *Change Order.* 6.1.9 When a change in the *Work* is proposed or required, the *Contractor* shall within 10 calendar days submit to the *Consultant* for review a claim for a change in *Contract Price* and/or *Contract Time.* Should 10 calendar days be insufficient to prepare the submission, the *Contractor* shall within 5 calendar days, advise the *Consultant* 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 *Contract Time* and the *Contract Price* shall include an adjustment, if any, for delay or for the impact that the change in the *Work* has on the *Work* of the *Contractor*, and once such adjustment is made, the *Contractor* shall be precluded from making any further claims for delay or impact with respect to the change in the *Work.*"
	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 *Consultant*: .1 by estimate and acceptance of a lump sum; .2 by negotiated unit prices which include the *Contractor's* overhead and profit, or;

		.3 by the actual *Direct Cost* to the *Owner,* 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 *Direct Costs* 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 *Subcontractor* quotations submitted listing items 1 to 4 above and item 6 below. .6 mark-up. 6.2.5 The *Owner* and the *Consultant* will not be responsible for delays to the *Work* resulting from late, incomplete or inadequately broken-down valuations submitted by the *Contractor.*"

GC 6.3 CHANGE DIRECTIVE

SC39.1	6.3.6.1	Amend 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	Delete paragraph 6.3.6.2 and replace it with the following: ".2 If a change in the *Work* results in a net decrease in the *Contract Price*, the amount of the credit shall be the net cost, without deduction for *Overhead* or profit."
	6.3.7.1(4)	Delete GC 6.3.7.1(4).
	6.3.7.7	Amend GC 6.3.7.7 by deleting the words "described in paragraph 6.3.7.1" and replacing them with "approved by the *Owner* in writing and in advance of any such expenses being incurred;"
	6.3.7.9	Amend GC 6.3.7.9 by adding the following to the end of the paragraph: "…when specifically requested by the *Owner* or as directed by the *Consultant*;".

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

GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

SC40.1	6.4.1	Delete paragraph 6.4.1 in its entirety and replace 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 *Contractor* will be considered by the *Owner* or the *Consultant* in connection with conditions which could reasonably have been ascertained by such investigation or other due diligence undertaken prior to the execution of the *Contract*.
	6.4.2	Amend paragraph 6.4.2 by adding a new first sentence as follows: "Having regard to paragraph 6.4.1, if the *Contractor* believes that the conditions of the *Place of the Work* differ materially from those reasonably anticipated, differ materially from those indicated in the *Contract Documents* and were concealed from discovery notwithstanding the conduct of the investigation described in paragraph 6.4.1, it shall provide the *Owner* and the *Consultant* with *Notice in Writing* no later than five (5) *Working Days* after the first observation of such conditions." -and- amend the existing second sentence of paragraph 6.4.2 in the second line, following the word "materially" by adding the words "or were concealed from discovery notwithstanding the conduct of the investigation described in paragraph 6.4.1,".
	6.4.3	Delete paragraph 6.4.3 in its entirety and substitute the following:

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

GC 6.5 DELAYS

SC41.1	6.5.1	In paragraph 6.5.1 delete the words after the word "for" in the fourth line and replace them with the words "…reasonable *Direct Costs* 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	Delete GC 6.5.2 in its entirety and replace it with the following: "6.5.2 If the *Contractor* is delayed in the performance of the *Work* 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 *Owner*, *Other Contractor(s)*, or the *Consultant*, and relating to the *Work* or the *Place of the Work*, then the *Contract Time* shall be extended for such reasonable time as the *Consultant* may determine. The *Contractor* shall be reimbursed by the *Owner* for reasonable *Direct Costs* 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	Delete paragraph 6.5.3 in its entirety and replace with the following: "6.5.3 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 *Contractor* 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 *Contract Time* attributable to the *Force Majeure* event, the *Owner* and the *Contractor* 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 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 *Force Majeure*."

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

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, delete the words "and if the *Consultant* has given a written statement to the *Owner* and *Contractor* which provides the detail of such neglect to perform the *Work* properly or such failure to comply with the requirements of the *Contract* to a substantial degree".
SC43.2	7.1.3.4	Add 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 *Consultant* and the *Owner* wherein the default can be corrected within the balance of the *Contract Time* and shall not cause delay to any other aspect of the *Work* or the work of other contractors, and in no event shall it be deemed to give a right to extend the *Contract Time*."
	7.1.4.1	Delete subparagraph 7.1.4.1 and replace it with the following: ".1 correct such default and deduct the cost, including *Owner's* expenses, thereof from any payment then or thereafter due the *Contractor*."
	7.1.4.2	Delete subparagraph 7.1.4.2 and replace it with the following: ".2 by providing *Notice in Writing* to the *Contractor*, terminate the *Contractor's* right to continue with the *Work* in whole or in part or terminate the *Contract*, and publish a notice of termination (Form 8) in accordance with the *Act*."
	7.1.5.3	In subparagraph 7.1.5.3 delete the words: "however, if such cost of finishing the *Work* is less than the unpaid balance of the *Contract Price*, the *Owner* shall pay the *Contractor* the difference"
	7.1.6 to 7.1.10	Delete GC 7.1.6 and replace 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 *Contract* set out herein, the *Owner* may terminate this *Contract* at any time for any other reason and without cause upon giving the *Contractor* fifteen (15) *Working Days Notice in Writing* to that effect. In such event, the *Contractor* shall be entitled to be paid for all *Work* performed including reasonable profit, for loss sustained upon *Products* and *Construction Equipment*, and such other damages as the *Contractor* may have sustained as a result of the termination of the *Contract*, but in no event shall the *Contractor* be entitled to be compensated for any loss of profit on unperformed portions of the *Work*, or indirect, special, or consequential damages incurred. 7.1.7 The *Owner* may suspend *Work* under this *Contract* at any time for any reason and without cause upon giving the *Contractor Notice in Writing* to that effect. In such event, the *Contractor* shall be entitled to be paid for all *Work* 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 *Products* and *Construction Equipment*, and such other damages as the *Contractor* may have sustained as a result of the suspension of the *Work*, but in no event shall the *Contractor* 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 *Contract* 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 *Contract* or a suspension of the *Work* 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 *Contractor* shall use its best commercial efforts to mitigate the financial consequences to the *Owner* arising out of the termination or suspension, as the case may be.

		7.1.9 Upon the resumption of the *Work* 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 *Contractor* will endeavour to minimize the delay and financial consequences arising out of the suspension. 7.1.10 The *Contractor's* obligations under the *Contract* as to quality, correction, and warranty of the *Work* performed by the *Contractor* up to the time of termination or suspension shall continue after such termination of the *Contract* or suspension of the *Work*."

GC 7.2 CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT

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

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

PART 8 DISPUTE RESOLUTION

GC 8.1 AUTHORITY OF THE CONSULTANT

SC45.1	8.1.3	Delete paragraph 8.1.3 in its entirety and substitute as follows: "8.1.3 If a dispute is not resolved promptly, the *Consultant* will give such instruction as in the *Consultant's* opinion are necessary for the proper performance of the *Work* 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	Add 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 *Contractor* has given an undertaking, in accordance with the *Act*, to refer a dispute to *Adjudication*, prior to delivering a notice of *Adjudication* in a form prescribed by the *Act*, the parties agree to first address all disputes with at least one in-person meeting with the *Owner's* representative, the *Consultant's* representative, and the *Contractor's* 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 *Adjudication* proceedings as required by, and in accordance with, the *Construction Act*. 8.2.4 The following procedures shall apply to any *Adjudication* the parties engage in under the *Construction Act*:

.1 any hearings shall be held at a venue within the jurisdiction of the *Place of the Work* or such other venue as the parties may agree and which is acceptable to the adjudicator;

.2 the *Adjudication* shall be conducted in English;

.3 each party may be represented by counsel throughout an *Adjudication*;

.4 there shall not be any oral communications with respect to issues in dispute that are the subject of an *Adjudication* 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 *Adjudication* are confidential and the parties shall not use such documents or information for any purpose other than the *Adjudication* 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 *Contractor* fails to comply with any of the notice requirements set out in the *Contract*, 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 *Contractor* shall have no entitlement whatsoever (including to an increase in the *Contract Price*, or an extension of *Contract Time*) in the context of an *Adjudication* under the *Construction Act* and waives the right to make any such claims or disputes in an *Adjudication*. This GC 8.2.6 shall operate conclusively as an estoppel and bar in the event such claims or disputes are brought in an *Adjudication* and the *Owner* 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 *Owner* to withhold, deduct or retain from monies otherwise owed to the *Contractor* under the *Contract* may be referred to, and included as part of, *Adjudications* under the *Construction Act*;

.2 that disputes related to the termination or abandonment of the *Contract*, as well as any disputes that arise or are advanced following the termination or abandonment of the *Contract*, shall not be referred to *Adjudication* under the *Construction Act*;

.3 that notice(s) of *Adjudication,* with respect to any dispute or claim relating to the *Project,* shall not be given, and no *Adjudication* shall be commenced following *Contract* completion, *Contract* abandonment, or termination of the *Contract*;

.4 that any *Adjudication* between the *Contractor* and a *Subcontractor* or a supplier that relates to an *Adjudication* between the *Owner* and the *Contractor* shall be

		joined together to be adjudicated by a single adjudicator, provided that the adjudicator agrees to do so, and the *Contractor* 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 *Contractor* is obliged to commence an *Adjudication* pursuant to an undertaking under the *Construction Act,* neither the *Owner* nor the *Contractor* shall commence an *Adjudication* during the *Restricted Period*. 8.2.8 The parties acknowledge and agree that no *Adjudication*, arbitration, action, suit or other proceeding may be brought by the *Contractor* against the *Owner* in respect of a claim for an increase to the *Contract Price* as set out in GC 6.6, before the *Consultant* 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 *Proper Invoice* shall not include any amounts pertaining to the *Contractor's* claim for an increase in *Contract Price* unless and until the *Consultant* has issued a written notice to the *Contractor* 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 *Contractor* from commencing an *Adjudicatio*n where, pursuant to the *Construction Act*, the *Contractor* is required to give an undertaking to a *Subcontractor* to commence an *Adjudication* following delivery of a *Notice of Non-Payment*."

GC 8.3 NEGOTIATION, MEDIATION AND ARBITRATION

SC46.1	8.3.1	Amend paragraph 8.3.1 by changing part of the second line from "shall appoint a *Project Mediator*" to "may appoint a *Project Mediator,* except that such an appointment shall only be made if both the *Owner* and the *Contractor* agree."
	8.3.4	Amend paragraph 8.3.4 by changing part of the second line from "the parties shall request the *Project Mediator"* to "and subject to paragraph 8.3.1 the parties may request the *Project Mediator".*
	8.3.6 to 8.3.9	Delete paragraphs 8.3.6, 8.3.7 and 8.3.8 in their entirety and replace 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 *Contractor* and the *Owner* agree. If the *Contractor* and the *Owner* agree to resolve the dispute by arbitration, the arbitration shall be conducted in the jurisdiction of the *Place of the Work*. 8.3.7 Prior to delivering a notice of *Adjudication* in a form prescribed by the *Act*, the parties agree to first address all disputes by attending at least one meeting with the *Owner*'s representative, the *Consultant*'s representative, and the *Contractor*'s representative, prior to commencing an *Adjudication*. 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 *Adjudication* shall provide the other party with 5 *Working Days' Notice in Writing* of its intention to issue a notice of *Adjudication*. 8.3.8 Other than where the *Contractor* is obliged to commence an *Adjudication* pursuant to an undertaking under the *Construction Act*, neither the *Owner* nor the *Contractor* shall commence an *Adjudication* during the *Restricted Period*. 8.3.9 Where either party has delivered a notice of *Adjudication* in a form prescribed by the *Act*, the procedures and rules set out under the *Construction Act* and the regulations thereto shall govern the *Adjudication*."

PART 9 PROTECTION OF PERSONS AND PROPERTY

GC 9.1 PROTECTION OF WORK AND PROPERTY

SC47.1	9.1.1.1	Delete subparagraph 9.1.1.1 in its entirety and substitute the following: ".1 errors in the *Contract Documents* which the *Contractor* could not have discovered applying the standard of care described in paragraph 3.14.1;"
	9.1.2	Delete paragraph 9.1.2 in its entirety and substitute as follows: "9.1.2 Before commencing any *Work*, the *Contractor* shall determine the locations of all underground or hidden utilities and structures indicated in or inferable from the *Contract Documents*, or that are inferable from an inspection of the *Place of the Work* exercising the degree of care and skill described in paragraph 3.14.1."
	9.1.5	Add 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 *Contractor* 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 *Contractor*, without first consulting the *Owner* and receiving written instructions as to the course of action to be followed from either the *Owner* or the *Consultant*. Where, however, there is danger to life, the environment, or public safety, the *Contractor* 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 inserting the following to the end of the paragraph: "For the purposes of GC 9.2 – TOXIC AND HAZARDOUS SUBSTANCES, *Excess Soil* 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	Amend GC 9.2.6 by adding the following words after the word "responsible" in the second line: "or whether any toxic or hazardous substances or materials already at the *Place of the Work* (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the *Contractor* or anyone for whom the *Contractor* 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 *Owner* or others,".

	9.2.8	Amend GC 9.2.8 by adding the following words after the word "responsible" in the second line: "or whether any toxic or hazardous substances or materials already at the *Place of the Work* (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the *Contractor* or anyone for whom the *Contractor* 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 *Owner* or others,".
	9.2.10	Add new paragraph 9.2.10 as follows: "9.2.10 The *Contractor*, *Subcontractors* and *Suppliers* shall not bring on to the *Place of the Work* any toxic or hazardous substances and materials except as required in order to perform the *Work*. 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 *Place of the Work*."

GC 9.4 CONSTRUCTION SAFETY

SC49.1	9.4.1	Delete GC 9.4.1 in its entirety and replace it with the following: "9.4.1 The *Contractor* shall be solely responsible for construction safety at the *Place of the Work* and for compliance with the rules, regulations, and practices required by the *OHSA*, 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 *Work*. The *Contractor*'s health and safety program documentation shall be made available for review by the *Owner* or *Consultant* immediately upon request. Without limiting the foregoing, the *Contractor* shall be solely responsible for construction safety in respect of the *Consultant*, *Subcontractors* and *Suppliers*, the *Owner's* own forces, *Other Contractors*, and all persons attending the *Place of the Work* during the course of the *Project*."
	9.4.2	Amend GC 9.4.2 by adding the following words after "and the *Contractor*": ", *Subcontractors* and *Suppliers*".
	9.4.3	Amend GC 9.4.3 by adding the following words after "and the *Contractor*": ", *Subcontractors* and *Suppliers*".
	9.4.4	Delete GC 9.4.4 and replace it with the following:

		"9.4.4 The *Owner* 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 *Contractor* with respect to occupational health and safety and related matters."
	9.4.5	Delete GC 9.4.5 in its entirety and replace it with the following: "9.4.5 Prior to the commencement of the *Work*, the *Contractor* shall submit to the *Owner*: .1 a current WSIB clearance certificate; .2 copies of the *Contractor*'s insurance policies having application to the *Project* or certificates of insurance, at the option of the *Owner*; .3 documentation setting out the *Contractor*'s in-house safety programs; .4 a copy of the Notice of Project filed with the Ministry of Labour naming itself as "constructor" under the *OHSA*; 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 *Place of the Work*;"
	9.4.6 to 9.4.12	Add 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 *Contractor* shall indemnify and save harmless the *Owner*, 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 *Contractor* under *OHSA* and any other occupational health and safety legislation in force at the *Place of the Work* including the payment of legal fees and disbursements on a solicitor and client basis. Such indemnity shall apply to the extent to which the *Owner* is not covered by insurance. 9.4.7 If the *Owner* is of the reasonable opinion that the *Contractor* has not taken such precautions as are necessary to ensure compliance with the requirements of paragraph 9.4.1, the *Owner* may take any remedial measures which it deems necessary, including stopping the performance of all or any portion of the *Work,* and the *Owner* may use its employees, the *Contractor*, any *Subcontractor* or any other contractors to perform such remedial measures. 9.4.8 The *Contractor* shall file any notices or any similar document required pursuant to the *Contract* or the safety regulations in force at the *Place of the Work*. This duty of the *Contractor* will be considered to be included in the *Work* and no separate payment therefore will be made to the *Contractor*. 9.4.9 Unless otherwise provided in the *Contract Documents*, the *Contractor* shall develop, maintain and supervise for the duration of the *Work* 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 *Owner* and any workers' compensation or occupational health and safety statutes or regulations in force at the *Place of the Work*.

		9.4.10 The *Contractor* shall provide a copy of the safety program described in GC 9.4.9 hereof to the *Consultant* for delivery to the *Owner* prior to the commencement of the *Work*, and shall, ensure, as far as it is reasonably practical to do so, that every employer and worker performing work in respect of the *Project* complies with such program. 9.4.11 The *Contractor* 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 *Place of the Work*, 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 *Contractor* shall promptly report in writing to the *Owner* and the *Consultant* all accidents of any sort arising out of or in connection with the performance of the *Work*, 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 *Contractor* to the *Owner* and the *Consultant* 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	Amend paragraph 10.1.2 by adding the following sentence to the end of the paragraph: "For greater certainty, the *Contractor* shall not be entitled to any mark-up for overhead or profit on any increase in such taxes and duties and the *Owner* shall not be entitled to any credit relating to mark-up for overhead or profit on any decrease in such taxes. The *Contractor* shall provide a detailed breakdown of Additional taxes if requested by the *Owner* in a form satisfactory to the *Owner*."
	10.1.3	Add new paragraph 10.1.3 as follows: "10.1.3 Where the *Owner* is entitled to an exemption or a recovery of sales taxes, customs duties, excise taxes or *Value Added Taxes* applicable to the *Contract*, the *Contractor* shall, at the request of the *Owner*, 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 *Owner*. The *Contractor* agrees to endorse over to the *Owner* 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	Amend paragraph 10.2.5 by adding the words "Subject to paragraph 3.4" at the beginning of the paragraph. -and- Add the following to the end of the second sentence:

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

GC 10.4 WORKERS' COMPENSATION

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

GC 11.1 INSURANCE

SC53.1	11.1	Delete entirety of GC 11.1 and replace with the following: "**GC 11.1 INSURANCE** 11.1.1 Without restricting the generality of GC 12 – INDEMNIFICATION, the *Contractor* 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 *Work* until the expiration of the warranty periods set out in the *Contract Documents*. Prior to commencement of the *Work* and upon the placement, renewal, amendment, or extension of all or any part of the insurance, the *Contractor* shall promptly provide the *Owner* 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 amending endorsements. .1 **General Liability Insurance**

		General liability insurance shall be in the name of the *Contractor,* with the *Owner* and the *Consultant* named as Additional 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, *Subcontractors* and/or agents. The insurance coverage shall not be less than the insurance required by IBC Form 2100, or its equivalent replacement, 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 *Ready-for-Takeover*, as set out in the certificate of *Ready-for-Takeover,* on an ongoing basis for a period of 6 years following *Ready-for-Takeover*. Where the *Contractor* maintains a single, blanket policy, the Addition of the *Owner* and the *Consultant* is limited to liability arising out of the *Project* and all operations necessary or incidental thereto. 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. .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 *owned* or leased by the *Contractor*, 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 *Contractor* shall provide the *Owner* with confirmation of automobile insurance coverage for all automobiles registered in the name of the *Contractor.* .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 *Contractor* with the *Owner* and the *Consultant* named as Additional 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 *Work*, whether owned by the *Contractor* or the owner or owned by others, so long as the property forms part of the *Work*. 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 replacement provided that the IBC Form 4042 shall include the latest Addition 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 *Contractor*, with the *Owner* and the *Consultant* named as Additional insureds, for not less than the replacement value of the boilers, pressure vessels and other insurable objects forming part of the *Work*. 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 *Work.*

(4) The policies shall provide that, in the case of a loss or damage, payment shall be made to the *Owner* and the *Contractor* as their respective interests may appear. The *Contractor* shall act on behalf of the *Owner* 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 *Contractor* shall proceed to restore the *Work*. Loss or damage shall not affect the rights and obligations of either party under the *Contract* except that the *Contractor* shall be entitled to such reasonable extension of the *Contract Time,* relative to the extent of the loss or damage, as determined by the *Owner*, in its sole discretion.

(5) The *Contractor* shall be entitled to receive from the *Owner*, in Addition to the amount due under the *Contract*, the amount at which the *Owner's* interest in restoration of the *Work* has been appraised, such amount to be paid as the restoration of the *Work* proceeds and as provided in GC 5.2 – APPLICATIONS FOR PROGRESS PAYMENT and GC 5.3 – PROGRESS PAYMENT. In Addition, the *Contractor* shall be entitled to receive from the payments made by the insurer the amount of the *Contractor's* interest in the restoration of the *Work*.

(6) In the case of loss or damage to the *Work* arising from the work of other contractors, or the *Owner's* own forces, the *Owner*, in accordance with the *Owner's* obligations under paragraph 3.2.2.4 of GC 3.2 – CONSTRUCTION BY OWNER OR OTHER CONTRACTORS, shall pay the *Contractor* the cost of restoring the *Work* as the restoration of the *Work* 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 *Contractor* for the performance of the *Work*, excluding boiler insurance, shall be in a form acceptable to the *Owner* and shall not allow subrogation claims by the insurer against the *Owner.* The policies shall be endorsed to provide the *Owner* with not less than 30 days' notice, in writing, in advance of cancellation, change or amendment restricting coverage. Subject to satisfactory proof of financial capability by the *Contractor* for self-insurance of his equipment, the *Owner* agrees to waive the equipment insurance requirement.

11.1.2 The *Contractor* shall be responsible for deductible amounts under the policies except where such amounts may be excluded from the *Contractor's* 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 *Work* is substantially less than the *Contract Price*, the *Owner* may reduce the amount of insurance required to waive the course of construction insurance requirement. 11.1.4 If the *Contractor* fails to provide or maintain insurance as required by the *Contract Documents*, then the *Owner* shall have the right to provide and maintain such insurance and provide evidence of same to the *Contractor*. The *Contractor* shall pay the costs thereof to the *Owner* on demand, or the *Owner* may deduct the amount that is due or may become due to the *Contractor*. 11.1.5 All required insurance policies shall be with insurers licensed to underwrite insurance in the jurisdiction of the *Place of the Work*."

***NEW* GC 11.2 CONTRACT SECURITY**

SC52.1	GC 11.2	Add new GC 11.2 – CONTRACT SECURITY as follows: "**GC 11.2 CONTRACT SECURITY** 11.2.1 The *Contractor* shall, prior to the execution of the *Contract*, 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 *Owner* and is permitted under the *Construction Act*, .2 be issued by an insurer licensed under the *Insurance Act* (Ontario) and authorized to transact a business of suretyship in the Province of Ontario; .3 shall be in the form prescribed by the *Construction Act*; .4 have a coverage limit of at least 50 per cent of the *Contract Price*, or such other percentage of the *Contract Price* as stated in the *Contract Documents*; .5 extends protection to *Subcontractors*, *Suppliers,* and any other persons supplying labour or materials to the *Project*; and .6 shall be maintained in good standing until the fulfillment of the *Contract*, including all warranty and maintenance periods set out in the *Contract Documents*.. 11.2.3 It is the intention of the parties that the performance bond shall be applicable to all of the *Contractor's* obligations in the *Contract Document* and, wherever a performance bond is provided with language which conflicts with this intention, it shall be deemed to be amended to comply. The *Contractor* represents and warrants to the *Owner* that it has provided its surety with a copy of the *Contract Documents* 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 *Owner* for and against costs and expenses (including legal and *Consultant* services and court costs) arising out of or as a consequence of any default of the *Contractor* under this *Contract*. 11.2.4 The *Contractor* shall be responsible for notifying the surety company of any changes made to the *Contract* during the course of construction.

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

PART 12 OWNER TAKEOVER

GC 12.1 READY-FOR-TAKEOVER

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

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

GC 12.2 EARLY OCCUPANCY

SC56.1	GC 12.2	Delete GC 12.2 – EARLY OCCUPANCY BY THE OWNER in its entirety, including all subparagraphs thereunder and replace 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	Delete from the first line of paragraph 12.3.1 the words "one year" and replace it with the words "two years" Delete from the first line of paragraph 12.3.2 the word "The" and replace it with the words "Subject to GC 1.1.3, the…"
	12.3.7 to 12.3.12	Add new paragraphs 12.3.7 to 12.3.12 as follows: "12.3.7 Where required by the *Contract Documents*, the *Contractor* shall provide a maintenance bond as security for the performance of the *Contractor's* obligations as set out in GC 12.3 WARRANTY. 12.3.8 The *Contractor* shall provide fully and properly completed and signed copies of all warranties and guarantees required by the *Contract Documents*, containing: .1 the proper name of the *Owner*; .2 the proper name and address of the *Project*; .3 the date the warranty commences, which shall be at the "*Ready-for-Takeover*" unless otherwise agreed upon by the *Consultant* in writing. .4 a clear definition of what is being warranted and/or guaranteed as required by the *Contract Documents*; and .5 the signature and seal (if required by the governing law of the *Contract*) of the company issuing the warranty, countersigned by the *Contractor*. 12.3.9 Should any *Work* 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 *Contractor* shall ensure that its *Subcontractors* are bound to the requirements of GC 12.3 – WARRANTY for the *Subcontractor's* portion of the *Work.* 12.3.11 The *Contractor* shall ensure that all warranties, guarantees or other obligations for *Work*, services or *Products* performed or supplied by any *Subcontractor, Supplier* or other person in connection with the *Work* are obtained and available for the direct benefit of the *Owner.* In the alternative, the *Contractor* shall assign to the *Owner* all warranties, guarantees or other obligations for *Work*, services or *Products* performed or supplied by any *Subcontractor, Supplier* or other person in connection with the *Work* 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 *Owner* under the *Contract Documents*. 12.3.12 The *Contractor* shall commence or correct any deficiency within 2 *Working Days* after receiving a *Notice in Writing* from the *Owner* or the *Consultant*, and shall complete the *Work* 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 *Owner* 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 *Contractor* fail to provide this emergency service within 8 hours of a request being made during the

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

PART 13 INDEMNIFICATION AND WAIVER

GC 13.1 INDEMNIFICATION

SC58.1	GC 13.1	Delete GC 13.1 – INDEMNIFICATION in its entirety and replace it with the following: "13.1.1 The *Contractor* shall indemnify and hold harmless the *Owner*, its parent, subsidiaries and affiliates, their respective partners, trustees, officers, directors, agents and employees and the *Consultant* 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 *Owner* 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 *Contractor*, its employees, agents, *Subcontractors*, *Suppliers* 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 *Work*, the *Owner's* property or equipment, the *Contractor's* property or equipment or equipment or property adjacent to the *Place of the Work* or death or injury to the *Contractor's* personnel). 13.1.2 The *Owner* shall indemnify and hold the *Contractor*, its agents and employees harmless from and against claims, demands, losses, costs, damages, actions, suits or proceedings arising out of the *Contractor*'s performance of the *Contract* which are attributable to a lack of or defect in title or an alleged lack of or defect in title to the *Place of the Work*. 13.1.3 The provisions of GC 13.1 - INDEMNIFICATION shall survive the termination of the *Contract,* 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 *Work* 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" add the words "claims for delay pursuant to GC 6.5 DELAYS" -and- add the words "(collectively "**Claims**")" after "*Ready-for-Takeover*" 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	Delete 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 delete the words “in paragraphs 13.2.1.2 and 13.2.1.3” and replace 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	Delete paragraph 13.2.3 in its entirety.
	13.2.4	Delete paragraph 13.2.4 in its entirety.
	13.2.5	Delete 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 *Contractor* -and- change the word “claim” to “Claim” in all instances in the paragraph.
	13.2.9	In paragraph 13.2.9 delete the words “under paragraphs 13.2.1 or 13.2.3” and replace them with “under paragraph 13.2.1” -and- change both instances of the words “the party” to “the *Contractor*”. Change the word “claim” to “Claim” in all instances in the paragraph.

***NEW* PART 14 OTHER PROVISIONS**

SC58.1	14.1	Add 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 *Place of the Work* at the time of execution of the *Contract* shall remain the property of the *Owner*. All *Work* and *Products* delivered to the *Place of the Work* by the *Contractor* shall be the property of the *Owner.* The *Contractor* shall remove all surplus or rejected materials as its property when notified in writing to do so by the *Consultant*."
	14.2	Add new GC 14.2 – CONSTRUCTION LIENS as follows: **"GC 14.2 LIENS** 14.2.1 Notwithstanding any other provision in the *Contract*, the *Consultant* shall not be obligated to issue a certificate, and the *Owner* shall not be obligated to make payment, subject to the *Owner*'s requirement to issue a *Notice of Non-Payment* (Form 1.1) to the *Contractor*, if at the time such certificate or payment was otherwise due: .1 a claim for lien has been registered against the *Project* lands by a *Subcontractor* or a *Supplier* that has not been vacated or discharged by the *Contractor* in accordance with the requirements of this *Contract*, or .2 if the *Owner* or a mortgagee of the *Project* lands has received a written notice of a lien that has not been resolved by the *Contractor* through the posting of security or otherwise. 14.2.2 In the event a construction lien arising from the performance of the *Work* is registered or preserved against the *Project* lands by a *Subcontractor* or a *Supplier*, or a written notice of a lien is given or a construction lien action is commenced against the *Owner* by a *Subcontractor* or a *Supplier*, then the *Contractor* 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 *Place of the Work*). If the lien is merely vacated, the *Contractor* shall, if requested, undertake the *Owner*'s defence of any subsequent action commenced in respect of the lien, at the *Contractor*'s 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 *Owner* against all costs and expenses arising from same, including legal costs on a full indemnity basis. 14.2.3 In the event that the *Contractor* fails or refuses to comply with its obligations pursuant to paragraph 14.2.2, the *Owner* 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 *Owner's* 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 *Project* lands, and in so doing will be entitled to a full indemnity from the *Contractor* for all legal fees, security,

			disbursements and other costs incurred and will be entitled to deduct same from amounts otherwise owing to the *Contractor*.
		14.2.4	In the event that any *Subcontractor* or *Supplier* registers any claim for lien with respect to all or part of the *Place of Work*, the *Owner* 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 *Act*, by paying into court as security the amount withheld.
		14.2.5	Nothing in this GC 14.2 serves to preclude the *Contractor* from preserving and perfecting its lien in the event of non-payment by the *Owner*."

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	Designated Substance Removal. (Additional removal not already identified in the ACM Summary report)	$10,000.00
2	Independent Testing & Inspection (soil, concrete, mortar, structural steel, air barrier, paving, painting) (As directed by the Consultant)	$10,000.00
4	Signage	$5,000.00
5	Door Hardware (Supply only. Installation in base bid)	$10,000.00
7	Data, PA ad telephone equipment	$10,000.00
8	A/V Equipment (Supply and install. Rough-ins in base bid)	$25,000.00
9	Mechanical equipment storage	$10,000.00

Total of All Allowances:	**$80,000.00**

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 Wok 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

Waterloo Region District School Board

Appendix - 013517-A

Facility Services

CONTRACTOR HOT WORK PERMIT

STOP!
Avoid hot work or seek an alternative method if possible.

This hot work permit is required for any temporary operation involving open flames or producing heat and/or sparks.
This includes but is not limited to: brazing, cutting, grinding, soldering, torch-applied roofing and welding.
A SEPARATE PERMIT IS REQUIRED FOR EACH AREA

Board Supervisor/ Manager/Proj. Coordinator Responsibilities:
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

Contractor Responsibilities:
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

PART 1

Section A Indicate Precautions Taken

- ☐ Available sprinklers, hose streams, and extinguishers available and in service

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

Hot work on walls, ceiling or roofs

- ☐ 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

Hot work on enclosed equipment

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

Fire watch/hot work and monitoring

- ☐ 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 alarm
- ☐ 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

Board Supervisor/Manager/Proj. Coordinator: _____
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

School:

Room/Area: _____

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 4200 Hot Works/Fire Watch (Copies Available on Request)

I:\Facility Srv\Controller\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 – Hazardous Materials

.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 Hazardous Materials

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 – Hazardous Materials

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 MTE Consultants Inc. 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 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.

.3 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 involved with the Board. It applies to Type 1, Type 2 and Type 3 Operations as stated in the Regulations and applies to emergency and non-emergency work (directly retained or working as a sub-contractor).

.2 Asbestos Abatement Contractors must maintain appropriate insurance coverage and WISB certification.

.3 Contractors retained for asbestos abatement work shall use personnel certified by the Ontario College of Trades and must provide the Consultant and Board with proof of asbestos certification (AAS and AAW) for all supervisors / all staff involved.

.4 School Access

.1 During school hours all asbestos contractors are to report to the school office upon arrival. After school hours, ensure card-in / card-out procedures are followed and building security is maintained.

.5 Communication

.1 Establish communication contact list with email and phone numbers that shall include:

.1 Principal / Vice Principal

.2 Area Facility Manager

.3 Head Custodian

.4 Environmental Officer

.5 Manager of Mechanical, Electrical and Environmental Services

.6 Manager of Health Safety & Security

.7 Contractor staff

.8 Consultant

.2 Contact the School Principal / Vice to set up a firm date for the abatement (removal / repair). Schedule to allow at least 72 hours notice ahead of the work.

.3 Confirm the date by notifying via email the following:

.1 Principal / Vice-principal,

.2 Area Facility Manager, and

.3 Environmental Officer.

.4 Consultant

.4 Indicate the date, the start time, the anticipated completion time for the work and the work areas in the school.

.5 Identify personnel managing the project and provide current cell numbers for emergency contacts.

.6 For emergency work, as requested by Area Supervisors, Facility Managers or Environmental Officer, no notification to the school is required.

.7 Additionally, for Type 3 work also contact:

.1 Manager of Health, Safety & Security, and

.2 Notify the MOL (also for Type 2) where required by regulation.

.3 Consultant

.8 Discussions with other groups, school staff, media and others is discouraged and shall be directed to the Board Communication Officer where warranted.

.6 Asbestos Operations

.1 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 anxiety of staff/school community. Where warranted, contact Area Supervisor, Facility Manager or Environmental Officer to obtain further direction.

.2 For non-emergency work, contractor is to assess the work on site and provide a cost estimate to the Environmental Officer, (daniela_budure@wrdsb.on.ca) and Consultant. Some work will require discussion with the Facility Manager or Environmental Officer to assess if additional work should be done as to completely remove all ACM material form the area or similar.

.3 Where the MTE report shows ACM requiring repair, remove and re-insulate where required.

.4 Before beginning any Type 1, Type 2 or Type 3 Operations, the work area must be secured, doors closed, warning signs added to all entrances, caution tape used in open areas and signs used to restrict access to the work area so as to keep persons not involved in the work from entering in the work area.

.5 Provide “Construction” warning signs on solid barriers between the Work and public areas. Install a sufficient number of “asbestos abatement” warning signs behind the barriers, posted to warn of the hazard, and that access to the work area is restricted to persons wearing protective clothing and equipment.

.6 The contactor is responsible to disable the mechanical ventilation serving the work area and positively prevent operation using Lock-out / Tag-out devices for each air handling unit /fan. Exercise caution during heating season to ensure areas of the building are maintained above freezing and ensure equipment is turned back on after abatement / air clearance completed.

.7 Contractor’s employees shall put on / take off PPE within work area marked by construction signs. No employee shall leave the work area wearing PPE.

.8 All dust and waste is to be cleaned up and removed at frequent / regular intervals as the work proceeds and immediately upon completion. No waste bags or similar are to be left behind.

1.5. SUBMITTALS

.1 Once the abatement is completed, forward a Letter of Completion to the Environmental Officer, (daniela_budure@wrdsb.on.ca). This letter shall be

received no later than 72 hours after completion and shall include any sample results.

.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 contactor must allow one additional day to re-clean and re-sample before school is to resume operations. For those projects not under the direct supervision of a Environmental Consultant, the contactor 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,

.2 Facility Manager,

.3 Environmental Officer,

.4 Manager of Mechanical, Electrical and Environmental Services, and

.5 Manager of Health, Safety & Security.

.6 Consultant

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

This report is provided for tender purposes and must be viewed in colour and in its entirety. An original copy is available at the school office along with annual inspection and abatement letters, if applicable.

Glenview Park Secondary School

2023 Asbestos Audit Update Report

Project Location:
55 McKay Street, Cambridge, ON

Prepared for:
Waterloo Region District School Board
51 Ardelt Avenue, Kitchener, ON

Prepared by:
MTE Consultants
520 Bingemans Centre Drive
Kitchener, ON N2B 3X9

January 23, 2023

MTE File No.: C34532-941

Engineers, Scientists, Surveyors.

MTE Consultants
520 Bingemans Centre Drive, Kitchener, Ontario N2B 3X9

January 23, 2023

MTE File No.: C34532-941

Waterloo Region District School Board
51 Ardelt Avenue
Kitchener, ON N2C 2R5

RE: 2023 Asbestos Audit Update – Glenview Park Secondary School
55 McKay Street, Cambridge, Ontario

1.0 Introduction

MTE Consultants Inc. (MTE) was authorized by the Waterloo Region District School Board (WRDSB) to conduct the 2023 Asbestos Audit Update for the subject building.

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.

The audit was conducted in accordance with the Ontario Ministry of Labour, *Regulation 278/05-Designated Substance-Asbestos on Construction Projects and in Buildings and Repair Operations* (O. Reg. 278/05). This report shall replace previous audit reports.

2.0 Scope of Work

The Scope of Work for this assessment was completed by MTE and 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 and Assessment Criteria

This inspection was conducted by visual and laboratory identification methods 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. Notwithstanding that reasonable attempts were made to identify all ACMs, the

possibility of concealed material exists and may not become visible until substantial demolition has occurred and therefore are currently undocumented and did not include the following.

- The following rooms:
  - WRDSB Room C102C - Hydro One electrical room and school staff do not have access keys; and
  - WRDSB Room C119E – Not accessible with on keys on site and school staff did not have access keys.
- 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 or determination of quantities;
- Materials that is present in such an inconsistent fashion that without complete removal of finishes, the extent cannot be determined;
- Non-permanent items or personal contents, furnishings; and
- Settled dust or airborne agents unless otherwise stated.

3.1 Condition of ACM

During the audit process the general condition of ACMs were observed and noted. Materials which are damaged can pose an increased exposure risk to workers, building occupants and the public. While assessing damage can be subjective, abatement items were grouped into two categories to aid in remedial prioritization.

Monitor Annually

These are items which display minor isolated damage; however, do not pose an immediate risk to workers from exposure to asbestos fibres due to the current condition of the material and/or location. No remediation is required at this time; however, these items should be monitored on a yearly 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

These are items which display damage and may pose potential risk to workers from exposure to asbestos fibres due to the physical condition and/or location of the material. Clean-up, repair or removal of these materials is required as soon as reasonably possible.

4.0 Findings

An inspection of the building was conducted by MTE on January 16-18, 2023. The two-storey school was constructed in 1956 with additions in 1959, 1972, 2003, and 2004. The inspection did not include areas of post 1990 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 together provide a current summary of the ACM identified throughout the building.

A summary of the damaged ACM identified at the time of the inspection is provided in **Appendix C**.

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

4.1 Analytical Results

During this inspection, no samples were collected.

Refer to Appendix C, Table 3 for a detailed summary of the analytical results for each sampled material.

4.2 Removed ACM

A summary of ACM that has been removed since the previous audit/inspection is provided below:

WRDSB Room B104.

- Vinyl Floor Tile 12” x 12” – Tan with Brown Streak
- Ceiling Tile 2’ x 4’ – Long Fissure Random Pinhole

WRDSB Room C116, C119A, C119C, C115A, C115B.

- Ceiling Tile 2’ x 4’ – Long Fissure Random Pinhole

WRDSB Room B104, B106, and Entry AB11.

- ACM Caulking in Doors

WRDSB Room D118.

- ACM Mastic

WRDSB Room Small Gym HVAC room (M202) and Mechanical Room (M200).

- Approximately 45 Asbestos Containing Pipe Fittings

WRDSB Room Corridor FR#s B811/B812 (ceiling area above/in the area of the wheelchair ramp/stairs).

- Approximately 8 linear feet of ACM Transite Pipe and Associated Insulation

4.3 Discovery of Additional ACM

No additional ACM or suspect ACM was identified.

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.

All asbestos work must be conducted by staff and/or contractors who are trained and experienced in the type of asbestos operations required, and should be overseen by a qualified third party Health, Safety and Environmental professional. In order to conduct Type 3 asbestos operations, contractors must be certified as Asbestos Abatement Workers AAW (Trade code 253W) and Asbestos Abatement Supervisors AAS (Trade code 253S) by The Ministry of Training, Colleges and Universities (Ministry of Advanced Education and Skills Development) as prescribed by Section 20 of O. Reg. 278/05.

5.2 Long Term Management

This audit was conducted for the long term management of ACM within the building. Prior to future construction or renovation projects, additional assessments and/or sampling may be required.

There are no requirements under current legislation to remove ACM from a building simply because it is present. However, O. Reg. 278/05 requires that an Asbestos Management Plan be implemented and maintained. Asbestos awareness training should be provided for staff that may come in contact with ACM during routine duties or in emergency situations.

ACM that will be disturbed, or will likely be disturbed, during building maintenance, renovations, construction, or demolition activities must be handled and disposed of in accordance with the procedures prescribed by O. Reg. 278/05.

ACM may also be present in concealed locations. If any construction, renovation, alteration, or maintenance activities are required or planned, invasive inspections of concealed locations for potential ACM must be performed prior to such activities. Should any suspect ACM be discovered, work should cease and the materials should not be disturbed. Suspect ACM must be treated as asbestos-containing or sampled and proven to not contain asbestos. Any activities that require disturbance of ACM must be performed in accordance with O. Reg. 278/05.

6.0 Limitations

Services performed by **MTE Consultants Inc.** (MTE) were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the Environmental Engineering & Consulting profession. No other representation expressed or implied as to the accuracy of the information, conclusions or recommendations is included or intended in this report.

This report was completed for the sole use of MTE and the Client. It was completed in accordance with the approved Scope of Work referred to in Section 0. As such, this report may not deal with all issues potentially applicable to the site and may omit issues that are or may be of interest to the reader. MTE makes no representation that the present report has dealt with all-important environmental features, except as provided in the Scope of Work. All findings and conclusions presented in this report are based on site conditions, as they existed during the time period of the investigation. This report is not intended to be exhaustive in scope or to imply a risk-free facility.

Any use which a third party makes of this report, or any reliance on, or decisions to be made based upon it, are the responsibility of such third parties. MTE accepts no responsibility for liabilities incurred by or damages, if any, suffered by any third party as a result of decisions made or actions taken, based upon this report. Others with interest in the site should undertake their own investigations and studies to determine how or if the condition affects them or their plans.

It should be recognized that the passage of time might affect the views, conclusions and recommendations (if any) provided in this report because environmental conditions of a property can change. Should additional or new information become available, MTE recommends that it be brought to our attention in order that we may re-assess the contents of this report.

All of which is respectfully submitted,

MTE Consultants Inc.

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Appendix A

Asbestos Management Database

	School Name	Legend:	Notes:
	Glenview Park Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **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: 1956 Addition(s): 1959, 1972, 2003, 2004		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**

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/Additions										
	Original Building (1956)	Structure	Deck	Steel	-	Non ACM	-	-	-	-
	Original Building (1956)	Structure	Deck	Wood	-	Non ACM	-	-	-	-
	Original Building (1956)	Structure	Deck	Concrete	-	Non ACM	-	-	-	-
	Original Building (1956)	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
	Original Building (1956)	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-
	Original Building (1956)	Roof Drains	Piping	Cast Iron	-	Non ACM	-	-	-	-
	Original Building (1956)	Not Inspected	Not Inspected	Roofing Materials	NF	Suspect ACM	VC	-	-	-
	Original Building (1956)	Windows	Interior/Exterior Frames	Grey Sealant	-	Non ACM	SL	S17abc	27-Mar-19	ND
	Original Building (1956)	Doors	Interior Frames	Beige Sealant	NF	ACM	SL	S10abc	27-Mar-19	1% Chrysotile
	Original Building (1956)	Doors	Interior Sidelights	Grey Sealant	-	Non ACM	SL	S11abc	27-Mar-19	ND
	Original Building (1956)	Doors	Exterior Frames	Brown Sealant	NF	ACM	HM	S13	27-Mar-19	1% Chrysotile
	Original Building (1956)	Doors	Exterior Frames	Grey Silicon Sealant	-	Non ACM	-	-	-	-
	Original Building (1956)	Mastic	Mastic	Floor Tile Mastic	NF	ACM	HM	S30	28-Mar-11	1.2% Chrysotile
	Original Building (1956)	Ceiling	Ceiling Tile 1' x 1'	Brown Mastic	-	Non ACM	SL	S01A - 1184	7-Jul-16	ND
	Original Building (1956)	Light Fixtures	Heat Shield	Paper	F	ACM	HM	S01	8-Feb-19	70% Chrysotile
	1959 Addition	Structure	Deck	Steel	-	Non ACM	-	-	-	-
	1959 Addition	Structure	Deck	Concrete	-	Non ACM	-	-	-	-
	1959 Addition	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
	1959 Addition	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-
	1959 Addition	Roof Drains	Piping	Cast Iron	-	Non ACM	-	-	-	-
	1959 Addition	Not Inspected	Not Inspected	Roofing Materials	NF	Suspect ACM	VC	-	-	-
	1959 Addition	Windows	Interior/Exterior Frames	Grey Sealant	NF	ACM	SL	S15abc	27-Mar-19	10% Chrysotile
	1959 Addition	Doors	Interior Frames	White Sealant	NF	ACM	SL	S14abc	27-Mar-19	1% Chrysotile
	1959 Addition	Doors	Exterior Frames	Brown Sealant	NF	ACM	HM	S13	27-Mar-19	1% Chrysotile
	1959 Addition	Mastic	Mastic	Floor Tile Mastic	-	Non ACM	SL	S16abc	27-Mar-19	ND
	1972 Addition	Structure	Deck	Steel	-	Non ACM	-	-	-	-
	1972 Addition	Structure	Deck	Concrete	-	Non ACM	-	-	-	-
	1972 Addition	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
	1972 Addition	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-
	1972 Addition	Roof Drains	Piping	Transite	NF	ACM	VC	-	-	-
	1972 Addition	Not Inspected	Not Inspected	Roofing Materials	NF	Suspect ACM	VC	-	-	-
	1972 Addition	Windows	Interior Frames	Brown Sealant	NF	ACM	HM	S12	27-Mar-19	1% Chrysotile

	School Name	Legend:	Notes:
	Glenview Park Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **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: 1956		
	Addition(s): 1959, 1972, 2003, 2004		

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
	1972 Addition	Windows	Exterior Frames	Brown Sealant	NF	ACM	HM	S13	27-Mar-19	1% Chrysotile
	1972 Addition	Doors	Interior Frames	Brown Sealant	NF	ACM	SL	S12abc	27-Mar-19	1% Chrysotile
	1972 Addition	Doors	Exterior Frames	Brown Sealant	NF	ACM	SL	S13abc	27-Mar-19	1% Chrysotile
	1972 Addition	Mastic	Mastic	Floor Tile Mastic	NF	ACM	HM	S15	15-Oct-90	1.3% Chrysotile
	1972 Addition	Ceiling	Ceiling Tile 1' x 1'	Brown Mastic	-	Non ACM	HM	S01	7-Jul-16	ND
Basement										
A01	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
A01	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
A01	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
A01	Storage	Ceiling	Metal Pan	Steel	-	Non ACM	-	-	-	-
A03	Storage	Floor	Carpet	-	-	Non ACM	-	-	-	-
A03	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
A03	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
A03	Storage	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.324 - 002	15-Oct-90	50-75% Chrysotile
A03	Storage	Piping	Pipe Insulation	Air Cell	F	ACM	SL	1680.324 - 009	15-Oct-90	75% Chrysotile
A04	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
A04	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
A04	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
A04	Storage	Ceiling	Metal Pan	Steel	-	Non ACM	-	-	-	-
A05	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
A05	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
A05	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
A05	Storage	Ceiling	Metal Pan	Steel	-	Non ACM	-	-	-	-
A119D	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
A119D	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
A119D	Stairwell	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
A119D	Stairwell	Ceiling	Metal Pan	Steel	-	Non ACM	-	-	-	-
A121D	Unknown	No Access								
905	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
905	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
905	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
905	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
909	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
	Glenview Park Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **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: 1956 Addition(s): 1959, 1972, 2003, 2004		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**

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
909	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
909	Stairwell	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
909	Stairwell	Ceiling	Metal Pan	Steel	-	Non ACM	-	-	-	-
Level 1										
#2	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
#2	Storage	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S03a	8-Feb-19	2% Chrysotile
#2	Storage	Wall	Brick	-	-	Non ACM	-	-	-	-
#2	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
#2	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
#3	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
#3	Storage	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
#3	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
#3	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
A100	Classroom	Floor	Carpet	-	-	Non ACM	-	-	-	-
A100	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A100	Classroom	Wall	Plaster	White/Grey	-	Non ACM	SL	S08de	8-Feb-19	ND
A100	Classroom	Ceiling	Ceiling Tile 2' x 8'	Acoustic Tile	-	Non ACM	-	-	-	-
A100A	Classroom	Floor	Carpet	-	-	Non ACM	-	-	-	-
A100A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A100A	Classroom	Ceiling	Concrete		-	Non ACM	-	-	-	-
A100A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A100A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A100B	Classroom	Floor	Carpet		-	Non ACM	-	-	-	-
A100B	Classroom	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
A100B	Classroom	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
A100B	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A100B	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A102	Entrance	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A102	Entrance	Wall	Concrete	-	-	Non ACM	-	-	-	-
A102	Entrance	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
A102	Entrance	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A102	Entrance	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A102A	Classroom	Floor	Carpet	-	-	Non ACM	-	-	-	-

School Name	Legend:	Notes:
Glenview Park Secondary School **Date Built:** Original: 1956 Addition(s): 1959, 1972, 2003, 2004	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **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.** **Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**

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
A102A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A102A	Classroom	Wall	Plaster	White/Grey	-	Non ACM	SL	S08c	8-Feb-19	ND
A102A	Classroom	Ceiling	Ceiling Tile 2' x 8'	Acoustic Tile	-	Non ACM	-	-	-	-
A102B	Classroom	Floor	Carpet	-	-	Non ACM	-	-	-	-
A102B	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A102B	Classroom	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
A102B	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
A102C	Corridor	Floor	Carpet	-	-	Non ACM	-	-	-	-
A102C	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
A102C	Corridor	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
A102C	Corridor	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
A102C	Corridor	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A102C	Corridor	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A102D	Classroom	Floor	Carpet	-	-	Non ACM	-	-	-	-
A102D	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A102D	Classroom	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
A102D	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
A104	Gymnasium	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
A104	Gymnasium	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
A104	Gymnasium	Ceiling	Wood	-	-	Non ACM	-	-	-	-
A104	Gymnasium	Piping	Pipe Insulation	Pipe Wrap Insulation	-	Non ACM	HM	S02	8-Feb-19	ND
A104	Gymnasium	Piping	Pipe Insulation	Pipe Wrap Paper	-	Non ACM	HM	S02	8-Feb-19	ND
A104A	Storage	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A104A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
A104A	Storage	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
A104A	Storage	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
A104B	Mechanical Room Access	Floor	Concrete	-	-	-	-	-	-	-
A104B	Mechanical Room Access	Wall	Concrete	-	-	-	-	-	-	-
A104B	Mechanical Room Access	Ceiling	Concrete	-	-	-	-	-	-	-
A104B	Mechanical Room Access	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.324 - 002	15-Oct-90	50-75% Chrysotile
A104B	Mechanical Room Access	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
A104C	Stage	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
A104C	Stage	Wall	Concrete	-	-	Non ACM	-	-	-	-
A104C	Stage	Ceiling	Wood	-	-	Non ACM	-	-	-	-
A104C	Stage	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.324 - 002	15-Oct-90	50-75% Chrysotile
A104C	Stage	Piping	Pipe Insulation	Air Cell	F	ACM	HM	1680.324 - 009	15-Oct-90	75% Chrysotile

School Name	Legend:	Notes:
Glenview Park Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **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: 1956		
Addition(s): 1959, 1972, 2003, 2004		

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
A104C	Stage	Piping	Pipe Insulation	Pipe Wrap Insulation	-	Non ACM	SL	S02abc	8-Feb-19	ND
A104C	Stage	Piping	Pipe Insulation	Pipe Wrap Paper	-	Non ACM	SL	S02abc	8-Feb-19	ND
A104D	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
A104D	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
A104D	Storage	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
A104F	Gymnasium	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
A104F	Gymnasium	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
A104F	Gymnasium	Ceiling	Wood	-	-	Non ACM	-	-	-	-
A104F	Gymnasium	Piping	Pipe Insulation	Pipe Wrap Insulation	-	Non ACM	HM	S02	8-Feb-19	ND
A104F	Gymnasium	Ceiling	Wood	-	-	Non ACM	-	-	-	-
A104F	Gymnasium	Piping	Pipe Insulation	Pipe Wrap Insulation	-	Non ACM	HM	S02	8-Feb-19	ND
A104F	Gymnasium	Piping	Pipe Insulation	Pipe Wrap Paper	-	Non ACM	HM	S02	8-Feb-19	ND
A104G	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
A104G	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
A104G	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
A104G	Storage	Piping	Pipe Insulation	Pipe Wrap Insulation	-	Non ACM	HM	S02	8-Feb-19	ND
A104G	Storage	Piping	Pipe Insulation	Pipe Wrap Paper	-	Non ACM	HM	S02	8-Feb-19	ND
A105	Storage	Floor	Vinyl Floor Tile 12" x 12"	White with Blue Flecks	-	Non ACM	HM	S04	2-Feb-10	ND
A105	Storage	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	SL	S03c	8-Feb-19	2% Chrysotile
A105	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
A105	Storage	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
A105	Storage	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A105	Storage	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	SL	S09b	8-Feb-19	ND
A106	Storage	Floor	Vinyl Floor Tile 9" x 9"	Tan with Red and Orange Streak	NF	ACM	SL	S03abc	2-Feb-10	4.5% Chrysotile
A106	Storage	Floor	Vinyl Floor Tile 9" x 9"	Green with White Black Fleck	-	Non ACM	-	-	-	-
A106	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
A106	Storage	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
A106A	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A106A	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A106A	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
A106A	Washroom	Ceiling	Plaster	White/Grey	-	Non ACM	SL	S04b	8-Feb-19	ND
A107	Staff Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
A107	Staff Room	Floor	Vinyl Floor Tile 12" x 12"	White with Blue Flecks	-	Non ACM	HM	S04	2-Feb-10	ND
A107	Staff Room	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	SL	S03d	8-Feb-19	2% Chrysotile
A107	Staff Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
A107	Staff Room	Ceiling	Plaster	White/Grey	-	Non ACM	SL	S04b	8-Feb-19	ND
A107	Staff Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite

	School Name	Legend:	Notes:
	Glenview Park Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **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: 1956		
	Addition(s): 1959, 1972, 2003, 2004		

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
A107	Staff Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	Non ACM	SL	S09a	8-Feb-19	ND
A107A	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A107A	Washroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
A107A	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A107A	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
A107A	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
A107B	Staff Room	Floor	Vinyl Floor Tile 12" x 12"	White with Blue Flecks	-	Non ACM	HM	S04	2-Feb-10	ND
A107B	Staff Room	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
A107B	Staff Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
A107B	Staff Room	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
A107B	Staff Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A107B	Staff Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A107C	Staff Room	Floor	Vinyl Floor Tile 12" x 12"	Brown with White Fleck	-	Non ACM	-	-	-	-
A107C	Staff Room	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
A107C	Staff Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
A107C	Staff Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A107C	Staff Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A108	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
A108	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
A108	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
A108	Office	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.324 - 002	15-Oct-90	50-75% Chrysotile
A111	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
A111	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
A111	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S03g	8-Feb-19	1% Chrysotile
A111	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A111	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A112	Office	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
A112	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
A112	Office	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
A112	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A112	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A112A	Office	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
A112A	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
A112A	Office	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
A112A	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite

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.**
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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
A112A	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A112B	Office	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
A112B	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
A112B	Office	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
A112B	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A112B	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A112C	Office	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
A112C	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
A112C	Office	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
A112C	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A112C	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A112D	Office	Floor	Vinyl Floor Tile 9" x 9"	Tan with Brown and White Streak	NF	ACM	SL	S05abc	2-Feb-10	4.4% Chrysotile
A112D	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
A112D	Office	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
A112D	Office	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
A112D	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A112D	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A112D	Office	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.324 - 002	15-Oct-90	50-75% Chrysotile
A114	Classroom	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
A114	Classroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
A114	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A114	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A114	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A114A	Classroom	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
A114A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A114A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A114A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A114A	Classroom	Ceiling	Wood	-	-	Non ACM	-	-	-	-
A116	Outdoor Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
A116	Outdoor Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
A116	Outdoor Storage	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A116	Outdoor Storage	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	SL	S21abc	2-Feb-10	ND
A116	Outdoor Storage	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
A117	Communication	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
A117	Communication	Floor	Concrete	-	-	Non ACM	-	-	-	-

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A117	Communication	Wall	Concrete	-	-	Non ACM	-	-	-	-
A117	Communication	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S07f	8-Feb-19	ND
A117	Communication	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
A118	Custodial Office	Floor	Vinyl Floor Tile 12"x 12"	Tan with Brown Streaks	NF	ACM	HM	S08	2-Feb-10	2.7% Chrysotile
A118	Custodial Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
A118	Custodial Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A118	Custodial Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A118A	Custodial Lunch Room	Floor	Vinyl Floor Tile 12"x 12"	Tan with Brown Streaks	NF	ACM	HM	S08	2-Feb-10	2.7% Chrysotile
A118A	Custodial Lunch Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
A118A	Custodial Lunch Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A118A	Custodial Lunch Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
A118A	Custodial Lunch Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A118A	Custodial Lunch Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A118B	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A118B	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A118B	Washroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	ND
A119	Classroom	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
A119	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A119	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	ND
A119	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
A119	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A119	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A120	Classroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
A120	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A120	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A120	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A120	Classroom	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
A121	Classroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
A121	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A121	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
A121	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A121	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A122	Classroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
A122	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A122	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	SL	S30a	2-Feb-10	ND
A122	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A122	Classroom	Ducting	Flex Joint	-	NF	ACM	VC	-	-	-

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A122A	Classroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
A122A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A122A	Classroom	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
A122A	Classroom	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
A123	Classroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A123	Classroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
A123	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07d	8-Feb-19	ND
A125	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A125	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A125	Washroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A126	Elevator Shaft	Floor	Concrete	-	-	Non ACM	-	-	-	-
A126	Elevator Shaft	Wall	Concrete	-	-	Non ACM	-	-	-	-
A126	Elevator Shaft	Ceiling	Metal Pan	-	-	Non ACM	-	-	-	-
A811	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A811	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
A811	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
A811	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
A811	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
A811	Corridor	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
A812	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A812	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
A812	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
A812	Corridor	Ceiling	Concrete	-	-	-	-	-	-	-
A812A	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A812A	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
A812A	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
A812B	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A812B	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
A812B	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
A813	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A813	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
A813	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
A813	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
A813	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
A813	Corridor	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-

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A814	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A814	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
A814	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
A814	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
A814	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
A814	Corridor	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
A814	Corridor	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A814	Corridor	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
A815	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A815	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
A815	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
A815	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
A815	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
A815	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
A815	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.324 - 002	15-Oct-90	50-75% Chrysotile
B102	Library	Floor	Carpet	-	-	Non ACM	-	-	-	-
B102	Library	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
B102	Library	Wall	Concrete	-	-	Non ACM	-	-	-	-
B102	Library	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B102A	Library Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
B102A	Library Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
B102A	Library Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
B102B	Library Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
B102B	Library Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
B102B	Library Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
B102C	Library Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
B102C	Library Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
B102C	Library Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B102D	Library	Floor	Carpet	-	-	Non ACM	-	-	-	-
B102D	Library	Wall	Concrete	-	-	Non ACM	-	-	-	-
B102D	Library	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B103	Office	Floor	Vinyl Floor Tile 12" x 12"	Tan Dense Fleck	-	Non ACM	HM	S06	2-Feb-10	ND
B103	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
B103	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S05a	8-Feb-19	1% Chrysotile
B103	Office	Ceiling	Ceiling Tile 1' x 1'	Long Fissure Random Pinhole	-	Non ACM	SL	S24abc	2-Feb-10	ND
B104	Classroom	Floor	Vinyl Sheet Flooring	Grey (Post 2019)	-	Non ACM	-	-	-	-

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B104	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B104	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
B104	Classroom	Ceiling	Ceiling Tile 2' x 4'	No Pattern (Post 2019)	-	Non ACM	-	-	-	-
B104	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
B105A	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
B105A	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B105A	Washroom	Ceiling	Plaster	White/Grey	-	Non ACM	SL	S06a	8-Feb-19	ND
B105B	Outdoor Storage	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
B105B	Outdoor Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
B105B	Outdoor Storage	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S05c	8-Feb-19	1% Chrysotile
B105B	Outdoor Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
B105B	Outdoor Storage	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S05c	8-Feb-19	1% Chrysotile
B105B	Outdoor Storage	Ceiling	Drywall	No Compound	-	Non ACM	VC	-	-	-
B105B	Outdoor Storage	Ceiling	Wood	-	-	Non ACM	VC	-	-	-
B105C	Washroom	Floor	Vinyl Floor Tile 12" x 12"	Tan Dense Fleck	-	Non ACM	HM	S06	2-Feb-10	ND
B105C	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B105C	Washroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S05b	8-Feb-19	1% Chrysotile
B105C	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B106	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Brown Dense Fleck	-	Non ACM	-	-	-	-
B106	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B106	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S05d	8-Feb-19	1% Chrysotile
B106	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S05	8-Feb-19	1% Chrysotile
B106	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
B106A	Laundry	Floor	Vinyl Floor Tile 12" x 12"	Brown Dense Fleck	-	Non ACM	-	-	-	-
B106A	Laundry	Wall	Concrete	-	-	Non ACM	-	-	-	-
B106A	Laundry	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S05	8-Feb-19	1% Chrysotile
B106A	HC Washroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S05	8-Feb-19	1% Chrysotile
B106A	Laundry	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
B106B	HC Washroom	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
B106B	HC Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B106B	HC Washroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S05	8-Feb-19	1% Chrysotile
B107	Closet	Wall	Concrete	-	-	Non ACM	-	-	-	-
B107	Closet	Floor	Concrete	-	-	Non ACM	-	-	-	-
B107	Closet	Ceiling	Wood	-	-	Non ACM	-	-	-	-
B108	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B108	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B108	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-

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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
B109	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Tan with Brown and Yellow	NF	ACM	HM	S20	2-Feb-10	5.7% Chrysotile
B109	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B109	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B109	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
B110	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Grey with White	NF	ACM	SL	S11abc	2-Feb-10	4.1% Chrysotile
B110	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B110	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B110	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
B111	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Grey with White, Yellow, & Black	NF	ACM	SL	S10abc	2-Feb-10	3.9% Chrysotile
B111	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B111	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B111	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
B112	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Tan with Brown and Yellow	NF	ACM	HM	S20	2-Feb-10	5.7% Chrysotile
B112	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B112	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B112	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
B112A	Mechanical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B112A	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B112A	Mechanical Room	Wall	Plaster	White/Grey	-	Non ACM	HM	S06	8-Feb-19	ND
B112A	Mechanical Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B112A	Mechanical Room	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
B113	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck	-	Non ACM	HM	S02	2-Feb-10	ND
B113	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B113	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B113	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
B811	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
B811	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
B811	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B812	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
B812	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
B812	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B812	Corridor	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
B813	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
B813	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
B813	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-

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B814	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
B814	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
B814	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
B814	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B815	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
B815	Corridor	Wall	Plaster	White/Grey	-	Non ACM	SL	S06bcde	8-Feb-19	ND
B815	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
B815	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
B815	Corridor	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S05	8-Feb-19	1% Chrysotile
B815	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
B815	Corridor	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S05	8-Feb-19	1% Chrysotile
B815	Corridor	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	HM	S26	2-Feb-10	ND
B815	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B816	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
B816	Corridor	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S05e	8-Feb-19	ND
B816	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
B816	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
B816	Corridor	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	HM	S26	2-Feb-10	ND
B816	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B817	Corridor	Floor	Terrazzo	-	-	-	-	-	-	-
B817	Corridor	Wall	Concrete	-	-	-	-	-	-	-
B817	Corridor	Ceiling	Concrete	-	-	-	-	-	-	-
B818	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
B818	Corridor	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S05	8-Feb-19	1% Chrysotile
B818	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
B818	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
B818	Corridor	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	HM	S26	2-Feb-10	ND
B818	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B824	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
B824	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B824	Washroom	Ceiling	Plaster	White/Grey	-	Non ACM	SL	S06a	8-Feb-19	ND
C100	Lunchroom	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck	-	Non ACM	HM	S02	2-Feb-10	ND
C100	Lunchroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
C100	Lunchroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
C100	Lunchroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C100	Lunchroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C100A	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-

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C100A	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
C100A	Changeroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
C100B	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C100B	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
C100B	Washroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
C100B	Washroom	Light Fixture	Heat Shield	Paper	F	ACM	SL	S01abc	8-Feb-19	70% Chrysotile
C100C	Shower	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C100C	Shower	Wall	Brick	-	-	Non ACM	-	-	-	-
C100C	Shower	Wall	Concrete	-	-	Non ACM	-	-	-	-
C100C	Shower	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	SL	S03b	8-Feb-19	1% Chrysotile
C100C	Shower	Wall	Concrete	-	-	Non ACM	-	-	-	-
C100C	Shower	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	SL	S03b	8-Feb-19	1% Chrysotile
C101	Changeroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
C101	Changeroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C101	Changeroom	Wall	Brick	-	-	Non ACM	-	-	-	-
C101	Changeroom	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
C101A	Washroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
C101A	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C101A	Washroom	Wall	Brick	-	-	Non ACM	-	-	-	-
C101A	Washroom	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
C101B	Instructors Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
C101B	Instructors Room	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C101B	Instructors Room	Wall	Brick	-	-	Non ACM	-	-	-	-
C101B	Instructors Room	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
C101C	Washroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
C101C	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C101C	Washroom	Wall	Brick	-	-	Non ACM	-	-	-	-
C101C	Washroom	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
C101D	Shower	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C101D	Shower	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C101D	Shower	Wall	Brick	-	-	Non ACM	-	-	-	-
C101D	Shower	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
C102	Boiler Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
C102	Boiler Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C102	Boiler Room	Boiler	Boiler Breeching	(Post 2010)	-	Non ACM	-	-	-	-
C102	Boiler Room	Boiler	Boiler Refractory	Refractory (Post 2010)	-	Non ACM	-	-	-	-
C102	Boiler Room	Piping	Pipe Insulation	Air Cell	F	ACM	HM	1680.324 - 009	15-Oct-90	75% Chrysotile

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C102	Boiler Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.324 - 002	15-Oct-90	50-75% Chrysotile
C102A	Storage	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C102A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
C102A	Storage	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
C102B	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
C102B	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
C102B	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
C102B	Storage	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
C102C	Electrical Room	No Access								
C102D	Electrical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
C102D	Electrical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C102D	Electrical Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
C102E	Transformer Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
C102E	Transformer Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C102E	Transformer Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
C102F	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
C102F	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
C102F	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
C110	Cafeteria	Floor	Vinyl Floor Tile 12" x 12"	Tan Dense Fleck	-	Non ACM	HM	S06	2-Feb-10	ND
C110	Cafeteria	Floor	Vinyl Floor Tile 12" x 12"	Red Dense Fleck	-	Non ACM	HM	S16	2-Feb-10	ND
C110	Cafeteria	Wall	Concrete	-	-	Non ACM	-	-	-	-
C110	Cafeteria	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
C110	Cafeteria	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
C110A	Cafeteria	Floor	Vinyl Floor Tile 12"x 12"	Tan with Brown and White	NF	ACM	SL	S15abc	2-Feb-10	2.2% Chrysotile
C110A	Cafeteria	Wall	Concrete		-	Non ACM	-	-	-	-
C110A	Cafeteria	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
C110A	Cafeteria	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
C110A	Cafeteria	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
C111	Changeroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
C111	Changeroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C111	Changeroom	Wall	Brick	-	-	Non ACM	-	-	-	-
C111	Changeroom	Ceiling	Plaster	White/Grey	-	Non ACM	SL	S04a	8-Feb-19	ND
C111A	Corridor	Floor	Concrete	-	-	Non ACM	-	-	-	-
C111A	Corridor	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C111A	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-

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C111A	Corridor	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
C111B	Instructors Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
C111B	Instructors Room	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C111B	Instructors Room	Wall	Brick	-	-	Non ACM	-	-	-	-
C111B	Instructors Room	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
C111C	Washroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
C111C	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C111C	Washroom	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
C111D	Shower	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C111D	Shower	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C111D	Shower	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
C113	Storage	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C113	Storage	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C113	Storage	Wall	Brick	-	-	Non ACM	-	-	-	-
C113	Storage	Piping	Pipe Insulation	Pipe Wrap Insulation	-	Non ACM	HM	S02	8-Feb-19	ND
C113	Storage	Piping	Pipe Insulation	Pipe Wrap Paper	-	Non ACM	HM	S02	8-Feb-19	ND
C114	Guidance	Floor	Carpet	-	-	Non ACM	-	-	-	-
C114	Guidance	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck	-	Non ACM	HM	S02	2-Feb-10	ND
C114	Guidance	Wall	Concrete	-	-	Non ACM	-	-	-	-
C114	Guidance	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S03f	8-Feb-19	1% Chrysotile
C114	Guidance	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C114	Guidance	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C114A	Guidance Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
C114A	Guidance Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C114A	Guidance Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C114A	Guidance Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C114B	Group Counselling	Floor	Carpet	-	-	Non ACM	-	-	-	-
C114B	Group Counselling	Wall	Concrete	-	-	Non ACM	-	-	-	-
C114B	Group Counselling	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C114B	Group Counselling	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C114C	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
C114C	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C114C	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C114C	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C114D	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
	Glenview Park Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **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: 1956		
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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
C114D	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C114D	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C114D	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C114E	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
C114E	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C114E	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C114E	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C114F	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
C114F	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C114F	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C114F	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C114F	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C114G	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
C114G	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C114G	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C114G	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C115	Work Room	Floor	Vinyl Floor Tile 12" x 12"	White with Blue Flecks	-	Non ACM	HM	S04	2-Feb-10	ND
C115	Work Room	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S03e	8-Feb-19	ND
C115	Work Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C115	Work Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C115	Work Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	SL	S09c	8-Feb-19	ND
C115A	Coat Room Storage	Floor	Vinyl Floor Tile 12" x 12"	Bluck Fleck	-	Non ACM	-	-	-	-
C115A	Coat Room Storage	Wall	Concrete		-	Non ACM	-	-	-	-
C115A	Coat Room Storage	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Post 2019)	-	Non ACM	-	-	-	-
C115A	Coat Room Storage	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C115B	Coat Room	Floor	Vinyl Floor Tile 12" x 12"	White with Blue Flecks	-	Non ACM	HM	S04	2-Feb-10	ND
C115B	Coat Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C115B	Coat Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	-	-	-	-
C115B	Coat Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C115C	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C115C	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
C115C	Washroom	Ceiling	Drywall	Drywall Joint Compound (Post 2015)	-	Non ACM	VC	-	-	-
C117	Custodial Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
C117	Custodial Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C117	Custodial Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C117	Custodial Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND

School Name	Legend:	Notes:
Glenview Park Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **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: 1956		
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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
C118	Office	Floor	Vinyl Floor Tile 12"x 12"	Off-White with Tan Streaks	NF	ACM	SL	S07abc	2-Feb-10	5.2% Chrysotile
C118	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C118	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C118	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C118A	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
C118A	Office	Wall	Drywall	Drywall Joint Compound (Post 2019)	-	Non ACM	-	-	-	-
C118A	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C118B	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
C118B	Office	Wall	Drywall	Drywall Joint Compound (Post 2019)	-	Non ACM	-	-	-	-
C118B	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C119	Office	Floor	Vinyl Sheet Flooring	Grey	-	Non ACM	HM	S04	2-Feb-10	ND
C119	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
C119	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C119	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	SL	S30c	2-Feb-10	1.2% Chrysotile
C119	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C119	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C119A	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
C119A	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C119A	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C119B	Office	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C119B	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C119B	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C119B	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C119C	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
C119C	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C119C	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C119D	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
C119D	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C119D	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C119D	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C119E	Vault Room	Floor	Vinyl Floor Tile 12" x 12"	White with Blue Flecks	-	Non ACM	HM	S04	2-Feb-10	ND
C119E	Vault Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C119E	Vault Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C119E	Vault Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C119F	Washroom	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: 1956		
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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
C119F	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
C119F	Washroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C119F	Washroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C119G	Office	Floor	Vinyl Sheet Flooring	Grey	-	Non ACM	-	-	-	-
C119G	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C119G	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	SL	S30c	2-Feb-10	1.2% Chrysotile
C119G	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C119H	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
C119H	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C119H	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C119H	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C119H	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C119H	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
C119I	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
C119I	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C119I	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
C121	Office	Floor	Concrete	-	-	Non ACM	-	-	-	-
C121	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C121	Office	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
C123	Student Activities	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
C123	Student Activities	Wall	Concrete	-	-	Non ACM	-	-	-	-
C123	Student Activities	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
C123	Student Activities	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C123	Student Activities	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C123	Student Activities	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C126	Classroom	Floor	Carpet	-	-	Non ACM	-	-	-	-
C126	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
C126	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
C126	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C126	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C127	Custodial Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
C127	Custodial Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C127	Custodial Room	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
C129	Office	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
C129	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C129	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite

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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
C129	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C129A	Storage	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
C129A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
C129A	Storage	Wall	Plaster	White/Grey	-	Non ACM	SL	S08b	8-Feb-19	ND
C129A	Storage	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
C129B	Office	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
C129B	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
C129B	Office	Wall	Plaster	White/Grey	-	Non ACM	SL	S08a	8-Feb-19	ND
C129B	Office	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
C131	Change Room	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C131	Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C131	Change Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
C131A	Change Room	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C131A	Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C131A	Change Room	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	SL	S07b	9-Feb-19	2% Chrysotile
C131B	Change Room	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C131B	Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C131B	Change Room	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	9-Feb-19	1% Chrysotile
C131C	Shower	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C131C	Shower	Wall	Concrete	-	-	Non ACM	-	-	-	-
C131C	Shower	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	SL	S07a	9-Feb-19	1% Chrysotile
C132	Classroom	Floor	Carpet	-	-	Non ACM	-	-	-	-
C132	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
C132	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
C132	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C132	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C133	Team Room	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C133	Team Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C133	Team Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C133	Team Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C135	Change Room	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C135	Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C135	Change Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
C135A	Change Room	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C135A	Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-

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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
C135A	Change Room	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	9-Feb-19	1% Chrysotile
C135B	Change Room	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C135B	Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C135B	Change Room	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	9-Feb-19	1% Chrysotile
C135C	Change Room	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C135C	Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C135C	Change Room	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	9-Feb-19	1% Chrysotile
C136	Gymnasium	Floor	Wood	Parquet	-	Non ACM	-	-	-	-
C136	Gymnasium	Wall	Concrete	-	-	Non ACM	-	-	-	-
C136	Gymnasium	Ceiling	Metal Pan	-	-	Non ACM	-	-	-	-
C136A	Gym Storage	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
C136A	Gym Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
C136A	Gym Storage	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C136A	Gym Storage	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C136B	Gymnasium	Floor	Wood	Parquet	-	Non ACM	-	-	-	-
C136B	Gymnasium	Wall	Concrete	-	-	Non ACM	-	-	-	-
C136B	Gymnasium	Ceiling	Metal Pan	-	-	Non ACM	-	-	-	-
C137	Gym Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
C137	Gym Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
C137	Gym Storage	Ceiling	Metal Pan	-	-	Non ACM	-	-	-	-
C137	Gym Storage	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.324 - 002	15-Oct-90	50-75% Chrysotile
C811	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C811	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
C811	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
C811	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
C811A	Corridor	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck	-	Non ACM	HM	S02	2-Feb-10	ND
C811A	Corridor	Floor	Vinyl Floor Tile 12" x 12"	White with Black Fleck (Post 2015)	-	Non ACM	-	-	-	-
C811A	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
C811A	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
C811A	Corridor	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
C812	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C812	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
C812	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
C812	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
C812	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-

School Name	Legend:	Notes:
Glenview Park Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **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: 1956		
Addition(s): 1959, 1972, 2003, 2004		

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
C812	Corridor	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
C813	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C813	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
C813	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
C813	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
C813	Corridor	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
C814	Corridor	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C814	Corridor	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C814	Corridor	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
C814	Corridor	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C814	Corridor	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
C814	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
C814A	Corridor	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
C814A	Corridor	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C814A	Corridor	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
C814A	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
C815	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C815	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
C815	Corridor	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
C815	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
C815	Corridor	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
C816	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C816	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
C816	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
C816	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
C817	Corridor	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
C817	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
C817	Corridor	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
C817	Corridor	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
D100	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	-	-	-	-
D100	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D100	Classroom	Wall	Plaster	-	-	Non ACM	-	-	-	-
D100	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	-	-	-	-
D103	Custodial Room	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
D103	Custodial Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
D103	Custodial Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
D103	Custodial Room	Ceiling	Pipe Insulation	Air Cell	F	ACM	HM	1680.324 - 009	15-Oct-90	75% Chrysotile

School Name	Legend:	Notes:
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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
D103	Custodial Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.324 - 002	15-Oct-90	50-75% Chrysotile
D103A	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
D103A	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D103A	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
D103A	Washroom	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D105	Storage	Floor	Vinyl Floor Tile 12" x 12"	Beige Dense Fleck	-	Non ACM	-	-	-	-
D105	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
D105	Storage	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D105A	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
D105A	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D105A	Washroom	Ceiling	Plaster	White/Grey	-	Non ACM	SL	S04c	8-Feb-19	ND
D109	Career Centre	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
D109	Career Centre	Wall	Concrete	-	-	Non ACM	-	-	-	-
D109	Career Centre	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D109	Career Centre	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D110	Classroom	Floor	Vinyl Floor Tile 12" x 12"	White with Tan Specks	-	Non ACM	-	-	-	-
D110	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Orange Mottled	-	Non ACM	-	-	-	-
D110	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D110	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D110	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D110	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D110A	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Orange Mottled	-	Non ACM	-	-	-	-
D110A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D110A	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D110A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D110A	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D111	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
D111	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D111	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D111	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D111	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D112	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Brown Dense Fleck	-	Non ACM	SL	S14abc	2-Feb-10	ND
D112	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D112	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D113	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Brown Dense Fleck	-	Non ACM	HM	S14	2-Feb-10	ND

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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
D113	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D113	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D113	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
D113	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
D113	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D113A	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Brown Dense Fleck	-	Non ACM	HM	S14	2-Feb-10	ND
D113A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D113A	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D113A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
D113A	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D113A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
D113A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
D113A	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D114	Office	Floor	Vinyl Floor Tile 12" x 12"	Beige Dense Fleck	-	Non ACM	-	-	-	-
D114	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
D114	Office	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D114	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D115	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	SL	S12abc	2-Feb-10	ND
D115	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D115	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D115	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D115	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D116	Classroom	Floor	Vinyl Floor Tile 12" x 12"	White with Grey Black Fleck	-	Non ACM	-	-	-	-
D116	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D116	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D116	Classroom	Ceiling	Ceiling Tile 1' x 1'	Long Fissure Random Pinhole	-	Non ACM	HM	S24abc	2-Feb-10	ND
D116	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	Non ACM
D117	Office	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
D117	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
D117	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S05	8-Feb-19	1% Chrysotile
D117	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D117A	Office	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
D117A	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
D117A	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D118	Computers	Floor	Faux Wood	-	-	Non ACM	-	-	-	-
D118	Computers	Wall	Concrete	-	-	Non ACM	-	-	-	-
D118	Computers	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	1% Chrysotile

	School Name			**Legend:**				**Notes:**			
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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
D118	Computers	Ceiling	Ceiling Tile 2' x 4'	No Pattern	-	Non ACM	-	-	-	Non ACM
D119	Classroom	Floor	Laminate	-	-	Non ACM	-	-	-	-
D119	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D119	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
D119	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
D120	Work Room	Floor	Vinyl Floor Tile 12"x 12"	Tan with Brown Streaks	NF	ACM	SL	S08abc	2-Feb-10	2.7% Chrysotile
D120	Work Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
D120	Work Room	Wall	Plaster	White/Grey	-	Non ACM	SL	S04e	8-Feb-19	ND
D120	Work Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
D120	Work Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
D120A	Work Room	Floor	Vinyl Floor Tile 12"x 12"	Tan with Grey	NF	ACM	SL	S09abc	2-Feb-10	3.2% Chrysotile
D120A	Work Room	Wall	Brick	-	-	Non ACM	-	-	-	-
D120A	Work Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
D120A	Work Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
D121	Classroom	Floor	Laminate	-	-	Non ACM	-	-	-	-
D121	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D121	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
D121	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
D121A	Classroom	Floor	Laminate	-	-	Non ACM	-	-	-	-
D121A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D121A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
D121A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
D122	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green with White Black Fleck	-	Non ACM	HM	S02	2-Feb-10	ND
D122	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D122	Classroom	Wall	Plaster	White/Grey	-	Non ACM	SL	S04e	8-Feb-19	ND
D122	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
D122	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
D812	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
D812	Corridor	Wall	Plaster	White/Grey	-	Non ACM	SL	S04d	8-Feb-19	ND
D812	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
D812	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
D812	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D813	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
D813	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
D813	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND

	School Name			**Legend:**				**Notes:**			
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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
D813	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
N104	Servery	Floor	Vinyl Rolled Flooring	Grey (Post 2010)	-	Non ACM	-	-	-	-
N104	Servery	Wall	Concrete	-	-	Non ACM	-	-	-	-
N104	Servery	Wall	Drywall	Drywall Joint Compound (Post 2010)	-	Non ACM	-	-	-	-
N104	Servery	Ceiling	Drywall	Drywall Joint Compound (Post 2010)	-	Non ACM	-	-	-	-
N104	Servery	Ceiling	Ceiling Tile 2' x 4'	Flat Faxed Drywall (Post 2010)	-	Non ACM	-	-	-	-
N104	Servery	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
N105	Food Prep	Floor	Vinyl Rolled Flooring	Grey (Post 2010)	-	Non ACM	-	-	-	-
N105	Food Prep	Wall	Concrete	-	-	Non ACM	-	-	-	-
N105	Food Prep	Wall	Drywall	Drywall Joint Compound (Post 2010)	-	Non ACM	-	-	-	-
N105	Food Prep	Wall	Concrete	-	-	Non ACM	-	-	-	-
N105	Food Prep	Wall	Drywall	Drywall Joint Compound (Post 2010)	-	Non ACM	-	-	-	-
N105	Food Prep	Ceiling	Drywall	Drywall Joint Compound (Post 2010)	-	Non ACM	-	-	-	-
N105	Food Prep	Ceiling	Ceiling Tile 2' x 4'	Flat Faxed Drywall (Post 2010)	-	Non ACM	-	-	-	-
N106	Storage	Floor	Vinyl Rolled Flooring	Grey (Post 2010)	-	Non ACM	-	-	-	-
N106	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
N106	Storage	Wall	Drywall	Drywall Joint Compound (Post 2010)	-	Non ACM	-	-	-	-
N106	Storage	Ceiling	Drywall	Drywall Joint Compound (Post 2010)	-	Non ACM	-	-	-	-
N106	Storage	Ceiling	Ceiling Tile 2' x 4'	Flat Faxed Drywall (Post 2010)	-	Non ACM	-	-	-	-
N107	Storage	Floor	Vinyl Rolled Flooring	Grey (Post 2010)	-	Non ACM	-	-	-	-
N107	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
N107	Storage	Wall	Drywall	Drywall Joint Compound (Post 2010)	-	Non ACM	-	-	-	-
N107	Storage	Ceiling	Drywall	Drywall Joint Compound (Post 2010)	-	Non ACM	-	-	-	-
N107	Storage	Ceiling	Ceiling Tile 2' x 4'	Flat Faxed Drywall (Post 2010)	-	Non ACM	-	-	-	-
N113A	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Beige Dense Fleck	-	Non ACM	-	-	-	-
N113A	Classroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
N113A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
N113A	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
N113A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
N113B	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Beige Dense Fleck	-	Non ACM	-	-	-	-
N113B	Classroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
N113B	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
N113B	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
N113B	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
N113C	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Beige Dense Fleck	-	Non ACM	-	-	-	-
N113C	Classroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
N113C	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-

School Name	Legend:	Notes:
Glenview Park Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **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: 1956		
Addition(s): 1959, 1972, 2003, 2004		

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
N113C	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
N113C	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
N113D	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Beige Dense Fleck	-	Non ACM	-	-	-	-
N113D	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
N113D	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
N113D	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
N113E	Classroom	Floor	Hardwood	-	-	Non ACM	-	-	-	-
N113E	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
N113E	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
N113E	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
N113E	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
N113E	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
N114A	Classroom	Floor	Hardwood	-	-	Non ACM	-	-	-	-
N114A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
N114A	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
N114A	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
N114B	Classroom	Floor	Hardwood	-	-	Non ACM	-	-	-	-
N114B	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
N114B	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
N114B	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
N114C	Classroom	Floor	Hardwood	-	-	Non ACM	-	-	-	-
N114C	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
N114C	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S07e	9-Feb-19	ND
N114C	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
N116	Corridor	Floor	Concrete	-	-	Non ACM	-	-	-	-
N116	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
N116	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
901	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
901	Stairwell	Wall	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
901	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
901	Stairwell	Ceiling	Concrete	-	-	-	-	-	-	-
902	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
902	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
902	Stairwell	Wall	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
902	Stairwell	Wall	Brick	-	-	Non ACM	-	-	-	-
902	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
903	Stairwell	Floor	Terrazzo	-	-	-	-	-	-	-

School Name	Legend:	Notes:
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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
903	Stairwell	Wall	Concrete	-	-	-	-	-	-	-
903	Stairwell	Ceiling	Concrete	-	-	-	-	-	-	-
904	Foyer	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
904	Foyer	Wall	Brick	-	-	Non ACM	-	-	-	-
904	Foyer	Wall	Plaster	White/Grey	-	Non ACM	HM	S06	8-Feb-19	ND
904	Foyer	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	HM	S26	2-Feb-10	ND
905	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
905	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
905	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
905	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
907	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
907	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-

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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
907	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
907	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
908	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
908	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
908	Stairwell	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
908	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
908	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
908	Stairwell	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.324 - 002	15-Oct-90	50-75% Chrysotile
Level 2										
A104E	Office	Floor	Vinyl Floor Tile 9"x 9"	Orange with Brown Fleck & White	NF	ACM	VC	-	-	-
A104E	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
A104E	Office	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
A104E	Office	Ducting	Flex Joint	-	NF	ACM	VC	-	-	-
A201	Office	Floor	Vinyl Floor Tile 9"x 9"	Tan with Brown and White	NF	ACM	HM	S05	2-Feb-10	4.4% Chrysotile
A201	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
A201	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
A201	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A201	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	-	-	-	-
A201	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A202	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
A202	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A202	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A202	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A202	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A204	Office	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
A204	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
A204	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A204	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A204	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A205	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
A205	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A205	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A205	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite

	School Name	Legend:	Notes:
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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
A205	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A206	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
A206	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A206	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A206	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A206	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A207	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Green Dense Fleck	-	Non ACM	-	-	-	-
A207	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A207	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A207	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A207	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A208	Office	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
A208	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
A208	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A208	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A208	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A209	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
A209	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A209	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A209	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A209	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	-	-	-	-
A209	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A210	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
A210	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A210	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A210	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A210	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A211	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Tan with Brown Streaks	NF	ACM	HM	S08	2-Feb-10	2.7% Chrysotile
A211	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A211	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A211	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A211	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	-	-	-	-
A211	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A212	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Pink Dense Fleck	-	Non ACM	HM	S13	2-Feb-10	ND
A212	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-

	School Name			**Legend:**				**Notes:**			
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	Date Built:										
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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**	
A212	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile	

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A212	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A212	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	-	-	-	-
A212	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A213	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Pink Dense Fleck	-	Non ACM	HM	S13	2-Feb-10	ND
A213	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A213	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A213	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A213	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A214	Office	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
A214	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A214	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A214	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A214	Office	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
A214A	Kiln Room	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
A214A	Kiln Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
A214A	Kiln Room	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A214A	Kiln Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A214A	Kiln Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A214B	Custodial Room	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
A214B	Custodial Room	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A214B	Custodial Room	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A214B	Custodial Room	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
A215	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
A215	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A215	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
A215	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A215	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	-	-	-	-
A215	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A215	Classroom	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
A216	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
A216	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A216	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
A216	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A216	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	-	-	-	-
A216	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND

School Name	Legend:	Notes:
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A217	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
A217	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A217	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
A217	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A217	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	-	-	-	-
A217	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A217	Classroom	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
A218	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
A218	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Brown Dense Fleck	-	Non ACM	-	-	-	-
A218	Classroom	Floor	Vinyl Floor Tile 12" x 12"	White Brown Fleck	-	Non ACM	-	-	-	-
A218	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A218	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
A218	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
A219	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A219	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
A219	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
A219	Washroom	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
A821	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A821	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
A821	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
A822	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
A822	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
A822	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
A822	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B201	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck	-	Non ACM	HM	S02	2-Feb-10	ND
B201	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S05	8-Feb-19	1% Chrysotile
B201	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B201	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
B201	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
B201	Classroom	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
B202	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck	-	Non ACM	HM	S02	2-Feb-10	ND
B202	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B202	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
B202	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
B202	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND

School Name	Legend:	Notes:
Glenview Park Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **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: 1956		
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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
B202	Classroom	Piping	Pipe Insulation	Horsehair	-	Non ACM	-	-	-	-
B203	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Tan with Brown Streaks	NF	ACM	HM	S08	2-Feb-10	2.7% Chrysotile
B203	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S05	8-Feb-19	1% Chrysotile
B203	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
B203	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
B203	Classroom	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
B204	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Pink Dense Fleck	-	Non ACM	HM	S13	2-Feb-10	ND
B204	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B204	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S05	8-Feb-19	1% Chrysotile
B204	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B204	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S05	8-Feb-19	1% Chrysotile
B204	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B204	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
B204	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
B205	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
B205	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B205	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
B205	Washroom	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S06	8-Feb-19	ND
B205A	Custodial Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B205A	Custodial Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B205A	Custodial Room	Ceiling	Wood	-	-	Non ACM	-	-	-	-
B206	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Tan with Brown and White	NF	ACM	HM	S05	2-Feb-10	4.4% Chrysotile
B206	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B206	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S06	8-Feb-19	ND
B206	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B206	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
B207	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Tan with Brown and Yellow	NF	ACM	SL	S20abc	2-Feb-10	5.7% Chrysotile
B207	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B207	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S05	8-Feb-19	1% Chrysotile
B207	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B207	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
B208	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Tan with White and Grey	NF	ACM	SL	S18abc	2-Feb-10	5.8% Chrysotile
B208	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B208	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S06	8-Feb-19	ND
B208	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B209	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Grey with White, Yellow, & Black	NF	ACM	HM	S10	2-Feb-10	3.9% Chrysotile
B209	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-

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B209	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B209	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
B210	Workroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	SL	S12abc	2-Feb-10	ND
B210	Workroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B210	Workroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S06	8-Feb-19	ND
B210	Workroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
B210	Workroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
B211	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Green with Light Streaks	NF	ACM	SL	S17abc	2-Feb-10	6.1% Chrysotile
B211	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B211	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B211	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B211	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
B211	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
B212	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	SL	S12abc	2-Feb-10	ND
B212	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B212	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S06	8-Feb-19	ND
B212	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
B212	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
C245	Fitness Room	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
C245	Fitness Room	Floor	Rubber	-	-	Non ACM	-	-	-	-
C245	Fitness Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
C245	Fitness Room	Ceiling	Ceiling Tile	Acoustic Tile	-	Non ACM	-	-	-	-
C245A	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
C245A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
C245A	Storage	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.324 - 002	15-Oct-90	50-75% Chrysotile
C245B	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
C245B	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
C245B	Storage	Ceiling	Metal Pan	-	-	Non ACM	-	-	-	-
D201	Mechanical Room	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
D201	Mechanical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
D201	Mechanical Room	Wall	Brick	-	-	Non ACM	-	-	-	-
D201	Mechanical Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
D203	Girls' Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
D203	Girls' Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D203	Girls' Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
D203	Girls' Washroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
D203	Girls' Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	-	-	-	-

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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
D203	Girls' Washroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
D203	Girls' Washroom	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D203A	Fan Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
D203A	Fan Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
D203A	Fan Room	Wall	Brick	-	-	Non ACM	-	-	-	-
D203A	Fan Room	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D209	Boys' Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
D209	Boys' Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D209	Boys' Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
D209	Boys' Washroom	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D209A	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
D209A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
D209A	Storage	Wall	Brick	-	-	Non ACM	-	-	-	-
D209A	Storage	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D210	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
D210	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D210	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D210	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D210	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D210	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
D211	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Tan with Red & Orange	NF	ACM	HM	S03	2-Feb-10	4.4% Chrysotile
D211	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D211	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D211	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D211	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D211	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
D212	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Tan with Brown and White	NF	ACM	HM	S05	2-Feb-10	4.4% Chrysotile
D212	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D212	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D212	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D212	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D212	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
D213	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Pink Dense Fleck	-	Non ACM	HM	S13	2-Feb-10	ND
D213	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D213	Classroom	Wall	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND

	School Name			**Legend:**				**Notes:**			
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D213	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D213	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D213	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
D214	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
D214	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D214	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
D214	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D214	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D214	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
D214A	Storage	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
D214A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
D214A	Storage	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
D214A	Storage	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D214A	Storage	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S04	8-Feb-19	ND
D215	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Tan with Brown and White	NF	ACM	HM	S05	2-Feb-10	4.4% Chrysotile
D215	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Brown with Dark Brown Tan	NF	ACM	SL	S19abc	2-Feb-10	4.4% Chrysotile
D215	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D215	Classroom	Wall	Wood Panels	-	-	Non ACM	-	-	-	-
D215	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
D215	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
D216	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
D216	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D216	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D216	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D216	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
D217	Office	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
D217	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
D217	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
D217	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
D217A	Office	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
D217A	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
D217A	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
D217A	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
D217A	Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
D218	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Tan with Red & Orange	NF	ACM	HM	S03	2-Feb-10	4.4% Chrysotile

	School Name			**Legend:**				**Notes:**			
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D218	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D218	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
D218	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D218	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D218	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
D219	Classroom	Floor	Vinyl Floor Tile 12" x 12"	Green and Grey Dense Fleck	-	Non ACM	HM	S12	2-Feb-10	ND
D219	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
D219	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S03	8-Feb-19	2% Chrysotile
D219	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
D219	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	-	-	-	-
D219	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
D221	PR Room	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
D221	PR Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
D221	PR Room	Wall	Brick	-	-	Non ACM	-	-	-	-
D221	PR Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
D221	PR Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
D221	PR Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D223	Mechanical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
D223	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
D223	Mechanical Room	Ceiling	Wood	-	-	Non ACM	-	-	-	-
D821	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
D821	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
D821	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S06	8-Feb-19	ND
D821	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D821	Corridor	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D821	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.324 - 002	15-Oct-90	50-75% Chrysotile
D822	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
D822	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
D822	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S06	8-Feb-19	ND
D822	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D822	Corridor	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D823	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
D823	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
D823	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S06	8-Feb-19	ND
D823	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
	Glenview Park Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **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: 1956		
	Addition(s): 1959, 1972, 2003, 2004		

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
D823	Corridor	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
D824	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
D824	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
D824	Corridor	Wall	Plaster	White/Grey	-	Non ACM	HM	S06	8-Feb-19	ND
D824	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
D824	Corridor	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
M200	Mechanical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
M200	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
M200	Mechanical Room	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
M200	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
M200	Mechanical Room	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
M200	Mechanical Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.324 - 002	15-Oct-90	50-75% Chrysotile
M200	Mechanical Room	Ducting	Flex Joint	-	NF	ACM	VC	-	-	-
M200	Mechanical Room	Piping	Pipe Insulation	Mag Block	F	ACM	HM	1680.324 - 001	15-Oct-90	50-75% Chrysotile
M200	Mechanical Room	Ducting	Duct Insulation Parging	White Insulation	-	Non ACM	SL	S28abc	2-Feb-10	ND
M202	Mechanical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
M202	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
M202	Mechanical Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
M203	Fan Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
M203	Fan Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
M203	Fan Room	Ceiling	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
M203	Fan Room	Ducting	Flex Joint	-	NF	ACM	VC	-	-	-
M203	Fan Room	Piping	Pipe Insulation	Pipe Wrap Insulation	-	Non ACM	HM	S02	8-Feb-19	ND
M203	Fan Room	Piping	Pipe Insulation	Pipe Wrap Paper	-	Non ACM	HM	S02	8-Feb-19	ND
M300	Mechanical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
M300	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
M300	Mechanical Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.324 - 002	15-Oct-90	50-75% Chrysotile
M300	Mechanical Room	Ducting	Flex Joint	-	NF	ACM	VC	-	-	-
M300	Mechanical Room	Piping	Pipe	Transite	NF	ACM	VC	-	-	-
N200	Dark Room	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
N200	Dark Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
N200	Dark Room	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
N200	Dark Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
N200	Dark Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
N200B	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
N200B	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
N200B	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-

School Name	Legend:	Notes:
Glenview Park Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **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: 1956		
Addition(s): 1959, 1972, 2003, 2004		

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
N200C	Dark Room	Floor	Vinyl Floor Tile 12"x 12"	Tan with White Streaks	NF	ACM	HM	S01	2-Feb-10	3.2% Chrysotile
N200C	Dark Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
N200C	Dark Room	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
N200C	Dark Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
N200C	Dark Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
901	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
901	Stairwell	Wall	Plaster	White/Grey	-	Non ACM	HM	S08	8-Feb-19	ND
901	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
901	Stairwell	Ceiling	Concrete	-	-	-	-	-	-	-
902	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
902	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
902	Stairwell	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
902	Stairwell	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S07	8-Feb-19	2% Chrysotile
902	Stairwell	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
902	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
902	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
903	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
903	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
903	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
903	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	1680.324 - 008	15-Oct-90	5-10% Amosite
903	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S09	8-Feb-19	ND
904	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
904	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
904	Stairwell	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	HM	S26	2-Feb-10	ND
907	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
907	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
907	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2005)	-	Non ACM	-	-	-	-
908	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
908	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
908	Stairwell	Ceiling	Concrete	-	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
	Glenview Park Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **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: 1956		
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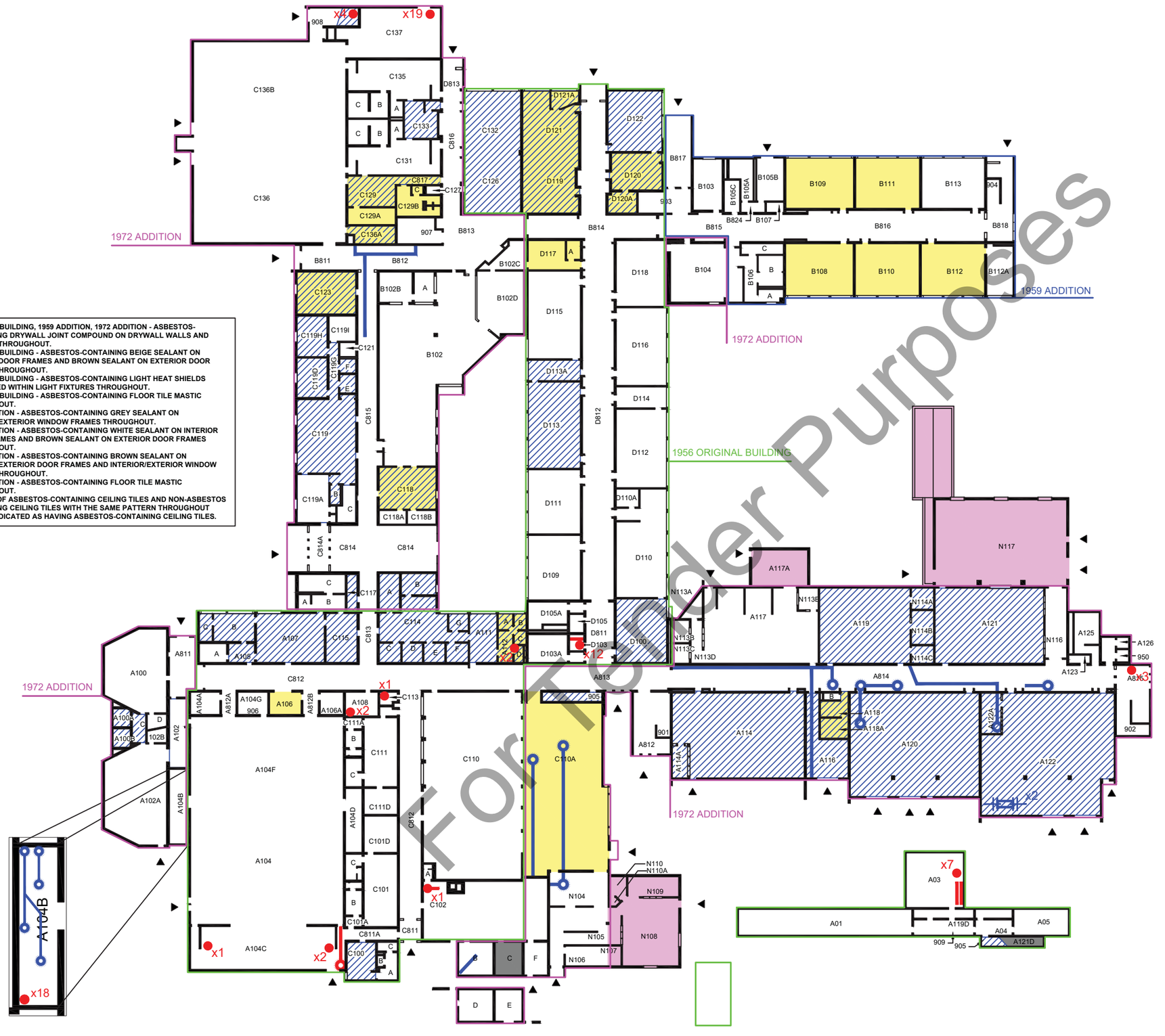
WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
Summary of Potential ACM Hidden or Not Assessed										
	Throughout Building	Not Inspected	Not Inspected	Wall Cavity Insulation						
	Throughout Building	Not Inspected	Not Inspected	Door Core Insulation						

Appendix B

Figures



ORIGINAL BUILDING, 1959 ADDITION, 1972 ADDITION - ASBESTOS-CONTAINING DRYWALL JOINT COMPOUND ON DRYWALL WALLS AND CEILINGS THROUGHOUT.
ORIGINAL BUILDING - ASBESTOS-CONTAINING BEIGE SEALANT ON INTERIOR DOOR FRAMES AND BROWN SEALANT ON EXTERIOR DOOR FRAMES THROUGHOUT.
ORIGINAL BUILDING - ASBESTOS-CONTAINING LIGHT HEAT SHIELDS SUSPECTED WITHIN LIGHT FIXTURES THROUGHOUT.
ORIGINAL BUILDING - ASBESTOS-CONTAINING FLOOR TILE MASTIC THROUGHOUT.
1959 ADDITION - ASBESTOS-CONTAINING GREY SEALANT ON INTERIOR/EXTERIOR WINDOW FRAMES THROUGHOUT.
1959 ADDITION - ASBESTOS-CONTAINING WHITE SEALANT ON INTERIOR DOOR FRAMES AND BROWN SEALANT ON EXTERIOR DOOR FRAMES THROUGHOUT.
1972 ADDITION - ASBESTOS-CONTAINING BROWN SEALANT ON INTERIOR/EXTERIOR DOOR FRAMES AND INTERIOR/EXTERIOR WINDOW FRAMES THROUGHOUT.
1972 ADDITION - ASBESTOS-CONTAINING FLOOR TILE MASTIC THROUGHOUT.
MIXTURE OF ASBESTOS-CONTAINING CEILING TILES AND NON-ASBESTOS CONTAINING CEILING TILES WITH THE SAME PATTERN THROUGHOUT ROOMS INDICATED AS HAVING ASBESTOS-CONTAINING CEILING TILES.

NOTES:

ALL DRAWINGS TO BE REFERENCED WITH THE ASSOCIATED REPORT, LOCATIONS AND QUANTITIES ARE APPROXIMATE.

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.

THIS FIGURE IS COLOUR DEPENDENT, PHOTOCOPIES MAY ALTER INTERPRETATION OF THE FIGURE. ALWAYS REFER TO ORIGINAL DRAWINGS AND REPORT.

Legend

- 13 — Fixed Reference Number
- No Access
- Post 1986 Construction

Asbestos-Containing Materials (ACM):

- Floor Tile
- Rolled Flooring
- Ceiling Tile
- Friable Soft Textured Ceiling
- Non-Friable Hard Textured Ceiling
- Spray-On Fire Proofing
- Transite (Asbestos Cement) Paneling
- Duct Insulation
- x2(1) — Pipe Fitting Insulation w Quantity (Brackets Indicate # of Damaged Fittings)
- Pipe Insulation (Vertical and Horizontal)
- Transite (Asbestos Cement) Pipe (Vertical and Horizontal)
- x2(1) — Duct Expansion Joints w Quantity (Brackets Indicate # of Damaged Joints)
- Friable Debris

MTE
Engineers, Scientists, Surveyors
Ph. (519) 743-6500 www.mte85.com

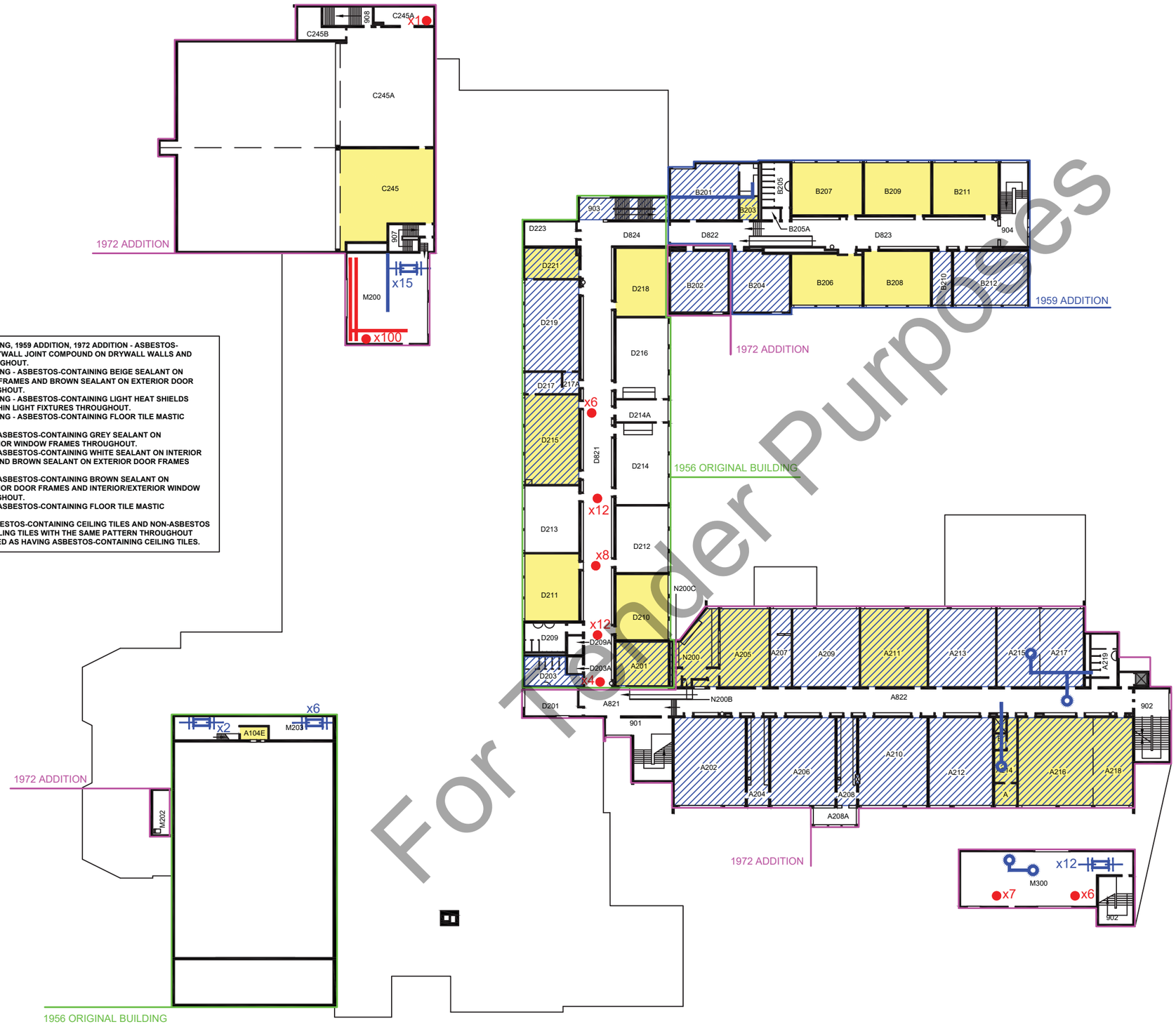
CLIENT
WATERLOO REGION DISTRICT SCHOOL BOARD

PROJECT
2023 ASBESTOS AUDIT UPDATE

DRAWING
GLENVIEW PARK SECONDARY SCHOOL

LEVEL ONE

Project Manager PXS	Date January 2023
Design By WRDSB	Project No. 34532-941
Drawn By SGL	Drawing No. 1.0
Scale N.T.S.	



ORIGINAL BUILDING, 1959 ADDITION, 1972 ADDITION - ASBESTOS-CONTAINING DRYWALL JOINT COMPOUND ON DRYWALL WALLS AND CEILINGS THROUGHOUT.
ORIGINAL BUILDING - ASBESTOS-CONTAINING BEIGE SEALANT ON INTERIOR DOOR FRAMES AND BROWN SEALANT ON EXTERIOR DOOR FRAMES THROUGHOUT.
ORIGINAL BUILDING - ASBESTOS-CONTAINING LIGHT HEAT SHIELDS SUSPECTED WITHIN LIGHT FIXTURES THROUGHOUT.
ORIGINAL BUILDING - ASBESTOS-CONTAINING FLOOR TILE MASTIC THROUGHOUT.
1959 ADDITION - ASBESTOS-CONTAINING GREY SEALANT ON INTERIOR/EXTERIOR WINDOW FRAMES THROUGHOUT.
1959 ADDITION - ASBESTOS-CONTAINING WHITE SEALANT ON INTERIOR DOOR FRAMES AND BROWN SEALANT ON EXTERIOR DOOR FRAMES THROUGHOUT.
1972 ADDITION - ASBESTOS-CONTAINING BROWN SEALANT ON INTERIOR/EXTERIOR DOOR FRAMES AND INTERIOR/EXTERIOR WINDOW FRAMES THROUGHOUT.
1972 ADDITION - ASBESTOS-CONTAINING FLOOR TILE MASTIC THROUGHOUT.
MIXTURE OF ASBESTOS-CONTAINING CEILING TILES AND NON-ASBESTOS CONTAINING CEILING TILES WITH THE SAME PATTERN THROUGHOUT ROOMS INDICATED AS HAVING ASBESTOS-CONTAINING CEILING TILES.

NOTES:

ALL DRAWINGS TO BE REFERENCED WITH THE ASSOCIATED REPORT, LOCATIONS AND QUANTITIES ARE APPROXIMATE.

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Legend

- 13 — Fixed Reference Number
- No Access
- Post 1986 Construction

Asbestos-Containing Materials (ACM):

- Floor Tile
- Rolled Flooring
- Ceiling Tile
- Friable Soft Textured Ceiling
- Non-Friable Hard Textured Ceiling
- Spray-On Fire Proofing
- Transite (Asbestos Cement) Paneling
- Duct Insulation
- x2(1) — Pipe Fitting Insulation w Quantity (Brackets Indicate # of Damaged Fittings)
- Pipe Insulation (Vertical and Horizontal)
- Transite (Asbestos Cement) Pipe (Vertical and Horizontal)
- x2(1) — Duct Expansion Joints w Quantity (Brackets Indicate # of Damaged Joints)
- Friable Debris

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CLIENT
WATERLOO REGION DISTRICT SCHOOL BOARD

PROJECT
2023 ASBESTOS AUDIT UPDATE

DRAWING
GLENVIEW PARK SECONDARY SCHOOL

LEVEL TWO

Project Manager: PXS	Date: January 2023
Design By: WRDSB	Project No.: 34532-941
Drawn By: SGL	Drawing No.: 1.1
Scale: N.T.S.	

Appendix 01 35 34B– Lead Report

Waterloo Region
District School Board

51 Ardelt Avenue, Kitchener, ON N2C 2R5
Tel: 519-570-0003, Fax: 519 576-0478
FACILITY SERVICES

February 19, 2025

RE: Paint and Coatings Bulk Sampling – Letter of Findings
Glenview Park SS, 55 McKay St, Cambridge, ON N1R 4G8
Project-Specific Work Areas – Second Floor A wing

1. INTRODUCTION

Paint and coatings samples were collected for lead content analysis within Glenview Park SS, specifically in the second floor A wing. The samples were collected from surfaces within the project-specific location and submitted to ALS Environmental for the determination of lead content.

The extent of our paint sample collection and assessment area is outlined on the floor plan attached in Appendix A.

2. METHODOLOGY

An assessment for lead in paint was conducted by retrieving paint chip samples from representative surfaces within the area assessed that were deemed to have a potential to be disturbed as part of the planned renovation activities. The condition of painted surfaces from which samples were taken were also visually assessed for signs of deterioration such as cracking, chipping, flaking, bubbling and deterioration due to friction. Based on the degree and extent of deterioration, the conditions of these surfaces were assessed as good, fair, or poor.

The number of paint chip samples retrieved for analysis was based on surface colours observed. Samples were not retrieved from paint finishes with limited application. All paint chip samples were retrieved by scraping the paint down to the base material substrate to ensure collection of all layers of paint. Additional care was taken to avoid collection of the underlying substrate to reduce analytical substrate matrix interference.

Upon completion of our assessment, a paint chip sample was submitted to ALS Environmental for the determination of lead content. Analysis was conducted by the laboratory following the EPA Method 6010. Result of analysis was reported by the laboratory in micrograms per gram (µg/g).

3. RESULTS

Results of analysis for the determination of lead content are summarized in Table 1, below. The Laboratory Certificate of Analysis is included as Appendix B.

TABLE 1: Summary of Lead-in-Paint Analytical Results

Sample No.	Location	Surface	Paint Colour	Condition	Lead Conc. (µg/g)	EACC Classification
S1	FR#A219	Throughout	Red	Fair	135	'*De Minimis'* Level of Lead
S2	FR#A219	Throughout	Dark Beige	Fair	40.6	'*De Minimis'* Level of Lead
S3	FR#A218	Throughout	Light Beige	Fair	339	'*De Minimis'* Level of Lead
S4	FR#A212	Throughout	Blue	Good	819	'*De Minimis'* Level of Lead
S5	FR#A822	Throughout	Beige	Good	<5.0	'*De Minimis'* Level of Lead

Note: 1 mg/kg = 1 µg/g

4. CONCLUSIONS

'*De* Minimis*'* Level of Lead in Paint

All paint samples collected were determined to have a lead content below 1000 µg/g Lead by Weight, which is considered a "*de minimis*" level of lead in paint as per the EACC Lead Guideline for Construction, Renovation, Maintenance or Repair. Provided these materials are disturbed in a non-aggressive manner and the work is performed using normal dust control procedures, the worker protection from the inhalation of lead is not required.

All paint samples collected for lead content analysis were found to have lead concentrations below 1000 µg/g (0.1% Lead by Weight) and are considered to have a '*de minimis*' level of lead in paint as per the EACC Lead Guideline for Construction, Renovation, Maintenance or Repair. Provided these materials are disturbed in a non-aggressive manner and the work is performed using normal dust control procedures, the worker protection from the inhalation of lead is not required.

Prepared by:

Daniela Budure
Environmental Officer

Appendix A
Extent of Assessment Area & Paint Sample Locations

FIXED REFERENCE ROOM NUMBERS

WATERLOO REGION DISTRICT SCHOOL BOARD

PROJECT: GLENVIEW PARK SECONDARY SCHOOL - CAMBRIDGE

TITLE: SECOND FLOOR PLAN - FIXED REFERENCE ROOM NUMBERS

Date:	JULY 2023	Appr.:	.
Drawn by:	ADO	Dwg.No:	3 OF 3
Scale:	1" = 60'-0"		
Prev Rev:	JULY 2022 ADO		

Appendix B
Laboratory Certificate of Analysis

CERTIFICATE OF ANALYSIS

Work Order	:	**WT2502803**			
Client	:	**Waterloo Region District School Board**	Laboratory	:	ALS Environmental - Waterloo
Contact	:	Daniela Budure	Account Manager	:	Candice Hunter
Address	:	51 Ardelt Avenue Kitchener Ontario Canada N2C 2E1	Address	:	60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	:	519-570-0003 ext. 4300	Telephone	:	+1 519 886 6910
Project	:	GLENVIEW PARK SS	Date Samples Received	:	14-Feb-2025 08:40
PO	:	----	Date Analysis Commenced	:	18-Feb-2025
C-O-C number	:	----	Issue Date	:	18-Feb-2025 21:12
Sampler	:	CLIENT			
Site	:	----			
Quote number	:	Non - Regulated Standing SOA			
No. of samples received	:	5			
No. of samples analysed	:	5			

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Nik Perkio	Senior Analyst	Metals, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	*Description*
mg/kg	milligrams per kilogram

<: less than.
>: greater than.
Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

<1 or Not Detected with LOR of 1 equals Zero (0).

Analytical Results

Sub-Matrix: Paint Chips
(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab	LOR	Unit	S1-LOCATION FR#A219-RED	S2-LOCATION FR#A219-DARK BEIGE	S3-LOCATION FR#A218-LIGHT BEIGE	S4-LOCATION FR#A212-BLUE	S5-LOCATION FR#A822-BEIGE
Client sampling date / time					12-Feb-2025 14:30	12-Feb-2025 14:30	12-Feb-2025 14:30	12-Feb-2025 14:30	12-Feb-2025 14:30
					WT2502803-001	**WT2502803-002**	**WT2502803-003**	**WT2502803-004**	**WT2502803-005**
					Result	Result	Result	Result	Result
Metals									
Lead	7439-92-1	E494.Pb/WT	5.0	mg/kg	135	40.6	339	819	<5.0

Please refer to the General Comments section for an explanation of any result qualifiers detected.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2502803**	Page	: 1 of 5
Client	: **Waterloo Region District School Board**	Laboratory	: ALS Environmental - Waterloo
Contact	: Daniela Budure	Account Manager	: Candice Hunter
Address	: 51 Ardelt Avenue Kitchener ON Canada N2C 2E1	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 519-570-0003 ext. 4300	Telephone	: +1 519 886 6910
Project	: GLENVIEW PARK SS	Date Samples Received	: 14-Feb-2025 08:40
PO	: ----	Issue Date	: 18-Feb-2025 21:12
C-O-C number	: ----		
Sampler	: CLIENT		
Site	: ----		
Quote number	: Non - Regulated Standing SOA		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 -

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page of

Report To	Contact and company name below will appear on the final report
Company:	Waterloo Region District School Board
Contact:	Daniela Budure
Phone:	519-577-5854
	Company address below will appear on the final report
Street:	51 Ardelt Ave
City/Province:	Kitchener/ON
Postal Code:	

Invoice To		
	Same as Report To	☑ YES ☐ NO
	Copy of Invoice with Report	☐ YES ☐ NO
Company:		
Contact:		

Project Information	
ALS Account # / Quote #:	
Job #:	Glenview Park SS
PO / AFE:	
LSD:	

ALS Lab Work Order # (lab use only): WT2502803

Reports / Recipients

Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☐ YES ☐ NO ☐ N/A

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: daniela_budure@wrdsb.ca

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Finance-ap@wrdsb.ca

Email 2:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Contact: Candice **Sampler:**

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharg

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharg

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge

Same day [E2] if received by 10am M-S - 200% rush sur

☐ fees may apply to rush resuests on weekends, statutory ho routine tests

Date and Time Required for all E&P TATs:

For tests that can not be performed accordi

Analysis

Indicate Filtered (F), Preserved (P) or Filter

Environmental Division
Waterloo
Work Order Reference
WT2502803

Telephone : +1 519 886 6910

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	LEAD CONTENT	SAMPLES ON HO	EXTENDED STORAGE	SUSPECTED HAZARD
	S1 - Location FR#A219 - Red	12-Feb-25	14:30	Paint	1	R			
	S2 - Location FR#A219 - Dark Beige	12-Feb-25	14:30	Paint	1	R			
	S3 - Location FR#A218 - Light Beige	12-Feb-25	14:30	Paint	1	R			
	S4 - Location FR#A212 - Blue	12-Feb-25	14:30	Paint	1	R			
	S5 - Location FR#A822 - Beige	12-Feb-25	14:30	Paint	1	R			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?

☐ YES ☑ NO

Are samples for human consumption/ use?

☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (lab use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				18.6			

SHIPMENT RELEASE (client use)

Released by: [signature] Date: Feb 14, 2025 Time:

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: Date: Time:

FINAL SHIPMENT RECEPTION (lab use only)

Received by: [signature] Date: 14-Feb-25 Time: 8:40

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

$502.32

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 KIA 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, UA 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 Avenuse, 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 9101Quincy, 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

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 Subontractor. 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

1 General

1.1 SUMMARY

.1 Review drawings, site conditions, and other specification sections to ascertain the extent and nature of work of this section.

.2 The Work of this Section includes, but is not limited to the following:

.1 Demolish and removal of the following were indicated on the Drawings:

.1 Ceiling tiles and suspension grid scheduled for demolition, complete with existing light fixtures and equipment as scheduled.

.2 Partitions and associated framing.

.3 Millwork and associated support framing as scheduled.

.4 Roofing materials for installation of new roof top units.

.5 Mechanical equipment and fixtures scheduled, including all associated piping and hangers.

.6 Electrical equipment and fixtures scheduled, including all associated hardware and hangers.

.2 Disconnect/cap existing service in areas of demolition.

.3 Trace, demolish and remove decommissioned mechanical and electrical services found during demolition. Remove decommissioned services to the area of demolition to the source, leaving no buried services in walls and floors, unless otherwise approved by written notice from the Owner.

.4 Dispose of demolished materials except where required to be salvaged or reused.

.5 Refer to demolition notes indicated on all disciplines Drawings.

.3 Drawings contain details that suggest directions for solving some of the major demolition and removal requirements for this project; Contractor is required to develop these details further by submitting a demolition plan prepared by a professional engineer employed by the Contractor.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 American National Standards Institute (ANSI):

.1 ANSI A10.8, Scaffolding Safety Requirements

.5 American Society for Testing and Materials (ASTM):

.1 ASTM C475/C475M, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board

.6 Canadian Standards Association (CSA):

.1 CSA S350- M, Code of Practice for Safety in Demolition of Structures.

.7 National Fire Protection Association (NFPA):

.1 NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations

.8 Provincial Legislation:

.1 Comply with all applicable local and provincial legislative requirements specific to Authority Having Jurisdiction for work governed by this Section.

.1 CSA S350 “Code of Practice for Safety in Demolition of Structures”;

.2 Canadian Construction Safety Code;

.3 Employ rodent and vermin exterminators as required by health regulations.

.4 Obtain and pay for all necessary permits for waste and audit plans in compliance with provincial regulations.

1.3 DEFINITIONS

.1 Demolish: Detach items from existing construction and legally dispose of them off site, unless indicated to be removed and salvaged or removed and reinstalled.

.2 Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

.3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

.4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed and salvaged, or removed and reinstalled.

1.4 EXAMINATION

.1 Visit and examine the site and note all characteristics and irregularities affecting Work of this Section. Submit a pre-demolition inspection report. Ensure the Owner of premises being inspected is represented at inspection.

.2 Where appropriate prepare a photographic or video record of existing conditions, particularly of existing work scheduled to remain.

.3 Where applicable, examine adjacent tenancies not part of the scope of work. Determine extent of protection required to areas and related components not subject to demolition.

1.5 SUBMITTALS

.1 Provide required information in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Prepare schedule in conjunction with overall project schedule and outline proposed methods in writing. Obtain approval before commencing demolition work, and indicate the following:

.1 Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.

.2 Interruption of utility services.

.3 Coordination for shutoff, capping, and continuation of utility services.

1.6 QUALITY ASSURANCE

.1 Conform to requirements of all authorities having jurisdiction.

.2 Comply with applicable requirements of CSA S350-M "Code of Practice for Safety in Demolition of Structures".

.3 Work of this Contract shall be executed by an approved company having a minimum of five (5) years continuous experience and able to deploy adequate equipment and skilled personnel to complete work expediently in an efficient and orderly manner.

.4 Perform cutting and coring, where applicable, by a firm specializing in this type of work, able to produce evidence of successful completion of similar work over a period of at least five (5) years immediately prior to date of contract.

.5 Apply for, secure, arrange and pay for all permits, notices and inspections necessary for proper execution and completion of work in this Section.

.6 Professional Engineer Qualifications: Procure the services of a professional engineer who is experienced in providing relevant engineering services to perform the following:

.1 Review portions of the Work requiring structural performance, prepare plan of action, engineer temporary shoring and bracing, and Provide site administration and inspection for work of this Section.

1.7 PROTECTION

.1 Prevent movement or settlement of adjacent work. Provide and place bracing or shoring and be responsible for safety and support of such work. Be liable for any such movement or settlement, and any damage or injury caused.

.2 Cease operations and notify Consultant if safety of any adjacent work or structure appears to be endangered. Take all precautions to support the structure. Do not resume operations until reviewed with the Consultant.

.3 Prevailing weather conditions and weather forecasts shall be considered. Demolition work shall not proceed when weather conditions constitute a hazard to the workers and site.

.4 Prevent damage of surrounding vegetation by construction.

.5 Prevent debris from blocking surface drainage inlets and mechanical and electrical systems which remain in operation.

.6 Temporarily suspended work that is without continuous supervision shall be closed to prevent entrance of unauthorized persons.

1.8 PROTECTION OF SERVICES AND STRUCTURES

.1 Take necessary precautions to guard against movement, settlement or collapse of existing adjacent utility services, public property and/or structures, whether to remain or not. If these or other unforeseen conditions develop, take immediate emergency measures, report to Consultant, confirm in writing, and await instructions before proceeding with any further related demolition work.

.2 Prior to saw cutting or core drilling of existing concrete slabs, use ground penetrating radar (GPR) to detect utilities and structural reinforcing. Concrete X-Rays can be used when access to both sides of concrete slab is accessible for placement of required x-ray film.

1.9 EXISTING SERVICES

.1 Prior to start of demolition disconnect all electrical service lines in the areas to be demolished. Post warning signs on all electrical lines and equipment which must remain energized to serve other areas during period of demolition. Disconnect electrical service lines in demolition areas to the requirements of local authority having jurisdiction.

.2 In each case, notify the affected utility company in advance and obtain approval where required before commencing with the work on main services.

.3 Arrange with utility companies for locating of such services and for disconnection of existing services owned by utility companies and which will be disconnected by said utility companies, provided such services do not interfere with adjacent tenancy operators.

.4 Remove sewer and water lines where required within existing building as deemed necessary, and cap to prevent leakage, in accordance with authorities having jurisdiction.

1.10 DECOMMISSIONED SERVICES

.1 Remove fully decommissioned electrical and mechanical service lines, plumbing, ducting, fixtures and all fasteners and supports for decommissioned items.

.1 Remove sewer and water lines where required within existing building as deemed necessary, and cap to prevent leakage, in accordance with authorities having jurisdiction.

.2 Patch and repair surfaces affected by this selective demolition to match existing adjacent surfaces, as approved by the Consultant.

1.11 EXISTING WARRANTIES

.1 Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

2 Products

2.1 DEBRIS, SALVAGED MATERIAL AND EQUIPMENT DISPOSAL

.1 All materials and or equipment salvaged from demolition work becomes property of demolition Contractor unless designated otherwise.

.2 At no cost to Owner repair or replace material and/or equipment scheduled to remain which is damaged by demolition work. Do not sell any salvaged material or equipment directly from project site.

.3 Remove waste debris continually and entirely from project site during demolition work. Do not load vehicles transporting such debris beyond their safe capacity or in a manner which might cause spillage on public or private property. If spillage does occur, clean up immediately to prevent traffic hazards or nuisance.

2.2 PROTECTION - DUST TIGHT SCREENS

.1 Vertical Temporary Protection:

.1 Provide dust tight screens or barriers to localize dust generating activities for the protection of tenants, employees, equipment, adjacent and finished areas of Work, and the public. Maintain and relocate protection until Work is complete. Respond immediately to complaints of dust received from the public, authorities having jurisdiction, Owner and Consultant.

.2 Obtain Consultant's approval of installed dustproof screens and protection methods before proceeding with construction/alteration work.

.3 Painted gypsum wallboard and metal stud dustproof screens, shall extend to underside of structure, and shall be erected to protect adjoining areas and rooms.

.4 Apply bead of sealant or other acceptable seal continuously around periphery of each face of partitioning to seal gypsum board/structure junction where dustproof screens abut fixed building components. Seal perimeter of cutouts, around fixtures and fittings and other penetrations. Tape or seal between adjacent boards. Separate construction areas from occupied areas.

.5 Provide protection for existing equipment sensitive to dust and noise. Prevent dust migration through HVAC or return air systems.

.6 Co-ordinate location of dust barriers and dust tight doors with Consultant.

.7 Install temporary packing at bottom of doors to areas where demolition/construction shall be performed to prevent dust seepage into existing spaces. Do not permit dust and dirt to escape beyond area being constructed/altered.

.8 Provide daily vacuuming of construction dust from existing areas as work progresses; this shall be considered a minimum requirement, increase vacuuming as necessary. The Owner may have vacuuming work done by others and cost deducted from Contractor's progress payments if this requirement is not fulfilled.

.9 Remove dustproof screens at completion of work in areas and make good damaged or blemished areas. Patch and make good to access, altered and damaged areas caused by work and screens. Maintain integrity of fire or sound separation.

.2 Horizontal Temporary Protection:

.1 Supply and install durable paperboard that rolls out flat, complete with taped seams to seal out liquids.

.2 Basis of Design Materials: Ram Board Plus by ULINE.ca.

2.3 REPAIR MATERIALS

.1 Use repair materials identical to existing materials:

.1 If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

.2 Use a material whose installed performance equals or surpasses that of existing material.

.3 Comply with material and installation requirements specified in individual Specification Sections.

.2 Concrete Unit Masonry: Lightweight concrete masonry units, and mortar, cut and trimmed to fit existing opening to be filled. Provide standard hollow core units, square end units and bond beam units as indicated on Drawings.

.3 Brick: Install brick and mortar, cut and trimmed to fit existing opening to be filled, once demolition of hollow metal door and frame is completed. Match brick and mortar to existing adjacent materials as approved by the Consultant. Provide ties and accessories as required to complete the installation.

.4 Gypsum Board Patching Compounds: Joint compound to ASTM C475, bedding and finishing types thinned to provide skim coat consistency to patch and prepare existing gypsum board walls ready for new finishes in accordance with Section 09 29 00.

.5 Fireproofing: Patch and repair all fireproofing damaged during demolition of adjacent surfaces with compatible fireproofing materials. Provide test reports from fireproofing manufacture warranting installation, adhesion and compatibility between existing and new fireproofing materials.

.6 Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to Section 07 01 50 Maintenance Roofing Work for new roofing requirements.

2.4 EXISTING MATERIALS

.1 Items to be retained for re-use in new construction include, but are not limited to the following:

.1 Acoustic Ceiling Tile and Suspension System: Reconfigure for use with recessed lighting, as indicated on the Drawings.

.2 Confirm with Owner any materials that appear to be in re-usable condition prior to disposal.

.1 Owner has first right of refusal for all materials that appear to be in re-usable condition.

.3 Confirm with Consultant any materials scheduled for re-use that are not in re-usable condition prior to installation.

3 Execution

3.1 GENERAL

.1 Exercise caution in dismantling, disconnecting of work adjacent to existing work designated to remain.

.2 Carry out demolition in a manner to cause as little inconvenience to the adjacent properties as possible.

.3 Carry out demolition in an orderly and careful manner.

.4 Demolition by explosives is not permitted.

.5 Selling or burning of materials on site is not permitted.

.6 Lower waste materials in a controlled manner; do not drop or throw materials from heights.

.7 At end of each day's work, leave in safe condition so that no part is in danger of toppling or falling.

3.2 SAFETY AND SECURITY

.1 Maintain security of the building at all times during demolition work.

.2 Provide and maintain fire prevention equipment and alarms accessible during demolition.

3.3 ACCESS ROUTES

.1 Restrict operations to designated access routes.

.2 Do not obstruct roads, parking lots, sidewalks, hydrants and the like.

3.4 SELECTIVE DEMOLITION

.1 Provide necessary shoring and supports to assure safety of structure prior to cutting and coring.

.2 Where practical, sawcut and remove material as required.

.3 Where sawcutting is not appropriate, use suitable hand tools.

.4 Demolish, cut-out and remove from site all other work noted on drawings or required to permit new construction.

.5 Fill all openings in concrete block walls with concrete masonry units, coursing to match existing, prepare ready to receive new finishes to match existing.

.1 Provide bond beams in new openings cut into existing concrete masonry unit walls.

.2 Provide finished end masonry units to patch and repair for new jamb sections in existing concrete masonry unit walls.

.6 Fill all openings in gypsum board walls with gypsum board and steel framing to match existing, skim coat to make wall smooth and even.

.7 Demolish completely all ceiling panels and grid noted as demolition, and not requiring reinstallation in new reflective ceiling plan layout.

.8 Patch and repair all walls, floor and ceilings damaged during demolition with material matching adjacent walls, prepare ready for new finishes.

.1 Prepare existing surfaces schedule to receive new finish by grinding, filling, over-coating, stripping, washing, etching, shot blasting or other chemical or mechanical means, as required to ensure satisfactory installation of new finish.

.9 Exterior Walls:

.1 Where existing doors and/or windows are schedule to be removed during demolition, patch and repair exterior walls using similar wall construction techniques as adjacent wall construction.

.2 Ensure compatibility between insulation, air barrier and vapour retarder, providing continuous air and vapour control and wall R-Value between existing and new construction.

.3 Provide exterior and interior finish materials, matching existing adjacent materials, to provide an even-plane surface of uniform appearance.

.10 Interior Walls:

.1 Where existing doors and/or windows are schedule to be removed during demolition, patch and repair interior walls using similar wall construction techniques as adjacent wall construction.

.2 Ensure compatibility between new and existing wall components, providing continuity between control layers within the original wall design.

.3 Provide exterior and interior finish materials, matching existing adjacent materials, to provide an even-plane surface of uniform appearance.

3.5 EXCESSIVE DEMOLITION

.1 Where excessive demolition occurs, be responsible for cost of replacing such work.

.2 Consultant shall determine extent of such 'over-demolition' and method of rectification.

3.6 COMPLETION

.1 Leave project site as directed, reasonably clean and presentable, free from above grade debris, any salvaged material and/or equipment except those designated to remain.

.2 Maintain access to exits clean and free of obstruction during removal of debris.

END OF SECTION

1 General

1.1 SUMMARY

.1 Hazardous materials have been identified as being present in the building; abatement and removal form a part of the Work of the Project.

1.2 RELATED REQUIREMENTS

.1 Section 02 41 19: Selective Demolition

1.3 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards

.4 Environment Canada:

.1 Canadian Environmental Protection Act, Latest

.2 Export and Import of Hazardous Waste Regulations (Latest), including amendments

.5 Health Canada:

.1 Safety Data Sheets (SDS)

.2 Workplace Hazardous Materials Information System (WHMIS)

.6 Transport Canada:

.1 Transportation of Dangerous Goods Act, Latest

.2 Transportation of Dangerous Goods Regulations, including amendments

1.4 DEFINITIONS

.1 Dangerous Goods: Product, substance, or organism that is specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.

.2 Hazardous Material: Product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.

.3 Hazardous Waste: Any hazardous material that is no longer used for its original purpose and that is intended for recycling, treatment or disposal.

.4 Workplace Hazardous Materials Information System (WHMIS): Canada wide system designed to give employers and workers information about Hazardous Materials used in workplace. Under WHMIS, information on Hazardous Materials is provided on container labels, safety data sheets (SDS), and worker education programs. WHMIS is put into effect by combination of federal and provincial laws.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Construction Meeting: Conduct a meeting at Project site in accordance with requirements listed in Division 01, to confirm extent of Hazardous Materials abatement and removal to review Contractor's project requirements, site safety concerns and scheduling requirements and to establish procedures for any materials listed in the hazardous materials report.

.2 Coordination: Coordinate Hazardous Materials work so that work of this Section adheres to criteria indicated in the Hazardous Materials Report prepared by a specialist consultant retained by the Owner.

1.6 EXAMINATION

.1 Visit and examine the site and note all characteristics and irregularities affecting Work of this Section. Submit a pre-demolition inspection report. Ensure the Owner of premises being inspected is represented at inspection.

.2 Where appropriate prepare a photographic or video record of existing conditions, particularly of existing work scheduled to remain.

.3 Where applicable, examine adjacent tenancies not part of the scope of work. Determine extent of protection required to areas and related components not subject to demolition.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements: Perform work of this section in accordance with environmental, fire, health and safety acts, codes and regulations as established by the Authority Having Jurisdiction.

.2 Qualifications: Provide proof of qualifications when requested by Consultant:

.1 Abatement and Removal Personnel: Use contractors, subcontractors or personnel who have specific training and experience with the abatement and removal of Hazardous Materials identified as being present at the project site; train personnel in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.

.2 Insurance: Use a hazardous materials abatement company that has adequate insurance for performing work of this Section.

.3 Equipment: Use equipment, storage containers and other temporary facilities appropriate to the level of risk presented by the Hazardous Materials identified as being present at the project site and that are acceptable to the Authority Having Jurisdiction.

1.8 SITE CONDITIONS

.1 Hazardous materials identified in the Hazardous Materials report and other related information referenced in the Contract Documents are for the information only, and does not represent a warranty by the Consultant of actual site conditions; use of this information is at Contractor and Subcontractor's own risk.

.2 Visit site to become acquainted with site conditions before submitting Bids to derive an opinion on the results of the information presented by the Hazardous Materials Report and the extent of work required to complete the requirements of this Section.

.3 The Consultant and Owner recognize that conditions indicated in the Hazardous Materials Report actually encountered during construction may differ from the information presented in the Hazardous Materials Report; where this occurs the changed conditions will be administered as a change in accordance with the Contract.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Storage and Handling Requirements: Store and handle Hazardous Materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines and as follows:

.1 Store and handle flammable and combustible materials in accordance with current Fire Code requirements.

.2 Store Hazardous Materials and wastes in closed and sealed containers.

.3 Label containers of Hazardous Materials and wastes in accordance with WHMIS.

.4 Store Hazardous Materials and wastes in containers compatible with that material or waste.

.5 Segregate incompatible materials and wastes.

.6 Ensure that different Hazardous Materials or hazardous wastes are not mixed.

.7 Store Hazardous Materials and wastes in secure storage area with controlled access.

.8 Maintain clear egress from storage area.

.9 Store Hazardous Materials and wastes in location that will prevent them from spilling into environment.

.10 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.

.11 Maintain inventory of Hazardous Materials and wastes, including product name, quantity, and date when storage began.

.12 Report spills or accidents immediately to Consultant and submit a written spill report within 24 hours of incident.

.2 Transportation: Transport Hazardous Materials and wastes in accordance with federal Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations and as follows:

.1 Comply with federal Export and Import of Hazardous Waste Regulations where it is necessary to export hazardous waste to another country.

.2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.

.3 Use licensed carrier authorized by provincial authorities to accept subject material.

.4 Obtain written notice from intended hazardous waste treatment or disposal facility that it will accept material and that it is licensed to accept this material prior to shipping hazardous waste.

.5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.

.6 Use trained personnel to handle, offer for transport, or transport dangerous goods.

.7 Provide photocopy of shipping documents and waste manifests to Consultant.

.8 Track receipt of completed manifest from consignee after shipping dangerous goods; provide a photocopy of completed manifest to Consultant.

.9 Report discharge, emission, or escape of Hazardous Materials immediately to Authority Having Jurisdiction and Consultant; take reasonable measures to control release.

2 Products

2.1 MATERIALS

.1 Provide all temporary facilities, equipment, containers and spill remediation kits required by Authority Having Jurisdiction and as necessary to complete the work of this Section.

.2 Provide SDS in proximity to where materials are being stored; communicate this location to personnel who may have contact with hazardous waste materials.

3 Execution

3.1 DISPOSAL

.1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.

.2 Recycle hazardous wastes where there is approved, cost effective recycling process available.

.3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.

.4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.

.5 Disposal of Hazardous Materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.

.6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.

.7 Take necessary precautions to avoid mixing clean and contaminated wastes.

.8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:

.1 Hazardous wastes recycled in manner constituting disposal.

.2 Hazardous waste burned for energy recovery.

.3 Lead acid battery recycling.

.4 Hazardous wastes with economically recoverable precious metals.

.5 Additional items identified during the course of the work.

.9 Sequence abatement and removal of Hazardous Materials with selective demolition work; complete removal of Hazardous Materials and make areas clean before actual start of demolition activities.

END OF SECTION

1 General

1.1 SUMMARY

.1 Work of this Section includes the supply and installation of the following concrete floor treatments, as well as testing and measurement for floor flatness and levelness.

.1 Liquid-Applied Penetrating Sealer.

.2 Cementitious Topping, Patching and Flash Patching Materials.

1.2 DEFINITIONS

.1 Floor Classifications: Classification of concrete floor slabs based on their intended use, methods of finishing and finish materials applied to flooring as denoted by the F-rating below, and as follows:

.1 Single Course Floor: Floors placed in a single course with final finishing applied to properly levelled concrete.

.2 Finish or Finishes: Materials applied to finished concrete surface, i.e.: stained or coloured concrete, carpet, resilient flooring or ceramic tile.

.3 Finishing: Methods, tools and equipment employed to achieve levelness or surface flatness for shored slabs, and durability indicated and as follows:

.1 F3-Finishing: Floors having a straightedge value of ±1.6mm over 3048mm (1/6” over 10’); similar to CSA A23.1 Class C Slab Finishing.

1.3 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 Canadian Standards Association (CSA):

.1 CSA A23.1-14/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

1.4 ADMINISTRATION REQUIREMENTS

.1 Coordination:

.1 Coordinate a meeting between the Contractor, Subcontractor responsible for concrete placement, and the Consultant to determine site quality control testing section borders and sample measurement line locations, method of measurement, and accuracy requirements of the measuring devices.

.2 Pre-Construction Meetings:

.1 Arrange meeting with Contractor, Subcontractor for work of this Section and other Subcontractors affected by work of this Section to discuss effects and issues governing installation of concrete finishing materials.

.2 Prepare an outline agenda for meeting in accordance with Division 01.

1.5 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit manufacturer's product data for each materials specified including recommended application rates and methods of installation.

.3 Informational Submittals: Provide the following submittals during the course of the work:

.1 Site Quality Control Submittals: Submit results for straightedge measurements to demonstrate compliance with specified tolerances. Record the following information on a drawing indicating floor slab layout, column locations and slab penetrations:

.1 Indicate variance from specified straightedge measurements as a + or - value.

.2 Failed tests in excess of 50% of the straightedge will require the Subcontractor to flash patch floor to achieve specified tolerance; example of tolerance failure.

1.6 QUALITY ASSURANCE

.1 Subcontractor executing work of this Section shall employ installers having a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Ensure proper use of proprietary materials in strict accordance with the material manufacturer's directions.

1.7 SITE CONDITIONS

.1 Environmental Requirements:

.1 Ensure that adequate temporary heating is provided as required for cold weather work.

.2 Provide adequate moisture, sun shades and wind barriers to prevent too rapid drying of concrete during hot weather.

.2 Protection:

.1 Ensure that finished concrete floor areas are protected from abrasion from foot or wheeled traffic, and from damage caused by spillage of oil or other harmful materials.

2 Products

2.1 MATERIALS

.1 Liquid-Applied Penetrating Sealer (CONC-1):

.1 Clear water-based silane micro emulsion penetrating concrete sealer, formulated to prevent water and chloride intrusion into concrete surfaces.

.2 Basis of Design Materials: Intraguard by WR Meadows.

.2 Topping:

.1 Cementitious, self levelling, single component, polymer modified overlayment, for application thicknesses to a minimum of 19mm to 50mm (¾" to 2").

.2 Basis of Design Materials:

.1 Sikafloor Level 25CA by Sika Canada Ltd.

.2 Ultratop by Mapei Canada Inc.

.3 Gem-Crete TO by W.R. Meadows of Canada

.4 (Or approved equivalent).

.3 Patching and Flash Patching Materials:

.1 Cementitious based, polymer modified, fine aggregate, single component, rapid curing, early strength floor patching compounds having high adhesion, for application in thicknesses to a minimum of 1/8" to 1".

.2 Basis of Design Materials:

.1 SikaQuick 1000 by Sika Canada Ltd.

.2 Planitop 18ES by MAPEI Canada Inc.

.3 Meadow-Crete H by W.R. Meadows of Canada

.4 (Or approved equivalent).

.4 Joint Sealant: Refer to Section 07 92 00.

3 Execution

3.1 EXAMINATION

.1 Before commencing work, ensure that surfaces are acceptable to receive and maintain concrete finishing, and that specified installation will be achieved.

3.2 FINISHING FLOORS AND SLABS

.1 Finish floors and slabs in accordance with CSA A23.1 recommendations for finishing operations for concrete surfaces; do not wet concrete surfaces.

3.3 INSTALLATION

.1 Installation - Liquid-Applied Penetrating Sealer:

.1 Vertical Surfaces:

.1 Apply using a brush, roller or low pressure spray, working from top to bottom by maintaining a 305mm (12") parallel curtain (run down).

.2 When applying the material on a vertical surface, avoid accumulation and run-off of the material. In the event of material accumulation or run-off lines being formed, redistribute the material on the surface or remove by sponging.

.3 Apply flood coat in two (2) passes, "wet on wet" with the second pass at right angles to the first. Material coverage should not be greater than 2.5 m2/L total (100 ft2/US gal.), unless otherwise recommended by the Manufacturer.

.2 Horizontal Surfaces:

.1 Apply using a roller or low pressure spray, ensuring that product penetrates the substrate and does not "pond" or "puddle" on the surface.

.2 If ponding occurs, redistribute or remove the excess material on the surface before material starts to dry and form a film that will prevent penetration of excess material.

.3 Material coverage should not be greater than 4.4 m2/L (180 ft2/US gal.), unless otherwise recommended by the Manufacturer.

.4 Apply flood coat in two (2) passes, "wet on wet" with the second pass at right angles to the first.

.5 Complete and correct coverage of surfaces is crucial to the success of such sealers.

.2 Cementitious Levelling Treatments and Cementitious Topping, Patching and Flash Patching Materials:

.1 Leak Prevention:

.1 Fill cracks and voids in subfloor where leakage of slurry could occur using suitable quick setting patch material or caulk, as recommended by underlayment manufacturer.

.2 Prime substrate according to manufacturer's recommendations.

.3 Installation shall not begin until building is enclosed and ventilated.

.4 Mix levelling treatments and cementitious topping, patching and flash patching materials in accordance with Manufacturer's written instructions.

.5 Pour levelling treatments and cementitious topping, patching and flash patching materials to recommended thickness and immediately spread and screen to desired surface finish and level.

.3 Control Joints:

.1 Follow existing control joints in concrete levelling and topping finishes to prevent cracking. When concrete levelling and topping finishes are firm enough not to be torn or damaged by cutting, cut 5mm (3/16") wide control joints into surface of concrete with abrasive blade power saw.

.2 Once levelling and topping finishes are cured, fill control joints with joint sealant.

.1 Completely clean side joint surfaces of dirt, oil, grease, and similar contaminants, and mask floor surfaces at joints while installing joint sealant.

.2 Prime side joint surfaces with compatible primer if surfaces are not completely dry.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes supply and installation of unit masonry assemblies consisting of the following:

- .1 Veneer Brick
- .2 Standard Concrete Masonry Units (CMUs)
- .3 Fire Rated Concrete Masonry Units (CMUs)
- .4 Mortar, and Grout
- .5 Reinforcing steel
- .6 Masonry joint reinforcement
- .7 Ties and anchors
- .8 Embedded flashing
- .9 Miscellaneous masonry accessories

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 American Concrete Institute: (ACI):

- .1 ACI 530.1/ASCE 6-99/TMS 602, Commentary on Specification for Masonry Structures

.5 Brick Institute Association (BIA)

- .1 BIA Technical Notes 20, Cleaning Brickwork
- .2 BIA Technical Notes 23A - Effloresence, Causes and Prevention

.6 Canadian Standards Association (CSA):

- .1 CSA A165 Series, CSA Standards on Concrete Masonry Units
- .2 CSA A179, Mortar and Grout for Unit Masonry
- .3 CSA A370, Connectors for Masonry
- .4 CAN/CSA A371, Masonry Construction for Buildings
- .5 CSA S304.1, Design of Masonry Structures
- .6 CSA W186-M, Welding of Reinforcing Bars in Reinforced Concrete Construction

.7 American Society for Testing of Materials (ASTM):

- .1 ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- .2 ASTM A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- .3 ASTM A496/A496M, Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement

.4 ASTM A563, Standard Specification for Carbon and Alloy Steel Nuts

.5 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.6 ASTM A1011/A1011M, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength

.7 ASTM C67, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.

.8 ASTM C207, Standard Specification for Hydrated Lime for Masonry Purposes

.9 ASTM C270, Standard Specification for Mortar for Unit Masonry.

.10 ASTM C494, Standard Specification for Chemical Admixtures for Concrete.

.11 ASTM C568/C568, Standard Specification for Limestone Dimension Stone

.12 ASTM E488/E488M, Standard Test Methods for Strength of Anchors in Concrete Elements

.13 ASTM E514/E514M, Standard Test Method for Water Penetration and Leakage Through Masonry

.14 ASTM E2556/E2556M, Standard Specification for Vapour Permeable Flexible Sheet Water Resistive Barriers Intended for Mechanical Attachment.

.15 ASTM F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs

.16 ASTM F594, Standard Specification for Stainless Steel Nuts

.8 Ontario Concrete Masonry Block Association (OCBA):

.1 OCBA Metric Technical Manual

.9 Underwriters Laboratories of Canada (ULC):

.1 ULC List of Equipment and Materials for Fire Rated Construction

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Construction Conference: Arrange a site meeting attended by the contractor's superintendent, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section; agenda for meeting will include; but not be limited to, the following:

.1 Confirmation of specifications and details for the project

.2 Required mortar, grout and concrete testing, batch control and grouting procedures

.3 Installation requirements of air/vapour membranes and insulation and coordination with other components of the Work

.4 Confirmation of cavity compartmentalization and drainage requirements

.5 Confirmation of appearance of exposed block lintels

.6 Confirmation of reinforcement at corners and wall intersections

.7 Coordination of interior and exterior crack control measures

.8 Confirmation of trowelled or tooled joints to concealed and exposed masonry faces

.9 Confirmation of methods for keeping mortar out of cavity space

.10 Confirmation of methods for controlling efflorescence during construction

.11 Confirmation of membranes and membrane flashing materials and details used for construction

.12 Review of submitted masonry unit samples

.13 Review of hot and cold weather requirements

.2 Coordination: Coordinate components of the work of this Section with work performed by other Sections including; but not limited to, the following:

.1 Rain Screen Wall Construction:

.1 Masonry veneer forms a part of the exterior rain screen and protective facing.

.2 Construct assembly to allow for ventilation, drainage and pressure equalization of the voids between the veneer and the insulation with the outside pressures.

.3 Construct cavity space divided into separate compartments as a means of controlling these pressure differences within the building envelope.

.2 Steel Support Angles and Brackets:

.1 Coordinate requirements for structural steel support angles and brackets supplied and installed onto the building structure by Section 05 50 00.

.2 Provide requirements for supply of loose steel lintels and shelf angles installed by this section to Section 05 50 00.

.3 Masonry Anchors:

.1 Coordinate supply of anchor sections connecting to structural frame installed by Section 05 50 00.

.2 Include additional products for coordination furnished, but not installed, under this Section.

.4 Sheet Metal Flashings and Trim: As indicated in Section 07 62 00.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Samples: Submit samples of the following; stone tile panel, concrete block, mortar, masonry reinforcement, ties and anchors, damp course/thru-wall flashing and adhesive, metal drip flashing, mortar dropping control device and weepholes for Consultant's approval before commencing work of this section.

.3 Shop Drawings: Submit shop drawings indicating the following:

.1 Indicate sizes, profiles, coursing, and locations of special shapes for masonry units and stone masonry cladding.

.2 Indicate sizes, profiles, and locations of each stone trim unit required.

.3 Detail corner units, end dam units, and other special applications for fabricated flashings.

.4 Samples for Verification: Submit samples for verification for each type and colour of the following:

.1 Decorative stone masonry cladding units, in the form of small scale units.

.5 Informational Submittals: Provide the following submittals when requested by the Consultant:

.1 Submit ULC Assembly Listings and Materials cut sheets for fire rated assemblies as follows:

.1 Not later than 30 working days following Award of Contract, submit copies of ULC Assembly and Materials Listing for indicating ULC Number and how assembly meets the rating criteria for assemblies listed on drawings or meets requirements of Supplementary Standard SB-3 of Ontario Building Code.

.2 Use the same system and material as would be required for a tested assembly for the project; ULC Listings are tested with the specific materials indicated; substitutions will not be permitted unless evidence of equivalency is confirmed.

.3 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site; include manufacturer's printed instructions for installation.

.6 Certificates: Submit statements of material properties indicating compliance with specified requirements for each type and size of the following:

.1 Masonry Units:

.1 Include material test reports substantiating compliance with requirements.

.2 Include ULC Listings for fire resistance rated materials and construction equivalent to assemblies with indicated on drawings indicating fire resistance ratings.

.2 Cementitious Materials:

.1 Include brand, type, and name of manufacturer for site mixed mortar materials.

.2 Include description of type and proportions of ingredients for pre-blended, dry mortar mixes.

.3 Include description of type and proportions of ingredients for grout mixes.

.3 Accessories:

.1 Reinforcing bars

.2 Joint reinforcement

.3 Anchors, ties, and metal accessories

.4 Site Quality Control Submissions: Submit detailed description of methods, materials, and equipment used in accordance with cold or hot weather requirements; and proposed unit masonry cleaning techniques.

1.5 SITE CONDITIONS

.1 Protection of Masonry: Protect masonry and other work from marking and other damage and as follows:

.1 Cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work during construction until permanent flashings and membranes are completed.

.2 Cover partially completed masonry when construction is not in progress to prevent wetting of inside wythes of construction and contribution to efflorescence.

.3 Extend cover a minimum of 610mm (24") down both sides and hold cover securely in place.

.4 Secure cover a minimum of 610mm (24") down face next to un-constructed wythe and hold cover in place where 1 wythe of multi-wythe masonry walls is completed in advance of other wythes.

.5 Provide adequate bracing for masonry during construction and until permanent lateral supports are in place.

.6 Do not apply uniform floor or roof loads for a minimum of 12 hours and concentrated loads for a minimum of three (3) days after building masonry walls or columns.

.2 Cold Weather Protection:

.1 Keep masonry materials completely free from ice and frost. Use approved smokeless heaters. Do not use scorched sand. Do not use salts, admixtures or antifreezes.

.3 Conform to the following construction requirements indicated in CSA A371-04, paragraph 6.7.2 and 6.7.3:

AIR TEMPERATURE	HEATING OF MATERIALS	PROTECTION
Above 5 deg C	Normal masonry procedures.	Cover walls and materials
Between 0 deg C and 4 deg C	Heat sand or mixing water to a minimum of 20 deg C and a maximum of 70 deg C.	Cover walls and materials to protect from rain or snow for 48 hours.
Between -4 deg C and 0 deg C	Heat sand and mixing water to a minimum of 20 deg C and a maximum of 70 deg C.	Completely cover masonry for 48 hours after laying masonry units.
Between -7 deg C and -4 deg C	Heat sand and mixing water to a minimum of 20 deg C and a maximum of 70 deg C. Source heat shall be provided on both sides of the walls under construction. Windbreaks shall be employed when the wind speed exceeds 25 km/h.	Completely cover masonry with insulating blanks for 48 hours after laying masonry units.
-7 deg C and below	Heat sand and mixing water to a minimum of 20 deg C and a maximum of 70 deg C. Enclosures and supplementary heat shall be provided to maintain an air temperature above 0 deg C. The temperature of the unit when laid shall be not less than 7 deg C.	Provide enclosure and supply supplementary heat to maintain masonry enclosure above 0 deg C for 48 hours after laying masonry units.

.4 Hot Weather Requirements

.1 Comply with hot weather construction requirements contained in reviewed submittals.

.2 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

.3 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.

1.6 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Delivery and Acceptance Requirements: Deliver pre-blended, dry mortar mix in moisture resistant containers designed for lifting and emptying into dispensing silo; store dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

.2 Storage and Handling Requirements: Store masonry units on elevated platforms in a dry location and as follows:

.1 Stack materials on floors of building so that structural design loads are not exceeded; coordinate with Consultant.

.2 Cover tops and sides of stacks with waterproof sheeting securely tied to pallets if units are not stored in an enclosed location; do not install masonry units that become wet until they are dry.

.3 Store cementitious materials on elevated platforms, under cover, and in a dry location; do not use cementitious materials that have become wet or damp.

.4 Store aggregates where grading and other required characteristics can be maintained; store to prevent contamination by substances deleterious to performance and appearance.

.5 Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

2 Products

2.1 MANUFACTURERS

.1 Subject to compliance with requirements listed in this Section, manufacturers listed as offering products may be incorporated into the Work; alternates may be considered by the Consultant when submitted a minimum of five (5) days before closing of Bids.

.2 Manufacturer all exposed masonry by one manufacturer to provide uniform in colour, shade and texture.

2.2 BRICK VENEER UNITS

.1 Burned Clay Brick: Manufactured in accordance with CAN/CSA A82, and as follows:

.1 Grade: Exterior Grade (EG)

.2 Type: X

.3 Size, Colour, and Texture: To match adjacent brick veneer, as approved by the Consultant.

.2 Special Shapes:

.1 Provide units without cores or frogs and with exposed surfaces finished for ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces.

.2 Provide special shapes for applications where stretcher units cannot accommodate special conditions, including at corners, movement joints, bond beams, sashes, and lintels.

.3 Provide special shapes for applications requiring brick of size, form, colour, and texture on exposed surfaces that cannot be produced by sawing.

.4 Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

2.3 CONCRETE MASONRY UNITS

.1 Standard concrete blocks shall be autoclave or bubble cure process, high pressure steam cured, modular, conforming to CSA A165 Series-04 (R2009), with lineal shrinkage and moisture movement not to exceed 0.035% and shall be as follows;

.1 Classification: S/15/A/M, 75% solid for all locations where structural members bear on concrete block.

.2 H/15/A/M, for all other block work.

.3 Size: Modular imperial to sizes indicated on Drawings.

.4 Special shapes:

.1 Provide square units for exposed corners.

.2 Provide purpose made shapes for lintels and bond beams.

.3 Provide additional special shapes required for project.

.4 Manufacture special shapes at same time and with the same batch as standard concrete block to be used.

.2 Fire Resistant Concrete Masonry Units: Manufactured in accordance with CAN/CSA A165 Series as modified below:

.1 Classification:

.1 2 Hour Fire Rating: H/15/C/O

.2 1 Hour Fire Rating: H/15/A/O

.2 Concrete Composition – 2 Hour Fire Rating: Type $L_2$20S Concrete.

.3 Size: Modular to sizes indicated on Drawings.

.4 Where concrete block walls are required as fire separations or barriers, they shall conform to the National Building Code. With respect to equivalent thickness and type of concrete. Consult with Consultant for locations and special conditions.

.3 Exposed block shall all be made by one manufacturer and shall be uniform in colour, shade and texture.

2.4 MORTAR MATERIALS

.1 Mortar materials shall conform to CSA A179.

.2 Mortar for Manufactured Stone Masonry Units:

.1 Conforming to CSA A179, Proportion specification, 1 part Portland cement, 1 part hydrated lime, 6 parts mortar aggregate by volume for both cementitious materials and aggregate; integral mortar, non-staining, for setting: 1 part cement, 1 part lime, six parts sand.

.2 Mortar Aggregate: to CSA A179, white silica type; clean, dry, protected against dampness, freezing, and foreign matter.

.3 Water: Potable (clean, exempt of ice, oils, acid, alkalis, organic matter, sediments or any other harmful matter).

.4 Aggregate:

.1 Meeting CSA A179.

.2 Use same brands of materials and source of aggregate for entire project.

.3 Use washed aggregate consisting of natural sand or crushed stone for mortar that is exposed to view.

.4 Use aggregate graded with 100% passing the No. 16 (1.18-mm) sieve for joints less than 6 mm thick.

.5 Cement: Normal Portland cement, in accordance with CSA A3000, Type GU.

.6 Grout: In accordance with CSA A179, Table 3.

.7 Hydrated Lime: ASTM C207, Type S.

.8 Cold Weather Admixture:

.1 Non-chloride, non-corrosive, accelerating admixture in accordance with CSA A179 and ASTM C494, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

.2 Acceptable Materials:

.1 Grace Construction Products, Morset

.2 BASF, Trimix-NCA

2.5 MORTAR MIXES

.1 Mixing:

.1 Prepare and mix mortar materials under strict supervision and in small batches for immediate use only. Mix proprietary mortars in strict accordance with CSA A179. Do not use re-tempered mortars for coloured mortars.

.2 For Masonry Below Grade and In Contact With Earth:

.1 Use premixed silo or bagged Type 'S' masonry cement mortar having minimum compressive strength of 8.5 Mpa at 28 days, jobsite tested.

.3 For Exterior Wythe of Cavity/Composite Walls (non load-bearing, above grade):

.1 Use Type 'N', 1:1:6 pre-mixed, pre-coloured, Portland cement/lime/sand mortar, 'Betomix Plus' by Daubois Inc., or Maxi-Mix silo. Use non-staining "white" cement where required to achieve colour as selected later by the Consultant.

.4 For All Other Masonry:

.1 Use Type 'N', premixed silo or bagged masonry mortar having a minimum compressive strength of 3.5 Mpa at 28 days, jobsite tested as per property specification, Table 6, CSA A179.

2.6 MASONRY REINFORCEMENT, TIES AND ANCHORS

.1 Masonry Joint Reinforcement: In accordance with to CSA A371 and ASTM A496/A496M, with corrosion protection in accordance with CSA S304.1 and CSA A370, and as follows:

.1 Interior Walls: Hot dip galvanized, carbon steel.

.2 Exterior Walls: Hot dip galvanized, carbon steel.

.3 Lengths: A minimum of 3048mm (10’) with prefabricated corner and tee units.

.2 Connectors: In accordance with to CSA A370 and CSA S304.1 with hot dip galvanized finish.

.3 Single Wythe Masonry Joint Reinforcement: Either ladder or truss type with single pair of side rods.

.4 Ties and anchors specified in this section shall be designed in accordance with CSA A370 for non-conventional masonry connectors as follows:

.1 Deflection: Maximum 1.6mm (1/16”) including free play, when acted upon by a lateral load of 0.45 kN, in all possible positions of adjustment.

.2 Positive restraint at position of maximum adjustment.

.3 Free play of multi-component ties maximum 0.8mm (1/32”) when assembled in all possible configurations.

.4 Anchors shall allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall.

.5 Lateral Partition Supports (Top of Wall Anchors):

.1 Angle Support: Fabricated from 3mm (1/8”) core metal thickness angled steel plate having 75mm (3”) long legs fastened to deck structure to allow vertical movement of masonry assembly; hot dip galvanized; coordinate with Section 07 84 00 for firestopping insulation and smoke seals.

.1 Basis of Design Materials: Blok-Lok BL-LSA1 & 2

.2 Plate Support: Fabricated from 3mm (1/8”) core metal thickness stainless steel plate with 10mm (3/8”) diameter metal 150mm (6”) long welded to plate having closed end plastic tube fitted over rod that allows rod to move in and out of tube.

.3 Anchor Bolts: Where required provide Headed or L-shaped steel bolts in accordance with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers; hot-dip galvanized in accordance with ASTM A153/A153M, Class C.

.4 Post Installed Anchors: Provide chemical anchors, with capability to sustain, without failure, a load equal to six times the load imposed when installed in solid or grouted unit masonry and equal to four times the load imposed when installed in concrete when tested in accordance with ASTM E488/E488M conducted by a qualified independent testing agency, and as follows:

.1 Indoor Locations: Carbon-steel components zinc-plated in accordance with ASTM B633, Class Fe/Zn 5.

.2 Outdoor and High Humidity Locations: Alloy Group 1 or 2 stainless steel bolts complying with ASTM F593 and nuts complying with ASTM F594.

.3 Fastening into Solid Concrete or Solidly Grouted Installation: Two component, injectable adhesive specifically manufactured for use in installing dowels or threaded anchor rods and inserts into new or existing concrete or grout. Basis-of-Design Materials: Hilti Inc., HIT HY150 System, no Substitutions Accepted.

.4 Fastening Trough Hollow Wall Installation: Two component, injectable adhesive specifically manufactured for use in installing dowels or threaded anchor rods and inserts, with cylindrical mesh screen tube into new or existing masonry cavity wall. Basis-of-Design Materials: Hilti Inc., HIT HY20 System, no Substitutions Accepted.

.6 Galvanizing for Masonry Reinforcement, Ties and Anchors:

.1 Hot Dip Hardware and Bolts: In accordance with ASTM A153/A153M, Class B-2 regardless of location.

.2 Hot Dip Sheet Steel: In accordance with ASTM A653/A653M, Coating Designation Z600, regardless of location.

.3 Structural Shapes and Pipes: In accordance with ASTM A123/A123, Grade 85, regardless of location.

.7 Rebar Positioners: 9 gauge diameter wire, hot dipped galvanized.

.1 Basis of Design Materials: Blok-Lok BL-RB Rebar Positioners.

.8 Fastening Into Solid Concrete or Solidly Grouted Installation: Two component, injectable adhesive specifically manufactured for use in installing dowels or threaded anchor rods and inserts into new or existing concrete or grout, and as follows:

.1 Epoxy Composition: Sealed packaging containing resin, hardener, cement and water; components.

.2 Curing Time: Rapid set, high strength and stiffness; maximum time 45 minutes at 20 deg C.

.3 Basis-of-Design Materials: Hilti Inc., HIT HY150 System

.9 Fastening Trough Hollow Wall Installation: Two component, injectable adhesive specifically manufactured for use in installing dowels or threaded anchor rods and inserts, with cylindrical mesh screen tube into new or existing masonry cavity wall, and as follows:

.1 Epoxy Composition: Sealed packaging containing resin, hardener, cement and water.

.2 Curing Time: Rapid set, high strength and stiffness; maximum time 60 minutes at 20 deg C.

.3 Basis-of-Design Materials: Hilti Inc., HIT HY20 System.

2.7 WEEPHOLES

.1 PVC 'T' shaped brick vents by Goodco Limited, or cadmium plated airplane type 'Weep Holes-343' by Blok-Lok Limited, set 810mm (32") O.C. in the following locations:

.1 Bottom course of exterior masonry units throughout;

.2 Top courses of exterior masonry units throughout;

.3 Exterior masonry units resting on lintels and intermediate angles.

2.8 EMBEDDED FLASHING MATERIAL

.1 Flexible Flashing Membrane:

.1 Self adhering rubberized asphalt flashing; non-extruding composite flashing membrane compatible with air and vapour membrane; consisting of pliable, adhesive rubberized asphalt compound, bonded to a high density, cross laminated polyethylene film to produce an overall thickness of a minimum of 1/32” and specifically manufactured for use as a through wall flashing and damp course membrane, and as follows:

.1 Acceptable Materials:

.1 Henry Company, Blueskin TWF

.2 Grace Construction Products, Perm-A-Barrier 4000 Wall Flashing

.3 Soprema, Sopraseal Stick 1100HT

.2 Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

.2 Metal Flashing: Provide metal flashing materials in accordance with Section 07 62 00, and as follows:

.1 Fabricate through wall flashing with snap lock receiver on exterior face to receive counter flashing.

.2 Fabricate through wall flashing with drip edge by extending flashing 13mm (½") out from wall, with outer edge bent down 30 deg and hemmed.

.3 Fabricate through wall flashing with sealant stop by bending metal back on itself 19mm (¾") at exterior face of wall and down into joint 10mm (3/8") to form a stop for retaining sealant backer rod.

.4 Fabricate metal drip edges and sealant stops for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending a minimum of 75mm (3") into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam; form hem on upper surface of metal so that completed seam will shed water.

.5 Fabricate metal drip edges for flexible flashings from stainless steel; extend a minimum of 75mm (3") into wall and 13mm (½") out from wall, with outer edge bent down 30 deg and hemmed.

2.9 MORTAR DROPPING CONTROL DEVICES

.1 Mortar Dropping Control Devices:

.1 High density, polyethylene or nylon woven mesh type mortar dropping control devices with trapezoidal "zigzag" shaped top edge, designed to allow moisture/water to flow/drain downward in cavity/collar joints to the weepholes, thicknesses to suit cavies and collar joints, 'The Mortar Net' by Mortar Net USA Ltd., and distributed by JV Building Supply, division of Consolidated Materials Corporation, or Mortar Trap by Hohmann and Barnard, or approved equal.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

.1 Firestopping: As specified under Section 07 84 00.

.2 Sealants: As specified under Section 07 92 00, and as follows:

.1 Vertical Sealant: Colour to match brick

.2 Horizontal Sealant: Colour to match mortar

.3 Maintenance Cleaners: Manufacturer's recommended maintenance cleaners formulated for use with anti-graffiti coating used on project.

.4 Support Angle:

.1 Hot dip galvanized in accordance with CSA A370 and ASTM A153/A153M.

.5 Fasteners: Galvanized fasteners meeting the requirements of ASTM A325, and as recommended by manufacturer.

.6 Joint Filler:

.1 Compressible Filler: Pre-moulded filler strips in accordance with ASTM D1056, Grade 2A1; compressible up to 35%; of width and thickness indicated; formulated from neoprene, urethane or PVC.

.7 Bond Breaker Strips: #15 asphalt saturated, organic roofing felt in accordance with CSA A123.3.

2.11 MASONRY COATINGS

.1 Proprietary Masonry Cleaner: Masonry manufacturer's recommended cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discolouring or damaging masonry surfaces.

.1 Clear coating.

.2 Verify acceptability of cleaner for cleaning masonry with mortar joints and for kinds of masonry units specified.

3 Execution

3.1 EXAMINATION

.1 Examine conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work.

.1 Prepare written report listing conditions detrimental to performance of work and submit to the Consultant.

.2 Verify that foundations are within tolerances specified.

.3 Verify that reinforcing dowels are properly placed.

.2 Examine rough-in and built-in construction for piping systems to verify actual locations of piping connections before installation of unit masonry.

.3 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION - GENERAL

.1 Thickness: Build cavity walls and other masonry construction to full thickness shown on Drawings.

.2 Use full size units without cutting except as follows:

.1 Cut units with motor driven saws if cutting is required to provide a continuous pattern or to fit adjoining construction.

.2 Provide clean, sharp, un-chipped edges.

.3 Allow units to dry before laying unless wetting of units is specified.

.4 Install cut units with cut surfaces and cut edges concealed where possible; obtain Consultant’s acceptance where cut edges must be exposed.

.3 Select and arrange units for exposed unit masonry to produce a uniform blend of colours and textures; mix units by drawing units diagonally down multiple rows from at least three different pallets as masonry units are placed. "Exposed" means visible in complete work, unpainted and painted.

.1 Large variations in colour or texture between adjacent blocks of material will cause the Consultant to reject the installation, and the installer to rebuild the assembly at no additional cost to Contract.

.4 Wet masonry before laying when recommended by manufacturer; allow units to absorb water so they are damp but not wet at time of laying.

.5 Maintain dimensions, lines and levels.

.6 Keep exposed faces free from stains, chips and cracks. Keep tolerance in plane of 1/8" in 8’-0". Do not use chipped, cracked or deformed units in exposed work.

.7 Buttering corners of units, throwing mortar droppings into joints, will not be permitted. Do not shift or tap units after mortar has taken initial set, where adjustments must be made after mortar has started to set, remove mortar and replace with fresh supply.

3.3 LAYING MASONRY WALLS

.1 Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement type joints, returns, and offsets; avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

.2 Bond Pattern for Exposed Masonry: Unless otherwise indicated in this Section or on the Drawings, lay exposed masonry in running bond, unless otherwise indicated on the Drawings; Do not use units with less than 100mm (4”) horizontal face dimensions at corners or jambs; lay masonry in running bond where not otherwise indicated.

.3 Lay concealed masonry with all units in a wythe in running bond or bonded by lapping a minimum of 100mm (4”), and as follows:

.1 Bond and interlock each course of each wythe at corners.

.2 Do not use units with less than nominal 100mm (4”) horizontal face dimensions at corners or jambs.

.4 Stopping and Resuming Work:

.1 Stop work by racking back units in each course from those in course below; do not tooth.

.2 Clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry when resuming work.

.5 Built-In Work:

.1 Build in items specified in this and other Sections as construction progresses.

.2 Fill in solidly with masonry around built-in items.

.3 Fill space between steel frames and masonry solidly with mortar.

.4 Place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core where built-in items are to be embedded in cores of hollow masonry units.

.5 Protect built-in items from damage arising from work of this Section.

.6 Grouting Hollow Concrete Masonry Units – Load Barring Application:

.1 Fill cores in hollow concrete masonry units with grout 610mm (24”) under bearing plates, beams, lintels, posts, and similar items.

.2 Use concrete or fine grout where indicated, and also for vertical core filling, lintel beams, bond beams and other filled cores where reinforcing steel is indicated.

.3 Use fine grout where the space being grouted is 50mm (2”) or less in its least dimensions; use concrete in all other applications that call for grout.

.4 Use square end concrete masonry units wherever a full or half concrete masonry unit will receive concrete fill.

.5 Use full mortar bedding of cross webs for cores that are filled.

.6 Fill cores in lifts of 1220mm (4’) maximum; provide cleanout openings for lifts in excess of 4’ where Consultant has accepted larger lifts.

.7 Consolidate core fill during placement by vibration or puddling.

.8 Stop concrete core fill 38mm (1-1/2”) below top surface of lift whenever filling will be stopped for more than a 1 hour time duration.

.9 Fill all cores of roof parapets with concrete.

.10 Secure vertical reinforcement in position at top and bottom of core, and a maximum 4’ spacing, refer to Drawings for location of vertical reinforcement.

.11 Fill voids solid with mortar so that ties and anchors are set in full mortar bed where masonry walls abut steel or concrete columns.

.7 Build non-load bearing interior partitions full height of storey to underside of solid floor or roof structure above, leaving a gap to allow for structural deflection, and as follows:

.1 Fasten lateral partition supports to structure above and build into top of partition; grout cells of concrete masonry units solidly around plastic tubes of anchors and push tubes down into grout to provide 13mm (½”) clearance between end of anchor rod and end of tube; space anchors at 1220mm (4’) O.C.

3.4 MORTAR BEDDING AND JOINTING

.1 Lay hollow brick as follows:

.1 Face shall be fully bedded in mortar and with head joints of depth equal to bed joints.

.2 Webs fully bedded in mortar in all courses of piers, columns, and pilasters.

.3 Webs fully bedded in mortar in grouted masonry, including starting course on footings.

.4 Entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

.2 Lay block work as follows:

.1 Provide special shapes and sizes as required such as halves, jambs, lintels, solids, corners, semi-solids, etc.

.2 webs to align plumb over each other with thick ends of webs up. Leave no cells open in exposed work. Reinforce all block.

.3 Minimize cutting block. Cut exposed work with power driven abrasive cutting disc or diamond cutting wheel for flush mounted electrical outlets, grilles, pipes, conduit, etc., leaving 3mm (1/8") maximum clearance.

.4 Do not wet concrete masonry units before or during laying.

.5 Locate corners accurately. Use full bed of mortar for first course. Bed face shells and cross and end web fully in mortar. Stagger joints in every course. Align joints plumb over each other in every other course.

.6 Bond intersecting block walls in alternate courses. Where block abuts concrete, bond each block course with dovetail anchors, ties and dovetail slot. Do not break bond of corridor walls or other walls of exposed units where partitions intersect and if bonding would show through on intersect with prefabricated intersection masonry reinforcement in each course.

.7 Take special care in erecting block walls to which other sections will be applying finishes or attaching equipment to ensure tolerances required for work of other sections can be met with reasonable construction procedures. (e.g. thin-set application of ceramic tile.)

.8 Provide bullnose block at all exposed block corners.

.9 Build block lintels, ensure that lintel jointing coincides with regular bond.

.3 Set trim units in full bed of mortar with full vertical joints, and as follows:

.1 Fill dowel, anchor, and similar holes.

.2 Clean soiled surfaces with fibre brush and soap powder and rinse thoroughly with clear water.

.3 Allow cleaned impervious surfaces to dry before setting.

.4 Wet absorptive joint surfaces thoroughly before applying mortar.

.5 Lay trims in running bond, stack bond or soldier coursing as indicated on drawings. Where not indicated, notify Consultant prior to starting work.

.6 Set trims in accordance with manufacturers recommended installation practices and materials. Review manufacturer's written recommendations with the Consultant before proceeding.

.7 Use chipped or blemished units only where the defect will be concealed; reject all defective and broken units or units with chipped edges or corners.

.8 Install cut units with cut surfaces and, where possible, cut edges concealed. Where complex cutting is required, place mortar along the cut edge and trowel smooth to provide a consistent 50mm (2") wide gap.

.4 When mortar is "thumbprint" hard, tool all masonry joints (exposed or concealed) concave except at blockwork designated to receive ceramic tile finish which blockwork shall be struck 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.

.5 Lay all joints 10mm (3/8") thick unless otherwise specified or otherwise indicated. Fill all joints solidly with mortar except where specifically designated to be left open.

.6 Stagger joints in every course. Align joints plumb over each other in every other course. Vertical and horizontal joints to be uniform in thickness.

3.5 CAVITY WALL CONSTRUCTION

.1 Flexible Weather Barriers:

.1 Provide continuous 457mm (1'-6") wide flexible weather barrier membrane in exterior masonry cavity walls at expansion joints.

.2 Pack joint with loose batt insulation with face of insulation down 2 times the width of expansion from face interior wythe.

.3 Install flexible weather barrier membrane to substrate with adhesive, in strict accordance with manufacturer's instructions.

.4 Loop down flexible weather barrier into expansion/control joints approximately 2 times the width. Lap joints minimum 150mm (6") and seal. Ensure that flexible weather barrier lap joints which are looped into expansion/control joints are sealed with adhesive. Seal tops and bottoms of membrane barrier at change in construction to present continuous, uninterrupted flexible weather barrier.

.2 Keep cavity space and weep holes clean and free of mortar droppings and other foreign materials.

.3 Bond inner and outer wythes of cavity wall with cavity wall masonry reinforcement at 406mm (16") O.C. vertically. Provide additional reinforcing at openings as specified hereinafter.

.4 Install thru-wall flashings and dampproof course as specified elsewhere in this Section.

.5 Install mortar dropping control devices as specified elsewhere in this section.

.6 Install weep/vent holes as specified elsewhere in this section.

.7 Install insulation in cavity walls as they are built, as indicated in Section 07 21 29.

3.6 CONTROL JOINTS

.1 Provide vertical through wall control joints 7620mm (25') O.C. maximum (except as otherwise shown or specified) in continuous walls having no openings, intersections or columns. Control joints as shown on Drawings.

.2 Locate control joints at high stress concentrations and at points of weakness such as at abrupt changes in work height, wall thickness changes such as at chases and at pilasters and maximum of 3658mm (12') from corners.

.3 Construct joint as detailed and generally as follows:

.1 Place building paper against end of block on one side of control joint. Extend bond breaker full wall thickness.

.2 Fill voids between ends of block with mortar to form key and strike back exposed vertical joints 19mm (3/4") deep, install backer rod and caulk in accordance with Section 07 92 00.

.3 Reinforce joints every third course with two 6mm (1/4") diameter greased smooth rods. Locate rods 32mm (1-1/4") in from faces of block centres on joint running parallel to wall.

3.7 REINFORCEMENT AND REINFORCING TIES

.1 Reinforce all masonry walls with continuous masonry horizontal reinforcement in every second block course.

.2 Provide extra reinforcement or reinforcing ties at openings so that first and second courses above and below openings are reinforced. Extend extra reinforcement 610mm (2') beyond opening in each direction.

.3 Anchor new masonry to structural steel to concrete elements, to existing construction at maximum 406mm (16") O.C., vertically in accordance with local building code requirements.

.4 Chemical Anchors:

.1 Coordinate work with Contractor for work that forms a part of this Section.

.2 Install anchors in accordance with manufacturer’s written instructions, and as follows:

.1 Drill and clean anchor holes in accordance with manufacturer’s instructions; insert screen tube, prepare and mix two part adhesive anchor system and fill holes; insert connector pins and twist to ensure that adhesive is in contact with connector pin.

.2 Do not adjust connector pins after gel time of adhesive occurs.

.3 Testing:

.1 Test first 10 anchors to demonstrate a pullout capacity equal to four times the required service capacity of 0.44 kN after cure time established by adhesive manufacturer.

.2 Randomly test 2% of remaining installed anchors after cure time established by adhesive manufacturer to service load capacity of 0.44 kN; additional tests may be required where failures occur.

3.8 FLEXIBLE AND METAL FLASHING

.1 Install damp course/thru-wall flashing with adhesive in accordance with manufacturer's written instructions, where indicated on drawings and in absence of any indication in locations as follows:

.1 First course above new grade line.

.2 Over exterior lintels and shelf angles.

.3 Under window sills.

.4 Wherever roofs or other exterior, horizontal surfaces intersect masonry walls, immediately above roof flashing or horizontal surface flashing and connect to roof, air barrier flashing strips or flashings.

.2 Install continuous metal drip flashing at all locations where thru-wall flashing occurs at wall face. Accurately mitre metal drip flashings at all inside and outside corners and deburr all sharp edges/corners. Insert metal drip flashing 50mm (2") into masonry joint with drip edge turned down approximately 10mm (3/8") to present a neat, straight line appearance. Adhere thru-wall flashing to top surface of metal drip flashings.

.3 Extend damp coursing and flashing through full thickness of walls, carrying material from outside to inside.

.4 Then install flashing, using same material as damp course, from outside through thickness of first wythe at same joint as damp course, up one block course in behind air barrier membrane and through the inner wythe for composite wall construction and up face of exterior wallboard 200mm (8") and under air barrier membrane for cavity wall construction.

.5 Lap all joints 150mm (6") and seal with adhesive.

.6 Wrap damp course/thru-wall flashing into inside corners and around outside corners, sealing seams and corners with adhesive/sealant.

.7 At ends of exterior lintels and shelf angles provide "end dams" in damp course/thru-wall flashing by extending damp course/thru-wall flashing up minimum of 150mm (6") and wrapping into inside corners and sealing with adhesive sealant. Adhere "end dam" to adjacent masonry veneer with adhesive.

.8 Inspect damp course/thru-wall flashing for punctures, tears, misaligned seams and the like, apply additional layer of damp course/thru-wall flashing, extending minimum of 6" around damaged area in all directions.

.9 Trim exposed edges of damp course/thru-wall flashing in a neat, even appearance, removing excess materials projecting beyond edge of support.

.10 Tie in damp course/thru-wall flashing with air barrier membrane to ensure continuity of air barrier in accordance with local building code requirements.

3.9 MASONRY COATINGS

.1 Masonry Sealers: Apply masonry sealer to unit masonry to gloss levels indicated in accordance with manufacturer’s written instructions.

.2 Cover surfaces not scheduled for masonry coatings; cover and protect surfaces and non-masonry finishes with in areas scheduled for coatings.

.3 Rinse off masonry until no indications of chemicals are present; rinse from bottom to top and from top to bottom; cleanup work area as work progresses; remove debris and waste from site at end of each work day.

3.10 BUILT-INS

.1 Built-in items provided by other Sections, anchor bolts, sleeves, inserts, loose steel lintels, shelf angles, access panels, and other such items. Built-in items to present neat, rigid, true and plumb installation. Leave wall openings required for ducts, grilles, pipes and other items.

.2 Fill voids between masonry and metal frames with masonry mortar.

3.11 REPOINTING OR TUCKPOINTING

.1 Repoint defective joints as follows:

.1 Cut back joints 13mm (1/2"), taking care not to damage units. Remove dust and loose materials by brushing or by water jet.

.2 If water jet is used, allow excess water to drain before repointing.

.3 Repoint with same mix as original. Pack mortar tightly in thin layers, and tool joints or strike flush as required.

3.12 CLEANING

.1 Keep work clean and free of mortar stains during laying.

.2 Allow mortar droppings which adhere to wall to dry out but not set.

.3 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, and defective joints tucked and pointed, clean masonry thoroughly.

.4 Remove mortar with wood paddles and scrapers before wetting.

.5 Saturate masonry with clean water and flush off loose mortar and dirt.

.6 Clean block work using water, scrubbing brushes and wood paddles only.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install all miscellaneous metal work indicated on drawings and not included in the work of other Sections in addition to items listed in this Section.

1.2 RELATED REQUIREMENTS

.1 Read carefully all other Sections and review drawings to determine extent of metal work supplied and installed, or installed by others.

.2 Be responsible for co-ordinating this section with all related sections.

1.3 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 Applicable Standards:

.1 American Society for Testing and Materials (ASTM):

.1 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless

.2 ASTM A276, Standard Specification for Stainless Steel Bars and Shapes

.3 ASTM A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

.4 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.5 ASTM A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip Plate, and Flat Bar

.6 ASTM C939, Standard Test Method for Flow of Grout for Preplaced Aggregate Concrete (Flow Cone Method)

.7 ASTM A1011/A1011M, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with improved Formability, and Ultra-High Strength

.8 ASTM C1107/C1107M, Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink)

.2 Canadian Standards Association (CSA):

.1 CSA G40.20-04/G40.21, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel

.2 CAN/CSA-G164-M, Hot Dip Galvanizing or Irregularly Shaped Articles

.3 CSA-S16, Design of Steel Structures

.4 CSA-S136, North American Specification for the Design of Cold Formed Steel Structural Members

.5 CSA W47.1, Certification of Companies for Fusion Welding of Steel

.6 CSA W55.3, Certification of Companies for Resistance Welding of Steel and Aluminum

.7 CSA W59, Welded Steel Construction (Metal Arc Welding)

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating

.2 CAN/CGSB-51.32-M, Sheathing, Membrane, Breather Type

.3 CGSB 31-GP-105Ma, Zinc Phosphate Conversion Coatings for Paint Base

.4 The Society for Protective Coatings (SSPC):

.1 SSPC1 Solvent Cleaning

.2 SSPC2 Hand Tool Cleaning

.3 SSPC-3 Power Tool Cleaning

.4 SSPC-6 Commercial Blast Cleaning

1.4 QUALITY ASSURANCE

.1 All Codes and Standards referred to in this Specification shall be current editions including all latest revisions and addenda.

.2 Conform to requirements of CSA-S16, Design of Steel Structures and CAN/CSA-S136, Cold Formed Steel Structural Members.

.3 Architectural metals work shall be of the highest architectural quality, free of scratches, pitting, roughness, marring, discolouration, staining and other imperfections.

.4 Work of this Section to be executed by firm thoroughly conversant with laws, by-laws and regulations which govern, and capable of workmanship of best grade of modern shop and field practice known to recognized manufacturer's specializing in this work.

.5 Work of this Section shall be executed by workers especially trained and experienced in this type of work. Have a full time, senior, qualified representative at the site to direct the work of this Section.

.6 Where required by authorities having jurisdiction, have work of this Section designed by a professional engineer licensed to design structures and registered in the Province of the Work.

1.5 SUBMITTALS

.1 Provide submittals bearing stamp or seal and signature of the Professional Engineer responsible for the design of the work of this Section.

.2 Shop Drawings:

.1 Make thorough examination of drawings and details, determine the intent, extent, and materials, and be fully cognizant of requirements when preparing shop drawings.

.2 Submit shop drawings showing and describing in detail all work of this Section including large scale detail of members and materials, of connection and interfacing with work of other Sections, jointing details, and of anchorage devices, dimension, gauges, thicknesses, description of materials, metal finishing, as well as other pertinent data and information.

.3 Digital files of design drawings shall not be used in the preparation of shop drawings.

1.6 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off the ground, under cover storage locations. Do not load any area beyond the design limits.

.2 Adequately protect and crate all components against damage, dirt, disfigurement and weather during delivery and storage. Damaged materials shall not be used and shall be replaced by approved material.

.3 Cover and protect the work of other Sections in the area of work from damage. Make good all damage to the satisfaction of the Consultant.

.4 Protect the installed work of this Section and on completion the work shall be examined and damage shall be remedied to the complete satisfaction of the Consultant.

2 Products

2.1 MATERIALS

.1 Structural Steel Sections and Steel Plate: New stock (not weathered or rusted); to conform to CAN/CSA-G40.21, Grade 300W (44W) and Grade 350W (50W) for wide flange shapes.

.2 Hollow Structural Sections (HSS): New stock; to conform to CAN/CSA-G40.21, Grade 350W (50W), Class C, stress relieved.

.3 Sheet Steel (Structural Quality): Conforms to ASTM A1011/A1011M.

.4 Sheet Steel (Commercial Quality): Conforms to ASTM A653/A653M, stretcher levelled or temper rolled.

.5 Tube: Conforms to ASTM A53.

.6 Steel Pipe: Hot-dip galvanized, zinc coated, welded and seamless type steel pipe conforming to ASTM A53/A53M.

.7 Non-Shrink Grout: Premixed, high strength, maximum bearing, impact resistant, non-shrink non-metallic aggregate grout having minimum 76 Mpa, 28 day compressive strength and conforms to ASTM C939 and ASTM C1107/C1107M.

.8 Primer Paint: CISC/CPMA 2-75.

.9 Bolts, Nuts, Washers: Conforms to ASTM A325.

.10 Welding Materials: Conforms to CSA W59.

.11 Metal Filler: Polyester based type.

.12 Painting:

.1 Shop Applied Structural Steel Primer: Steel Spec Universal Primer (B50RV6227 Red), by Sherwin Williams Company of Canada Ltd., or approved equal. Apply a minimum of 2 mils dft./coat. Grey coloured primer is acceptable.

.2 Refer to Section 09 90 00, and coordinate with the above.

.13 Isolation Coating: Acid and alkali resistant bituminous paint.

.14 Butyl Tape: Extruded, high grade, macro-polyisobutylene tape of size, width and shore hardness to suit conditions.

2.2 FABRICATION

.1 Fit and assemble work in shop where possible. Execute work according to details and reviewed shop drawings.

.2 Take measurements at the building for work which is to fit or be connected to steel or concrete before commencing fabrication.

.3 Where shop fabrication is not possible, make trial assembly in shop.

.4 Do all welding in accordance with requirements of CSA W59, CSA W55.3 and CSA W47.1 including all supplements. Weld stainless steel electric arc process. Grind welds smooth and flush with surface of parent metal, where exposed to view and where specifically indicated on drawings. Welds shall be continuous seam welds unless specified otherwise. Maintain sharp arises.

.5 Fit joints and intersecting members accurately in true planes, square, plumb, straight with tight joints and intersections.

.6 Provide adequate reinforcing, fastenings, anchors, accessories required for fabrication and erection of work of this Section. Such items occurring on or in an exterior wall or slab shall be hot-dip galvanized. Make thread dimensions such that nuts and bolts will fit without rethreading or chasing threads.

.7 Fabricate, drill and tap members to accommodate attachments, anchorage and work of other Sections where located and directed by them.

.8 Exposed steel surfaces shall be smooth and free from imperfections such as warping, buckling, weld marks, burrs, rust and scale.

.9 Gauges and sizes of metal shall be adequate for various conditions.

.10 Make exposed metal fastenings and accessories of same material, texture, colour and finish as base metal on which they occur unless otherwise shown or specified. Keep exposed fastenings to an absolute minimum evenly spaced and neatly laid out. Make fastenings of permanent type unless otherwise indicated.

2.3 SHOP PAINTING AND PROTECTION

.1 As per SSPC2 Hand Tool Clean and SSPC1 Solvent Clean, clean welds by wire brushing and wash down with clean water, to remove the chemical residues left by the electrodes, prior to painting.

.2 Prepare steel as per SSPC-3 Power Tool Cleaning for Interior or SSPC-6 Commercial Blast Cleaning for exterior members. Remove rust, mill scale, oil, dirt, and other foreign matter before commencing shop painting.

.3 Apply shop coat of primer to all surfaces except areas requiring field welding. Apply by brush, working paint well into surfaces, interstices and cavities.

.4 Primer is to be free of runs, sags, or other collections of primer due to dipping of members into primer.

.5 Steel work shall be painted under cover, and shall remain under cover, until the paint protection is dry.

.6 Prime field welded areas after erection and touch up shop coat where damaged and barred by erection and handling.

.7 Prime steel with two full coats of paint in strict accordance with paint manufacturer's directions.

.8 Give the parts which are inaccessible after assembly two coats of primer coat paint, of different colours, when members are noted to be painted.

3 Execution

3.1 GENERAL

.1 Verify at site that the Work to receive the work of this Section is free of irregularities detrimental to the installation and performance of the work and that it is located correctly and at proper levels before delivery and installation.

.2 Erection: To meet specified requirements of CAN/CSA-S16.

.3 Bearing Plates and Anchors: Standard.

.4 Anchors: Anchors to structural concrete shall be approved inserts set into concrete or approved self-drilling expansion insets drilled and placed afterwards.

3.2 INSTALLATION

.1 Assemble and erect work plumb, true, square, straight, level and accurate to sizes detailed, to reviewed shop drawings, free from distortion and defects detrimental to appearance and performance.

.2 Isolate metals where necessary to prevent corrosion due to contact between dissimilar metals and between metals and masonry, concrete or plaster. Use bituminous paint or butyl tape.

.3 Supply adequate instructions, templates, and if necessary, supervise installation of the fastenings or accessories requiring to be built-in by other Sections of the Work.

3.3 SCHEDULES

.1 Where items are required to be built into masonry, concrete or other work, supply such items to respective Sections with all anchors and accessories for building in.

.2 Itemized List: Supply and install metal work listed below unless specifically designated to be supplied only. Each item shall be as shown on drawings and as detailed on reviewed shop drawings.

.3 Miscellaneous Steel Framing, Channels, Angles, Plates and Brackets: As required and indicated on drawings.

.4 Masonry Lateral Supports:

.1 Install deflection space and lateral support for non-load-bearing masonry walls and partitions in accordance with specified requirements of CAN3-S304-M, where not provided by Section 05 50 00, Structural Steel.

.2 At walls with concealed tops:

.1 3" x 2" x 1/4" angles 8" long on both sides of walls. Anchor to structure above wall.

.3 At walls with tops exposed to view:

.1 3" x 2" x 1/4" angles, continuous on both sides of wall. Anchor to structure above wall.

.4 Finish: Prime paint.

.5 Loose Lintels:

.1 Provide and install loose lintels if not by structural steel.

.2 Finish: Hot-dip galvanized after fabrication.

.6 Other Miscellaneous Metal Components:

.1 As required and indicated on drawings.

.2 Finish: Prime paint for interior components, ready for finishing by Section 09 90 00 and hot-dip galvanized after fabrication for exterior components.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply all labour, materials, equipment, services and perform all operations required to complete all rough carpentry work to the full intent of the drawings and as herein specified.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards

.4 American Society for Testing and Materials (ASTM):

.1 ASTM A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

.2 ASTM C954, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

.3 ASTM D6007, Standard Test Method for Determining Formaldehyde Concentrations in Air from Wood Products Using a Small-Scale Chamber

.4 ASTM D6330, Standard Practice for Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels Using Small Environmental Chambers Under Defined Test Conditions

.5 ASTM E1333, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber

.5 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of building Materials and Assemblies

.6 American Wood Preservers Association (AWPA):

.1 AWPA Book of Standards, Latest edition

.7 Canadian General Standards Board (CGSB):

.1 CAN/CGSB 71.26, Standard for Adhesives for Field-gluing Plywood to Lumber Framing for Floor Systems.

.8 Canadian Roofing Contractors Association (CRCA):

.1 Roofing Specifications Manual – Latest Edition

.9 Canadian Standards Association (CSA):

.1 CSA A172, High Pressure Paper Base, Decorative Laminates

.2 CSA B111, Wire Nails, Spikes and Staples

.3 CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles

.4 CSA O80 Series-21, Wood Preservation

.5 CSA O86, Engineering Design in Wood

.6 CSA O112 Series, CSA Standards for Wood Adhesives

.7 CSA O121, Douglas Fir Plywood

.8 CAN/CSA-O141, Softwood Lumber

.9 CSA O151, Canadian Softwood Plywood

.10 CSA O325, Construction sheathing (Adopted NIST PS 2-18, with Canadian deviations)

.11 CSA O437 Series, Standard on OSB and Waferboard

.12 CSA O452 Series, Design Rated OSB

.10 National Lumber Grading Association (NLGA):

.1 NLGA Canadian Lumber Grading Rules

1.3 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Do not store seasoned materials under conditions that will cause their moisture content to increase.

.4 Protect edges and corners of sheet materials from damage during handling and storage.

.5 Store preservative-treated materials under cover, off the ground and protected from moisture.

2 Products

2.1 MATERIALS

.1 Framing Lumber:

.1 Lumber for structural components shall be of species and grade specified, well seasoned, processed and stamped at same mill with appropriate grade markings.

.2 Conform to requirements of Standard Grading Rules for Canadian Lumber of National Lumber Grades Authority the (NLGA) with latest supplements, approved by the Canadian Lumber Standards Administrative Board.

.2 Lumber:

.1 Except as indicated or stated otherwise, lumber to be softwood, S4S, moisture content 19% or less, in accordance with the following standards:

.1 CSA O141-05 (R2009) - “Softwood Lumber”.

.2 NLGA - “Standard Grading Rules for Canadian Lumber” (latest supplement).

.3 Framing and Board Lumber:

.1 Treatable Species: No. 2 and better - S4S, Dry, 19%.

.4 Framing, Furring, Strapping, Blocking:

.1 Spruce, 122c, "Standard" light framing, except as otherwise specified.

.5 Rough Hardware:

.1 Provide rough hardware such as nails, spikes, staples, H-clips, bolts, nuts, washers, screws, clips, strap iron and including hardware for temporary enclosures.

.2 Nails for plywood shall be annular or spiral type, all other nails shall be spiral type. All nails, spikes and staples shall conform to CSA B111.

.3 All rough hardware shall be galvanized unless otherwise noted. Galvanizing shall conform to CAN/CSA-G164.

.6 All Other Materials and Hardware:

.1 Shall be as noted on drawings.

2.2 PRESSURE PRESERVATIVE TREATED MATERIALS

.1 Pressure Preservative Treated Lumber: Lumber graded and stamped in accordance with applicable grading rules and standards of associations or agencies approved to grade lumber by Canadian Lumber Standards Accreditation Board in accordance with CSA O80 Series -08.

.1 Species: Pine or Spruce-Pine

.2 Grade: No.2 or better structural posts and lumber, pieces may be grade stamped or shipment certified by letter of compliance.

.3 Grading authority: NLGA, paragraph 131CC

.4 Material having twisted grain or structural defects affecting integrity of lumber will not be acceptable for this project.

.5 Use only material with radius edges, minimum 6 mm.

.6 Kiln dry lumber materials to 8% moisture content or less.

.2 Pressure Preservative Treated Plywood: Treated in accordance with CSA O80 Series -08 using water-borne preservative to obtain minimum net retention of 4 kg/m³ of wood. Plywood or laminated materials shall be manufactured with exterior grade adhesives. After treatment, plywood shall be kiln dried to moisture content of 8% or less.

2.3 PRESSURE FIRE RETARDANT TREATED MATERIALS

.1 Treat by pressure impregnation with fire-retardant chemicals in accordance with CSA O80 Series -08 to provide classification for flame spread of not more than 25, smoke developed of not more than 75 in accordance with CAN/ULC S102.

.2 All fire retardant wood must comply with the requirements in AWPA Standard C20 for lumber and C27 for plywood.

.1 AWPA C20: Structural Lumber, Fire-Retardant Pressure Treatment, lumber materials shall only be of species listed. After treatment, lumber 50 mm or less in thickness shall be kiln dried to moisture content of 8% or less.

.2 AWPA C27: Plywood, Fire-Retardant Pressure Treatment, plywood or laminated materials shall be manufactured with exterior grade adhesives. After treatment, plywood shall be kiln dried to moisture content of 8% or less.

.3 All species to comply with CAN/ULC S102 for surface-burning characteristics and shall bear identification showing classification and type of fire retardant.

.3 Each piece or bundle of fire-retardant treated material or panel to bear ULC inspection label or stamp attesting to FRS rating indicating flame spread, smoke developed, and fuel contributed classification meeting AWPA standard C20 and C27 for Type A Use.

.4 Fire retardant chemicals used to treat lumber must comply with FR-1 of AWPA Standard P17 and shall be free of halogens, sulphates and ammonium phosphate.

.5 Acceptable materials: Plywood and lumber materials treated by licensed applicators with fire retardant materials from the following:

.1 Dricon FRTW by Hickson Corporation.

.2 Pyro-Guard by Hoover Treated Wood Products Inc.

.3 D-Blaze by Chemical Specialties Inc.

3 Execution

3.1 INSTALLATION - GENERAL

.1 Consult with and co-operate with other Sections in advance and build-in or make provisions for installation of other work.

.2 Provide and fit in place all furring, strapping, battens, nailers, sleepers, grounds and blocking required to provide adequate properly placed fixing for all wood finishes, fitments and as required for the work of others trades.

.3 Blocking, strapping and other rough carpentry indicated shall not be regarded as complete or exact. Provide all rough carpentry work required, whether specifically shown or not.

.4 Grounds shall be of a thickness to provide for application of finishes. Room side surfaces of grounds shall be plumb and in true plane throughout.

.5 All nails shall be long enough so that at least half their length penetrate in to the second member. Splitting of wood members shall be minimized by staggering the nails in the direction of the grain and by keeping nails well in from edges.

.6 Blocking shall be through-bolted to structure.

.7 Anchor rough bucks to concrete or masonry with 10mm (3/8") diameter expansion bolts and shields or Drummond and Reeves security buck anchors, minimum three (3) per jamb.

3.2 WOOD BLOCKING, CANTS AND NAILERS

.1 Provide wood blocking, cants and nailers, where shown to be required as detailed. Bolt securely in place.

.2 Block under cants same thickness as installed roof insulation.

.3 Check mechanical, electrical, architectural drawings and provide all blocking, cants, nailers etc. required.

.4 Leave work ready for roofing work and prefinished sheet metal flashing installation.

3.3 PRESSURE PRESERVATIVE TREATED WOOD INSTALLATION

.1 Comply with AWPA M4.

.2 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation. Allow first coating to fully soak into grain before applying second coating in accordance with manufacturer’s instructions.

.3 Remove with fine sandpaper, chemical deposits on treated wood to receive applied finish.

.4 Use only hot-dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of preservative treated materials.

.5 Use water-borne preservative treated wood for:

.1 Wood in contact with masonry or concrete;

.2 Wood within 457mm (18”) of grade;

.3 Wood in contact with flashings;

.4 Wood in contact with waterproofing membranes, confirm compatibility with membrane manufacturer prior to application.

.6 Use oil-borne preservative treated wood for:

.1 Wood in contact with the ground;

.2 Wood in contact with freshwater;

3.4 PRESSURE FIRE RETARDANT TREATED WOOD INSTALLATION

.1 Field Cuts:

.1 Do not rip, mill or conduct extensive surfacing of fire retardant treated lumber, label will be voided.

.2 Only end cuts, drilling holes and joining cuts are permitted.

.3 All cuts on plywood will be considered end cuts.

.4 Fire-retardant lumber and plywood can be given a light sanding for cosmetic cleaning after treatment.

.5 Pre-cut to the greatest extent possible before treating.

.2 Fire retardant treated plywood used in structural applications shall be graded or span-rated material.

.3 Use only hot-dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of fire-resistant treated materials.

.4 Where humidity conditions are such that moisture may condense between hardware and treated wood, hardware shall be back-primed with a corrosive-inhibitive paint.

.5 Back-prime at contact points and fasteners to prevent electrolysis when fire retardant framing members are used in metal buildings.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply all labour, materials, equipment, services and perform all operations required to complete all finish carpentry, millwork and fitment installation including but not limited to the following:

.1 Interior millwork.

.2 High pressure decorative laminate.

.3 Site fabricated and installed shelving.

.4 Cabinet Hardware.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 Applicable Standards:

.1 American Society for Testing and Materials (ASTM):

.1 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

.2 ASTM D6007, Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber

.3 ASTM D6330, Standard Practice for Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels Using Small Environmental Chambers Under Defined Test Conditions

.4 ASTM E1333, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber

.2 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of building Materials and Assemblies

.3 Canadian Standards Association (CSA):

.1 CSA B111, Wire Nails, Spikes and Staples

.2 CSA G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles

.3 CAN/CSA O80 Series, Wood Preservation

.4 CSA O86, Engineering Design in Wood

.5 CSA O112 Series-M, Adhesives for Wood

.6 CSA O121-M, Douglas Fir Plywood

.7 CAN/CSA-O141-M, Softwood Lumber.

.8 CSA O151-M, Canadian Softwood Plywood.

.9 CSA O325.0, Construction Sheathing

.10 CSA O437 Series, OSB and Waferboard

.11 CSA O452 Series, Design Rated OSB

.4 National Lumber Grading Association (NLGA):

.1 NLGA Canadian Lumber Grading Rules

1.3 QUALITY ASSURANCE

.1 Contractor executing work of this section shall have a minimum of five (5) years continuous experience in successful manufacture/fabrication and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Follow applicable requirements of The Architectural Woodwork Manufacturer's Association of Canada (AWMAC) Standard for Millwork latest edition, including supplements and modifications.

.3 Unless otherwise indicated on drawings, all millwork shall be Custom Grade, in accordance with AWMAC standards.

.4 Supplements and modifications to the above standards as indicated on the drawings or as specified herein shall govern work of this section.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Samples for Verification: Submit two (2) samples prior to fabrication of millwork as follows; accepted samples will form the standard of acceptance for the remainder of the work:

.1 High pressure decorative laminate for finishing of millwork

.2 Exposed Fasteners, Hardware and Accessories: One unit for each type and finish.

.3 Shop Drawings:

.1 Submit detailed shop drawings of all shop fabricated finish carpentry components.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate sizes and locations of framing, blocking, furring, and reinforcements provided by work that is specified in other Sections is complete before starting work of this Section.

.2 Pre-Construction Meeting: Arrange a preconstruction meeting attended by Contractors personnel, Consultant, finish carpentry Subcontractor to discuss:

.1 Installation requirements,

.2 Special surface effects and finishing,

.3 Coordination of work with adjacent finishes,

.4 Protection of finishes,

.5 Acceptability of substrates and quality of materials being used for the project.

1.6 DELIVERY, STORAGE, HANDLING & PROTECTION

.1 Do not permit delivery of work of this section to site until area is sufficiently dry so that woodwork will not be damage by excessive changes in moisture content.

.2 Coordinate deliveries to comply with construction schedules and arrange ahead for under cover storage location.

.3 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect material with suitable non-staining waterproof coverings.

.4 Store material in original, undamaged containers or wrappings.

.5 Unsatisfactory materials shall be promptly removed from the site.

.6 Adequately protect the structure and work of other sections during delivery, storage, handling and execution of the work of this section.

.7 Provide tools, plant and other equipment required for the proper execution of the work of this section.

1.7 SITE CONDITIONS

.1 Site Measurements: Verify dimensions by site measurements before fabrication and indicate measurements on Shop Drawings where casework is indicated to fit walls and other construction; coordinate fabrication schedule with construction progress to avoid delaying the Work; locate concealed framing, blocking, and reinforcements that support woodwork by site measurements before being enclosed and indicate measurements on Shop Drawings.

.2 Established Dimensions: Establish dimensions and proceed with fabricating casework without confirmed site measurements where site measurements cannot be made without delaying the Work; coordinate with the construction to ensure that actual dimensions correspond to established dimensions; allow for trimming and fitting.

.3 Ambient Conditions: Maintain area or room in which casework is being installed at a uniform temperature and humidity for 24 hours prior to, during and after installation in accordance with AWS for relative humidity and moisture content; provide additional lighting to maintain a minimum of 430 lx on surfaces and areas where casework is being installed.

1.8 WARRANTY

.1 Warrant plastic laminate work of this Section against defects in materials and workmanship in accordance with General Conditions but for an extended period of two (2) years and agree to repair or replace faulty materials or work which appears during warranty period, without cost to the Owner.

.2 Defects shall include but not be limited to, opening of joints, cracking, shrinkage, warpage, delamination of plastic laminate.

2 Products

2.1 MATERIALS

.1 Framing Lumber:

.1 Lumber for structural components shall be of species and grade specified, well seasoned, and processed and stamped at same mill with appropriate grade markings. Conform to requirements of standard grading rule for Canadian lumber of Nation Lumber Grades Authority (NLGA) latest issue, approved by Canadian Lumber Standards Administrative Board, as follows:

.1 Rough Carpentry for built-in work: No. 2 select grade Ontario white pine.

.2 Blocking, Ground, Furring and Strapping, Bucks and Nailing Strips: C.L.A. No. 1 grade pine, kiln dried stock.

.3 Non-Exposed Softwood: Fabricator's option, meeting requirements of CAN/CSA O141-05(R2009), kiln dried for interior use to a moisture content of 4% to 8%, and 7% to 10% for exterior use; Surface 4 sides (S4S).

.2 Panel Materials:

.1 Plywood: Douglas Fir veneer core plywood, 19mm (3/4") thick or thickness as indicated on drawings, Select Sheathing-Tight Face, good two sides, sanded "B" faces and conforms to CSA 0121.

.2 Particleboard: ANSI A208.1, 700 kg/m³ density.

.3 Medium density fibreboard (MDF): ANSI A208.2, density minimum 750 kg/m³, moisture resistant.

.1 Basis of Design Materials: Premier Plus MR MDF by Flakeboard.

.4 Fire-Rated (FR) Medium density fibreboard (MDF): ANSI A208.2, meeting CAN/ULC S102, FSC certified; Modulus of Rupture (MOR): 4000 psi, with face screw hold of 250lbs.

.1 Basis of Design Materials: TRUPAN Fire-Rated (FR) MDF by Arauco.

.3 Glue: CSA 0112; Water-resistant urea-formaldehyde free resin glue.

.4 Plastic Laminate Covered Components:

.1 Plastic laminate face sheets: High pressure, paper based, melamine surfaced, laminated plastic sheets, conforming to CAN/CSA-A172, with thickness tolerances in accordance with Table 1 of CAN/CSA-A172 and plastic laminate grades as follows:

.1 General Purpose Grade (GP): Minimum 1.27mm (0.050") thick.

.2 Post-forming Grade (PF): Minimum 1.06mm (0.042") thick.

.2 Plastic Laminate Face Sheet Colour, Model and Manufacturer:

.1 (PLAM-1): As indicated in the Finishes Materials Legend on Drawing A3.3.

.3 Plastic Laminate Backing and Interior Cabinets Liner Sheets (MEL): High pressure, paper based, melamine surfaced, laminated plastic backing sheets, conforming to CAN/CSA-A172, backing grade (BK), minimum 0.5mm (0.020") thick.

.1 (MEL-1 to MEL-3): As indicated in the Finishes Materials Legend on Drawing A3.3.

.4 Cores: Unless otherwise indicated, 19mm (3/4") thick core.

.5 Laminating Adhesive: CSA-0112, water resistant type.

.6 Draw Bolt Fasteners: 'K&V 516' by Knape & Vogt Canada. No substitutions allowed.

.5 Rough Hardware:

.1 Provide required rough hardware to frame and fix all finished carpentry and include for expansion shields, nails, spikes, screws, bolts, anchors, clips, plates, washers, rods, wires, wall brackets, chrome finishing trim, and other ironmongery which may be required. All wood screws shall be drill thread screws except at chipboard where self-tapping screws shall be used. All rough hardware shall be galvanized unless otherwise noted.

.6 Cabinet Hardware: All cabinet hardware shall in general, conform to CAN/CGSB-9.25, ANSI/BHMA A156.9-1982 and shall be as follows, unless otherwise indicated on the Drawings:

.1 Acceptable manufacturers supplying cabinet hardware:

.1 Richelieu

.2 Stanley Hardware

.3 Knape & Vogt Canada

.4 Hafele Canada Inc.

.2 Door/Drawer Pulls (PULL-1): As indicated in the Finishes Materials Legend on Drawing A3.3.

.3 Adjustable Steel Standards and Supports: Nickel plated steel, adjustable on 13mm (1/2") centres. Standards at 151mm (6") from top and bottom. One support per 305mm (12") length of standard.

.4 Hinges: 95 deg opening, self-closing, concealed casework type hinges for overlay doors, having dual adjustable with heat tempered steel working parts with bright nickel finish (US14).

.5 Silencers: Round vinyl, self-adhering type silencers. Provide 2 per door.

.6 Drawer Slides: Full extension, side mounting, zinc coated, steel ball bearing, medium duty rated.

.7 Cabinet Locks: Single and double door cabinet cylinder locks to suit conditions by Best Lock Corporation. Co-ordinate keying with the Owner/Tenant.

.8 Magnetic Catches: Cast aluminum type.

.7 Wall Mounted Standards and Brackets:

.1 Basis of Design Manufacturer: Knape & Vogt Canada.

.2 Wall Mounted Standards: 22mm (7/8") wide x 17.5mm (11/16") high 12 gauge heavy-duty wall mounted standards with 50mm (2") slot adjustment, 914mm (3') long and capable of supporting 65 lbs./100 sq.ft.

.3 Brackets: 305mm (12") heavy-duty steel brackets with single, moulded nylon cam lock lever.

.4 Shelf Rests: Provide end, centre and front type shelf rests, complete with rubber cushions as required and for joining 2 shelves on one bracket.

.8 Accessories:

.1 Garment Hooks: 133mm (5-1/4") high with 75mm (3") projection, institutional type garment hooks with bright chrome finish complete with mounting screws, '2038 CHR' by Knape & Vogt Canada.

.2 Closet Rods: Extension type zinc coated steel closet rods with zinc coated forged steel end brackets and 2 centre supports, 1524mm to 2438mm (60" to 96") extension type, complete with mounting screws, 'KV2 ZC' by Knape & Vogt Canada.

2.2 FABRICATION AND WORKMANSHIP

.1 Work shall be executed by skilled carpenters under the supervision of a competent carpentry foreman. All items shall be shop assembled, insofar as is practical. Unless indicated otherwise comply with AWMAC Custom Grade requirements.

.2 Make thorough examination of drawings and details, check anchorage, interfacing with work of other sections and other factors influencing the installation of the work, and be fully cognizant of requirements.

.3 Finished woodwork shall be free from bruises, blemishes, mineral marks, knots, shakes and other defects and shall be selected for uniformity of colour, grain and texture.

.4 Be responsible for methods of construction and for ensuring that materials are rigidly and securely attached and will not be loosened by the work of other sections.

.5 Fabricate the work in a manner which will permit expansion and contraction of the materials without visible open joints.

.6 Mitre exposed corners; no end grain shall be visible in completed installation.

.7 Provide solid wood edging at exposed plywood edges.

.8 Jointing of shop assembled work shall be by means of mortise and tenons, dowels, stub tenons, dovetails, dadoes, lock joints as applicable for the jointing condition.

.9 Accurately cut, mitre, fit and frame work together to produce tight hairline joints, rigidly secured together in a permanent manner using glue, blind screw fixing or nails. Use concealed glue blocks for additional strength where possible.

.10 Finished woodwork shall be in one piece wherever possible and all trim shall be in long lengths. Where jointing is necessary in the length, the joints between pieces shall be scarfed, glued and properly fastened. The material being jointed shall match reasonably well for grain and colour where natural finish is specified. Joints between lengths where paint finish is to be applied may be finger jointed in lieu of scarfing. Trim shall be accurately cut and mitred at all corners, glued and properly fastened.

.11 Machine dressed work shall be properly machine using sharp cutters, the finished work shall be free from drag, feathers, slivers or roughness of any kind. Remove machine marks by sanding.

.12 Finished woodwork shall be carefully hand sanded after installation to remove roughness and planer marks. Sanding shall be done with the grain of the wood and finished with fine grit paper to leave a smooth scratch-free surface suitable to receive the paint or natural finishes to be applied over as specified in Section 09 90 00.

.13 Nail heads in the finished surfaces shall be set with straight shank nail sets. Screw and bolt heads in finished surfaces shall be let into the work and capped with edge grain wood caps dressed and finished flush.

.14 Provide cutouts for sinks, fixtures, fittings, inserts, outlet boxes, services, other mechanical and electrical items and appliances. Round corners, and chamfer edges. Where items for cutouts butt to underside or back of finished surface, finish exposed edge to match face. Where item covers cutout, and at all concealed cut edges of core material, apply uniform coating of seal to cut edges.

.15 The finished work shall be of a high quality, with all corners having exact angles to ensure no swerve or twisting. All bends, crimps or angle parts shall be produced by professional equipment and tools for this purpose and if long runs or repeats are required, such shall be produced in the shop, or have proper equipment on site.

.16 Counter Supports, Cabinets and Fitments:

.1 Provide and install counter supports, cabinets, and fitments as indicated on drawings.

.2 Shop fabricate and finish countertops and cabinet work in as large a size as practical. Verify field dimensions and conditions prior to fabrication.

.3 Make each unit rigid and self-supporting, suitable for individual removal. Assemble components with dovetail connections, mortise and tenon or blind dado joints, and adequately glued and secured with screws.

.4 Construct cabinets of solid lumber framing, with 19mm (3/4") MDF gables. Provide 19mm (3/4") MDF bottoms. Provide minimum 6mm (1/4") thick MDF full width backs having joints concealed behind framing. Backs which support shelves, equipment, or other loads, shall be 19mm (3/4") thick MDF. Route backs into end gables.

.5 Fabricate cabinet base in wood, separately in height indicated or, if not indicated, to match flooring base.

.6 Fabricate cabinet doors of flush panels from 19mm (3/4") thick MDF framed with hardwood edging.

.7 Make drawer fronts of 19mm (3/4") finished MDF, and wide enough to cover slide space. Provide 13mm (1/2") drawer backs, 16mm (5/8") sides, 6mm (1/4") dividers, and 6mm (1/4") bottoms, all of finished MDF. Fasten sides to fronts with dovetail joints, and grooved and glued joints for backs. Groove and glue bottoms into fronts and sides.

.8 Drawers shall be supported and guided with side extension drawer slides.

.9 Where a locking drawer is located below another drawer, provide 6mm (1/4") thick MDF diaphragm in framing immediately above locking drawer.

.10 Fabricate shelving of 19mm (3/4") finished MDF. Route cabinet gables to receive fixed shelving where indicated and to receive recessed metal shelf standards flush with adjacent surfaces for adjustable shelving.

.11 Fabricate countertops to details shown of 19mm (3/4") plywood, unless otherwise indicated on the Drawings as Solid Surface Countertops.

.1 Provide exterior grade waterproof Douglas Fir plywood for countertops to receive sinks. Fit corners and edges of countertops with solid stock. Extend side and backsplashes to heights indicated. Provide side returns to match backsplashes at all abutting fixed vertical surfaces.

.12 Support counters without cabinets below on solid wood framing, and MDF gables.

.13 Provide MDF shelf units with finished plywood cleats for shelving and coat rod installations. Provide closet rods with end flanges and intermediate supports.

.17 Edging Treatment:

.1 3mm (1/8”) Self Edge Laminate: HPDL, colour matching cabinet work, as indicated on the Drawings.

.18 Plastic Laminate Covered Components:

.1 Meet requirements of CAN/CSA-A172, Appendix A.

.2 Bond plastic laminate to core with adhesive using pressure. Provide balanced construction with plastic laminate face sheet on exposed sides of core and backer/liner sheet. Finish drawers with liner sheet on both sides of core for balanced construction.

.3 Unless otherwise detailed, provide 19mm (3/4") thick core.

.4 Apply plastic laminate to core material in accordance with adhesive manufacturer's instructions. Provide same core and laminate profiles to provide continuous support and bond over entire surface.

.5 Use continuous lengths up to 2439mm (8'). Keep joints 610mm (2') from cutouts and in locations indicated on reviewed shop drawings.

.6 Locate joints, where required at 2439mm to 3048mm (8' to 10') O.C. At L-shaped corners mitre plastic laminate, to the outside corner. Accurately fit members together to provide tight and flush butt joints, in true planes. Provide 6mm (1/4") blind spline and approved type draw bolts; one draw bolt for widths up to 150mm (6") at maximum 457mm (18") centres for widths exceeding 150mm (6"). Colour-match adjoining units.

.7 Form shaped profiles and bends using postforming grade laminate to laminate manufacturer's instructions.

.8 Where curved or bent surfaces are required, use postforming laminate.

.9 Self-edge straight-line-edging with general purpose laminate and radius corners with postforming laminate, of same colour and finish as facing sheet, to cover exposed edges of core material. Apply with same adhesive as facing sheet. Chamfer edges uniformly at approximately 20 deg using machine router. Do not mitre laminate edges.

.10 Fabricate horizontal wearing surfaces including counters, shelves, both sides of removable shelves, cabinet doors and drawer fronts, of general purpose laminate except where postforming is required.

.11 Use general purpose laminate for exposed vertical surfaces except where otherwise specified or indicated.

.12 Apply plastic laminate backing sheet to reverse side of core of plastic laminate finished work including under countertops and concealed portions of plastic laminate faced work. Provide backing sheet of specified minimum thickness, increased as required to compensate stresses caused by facing sheet.

.13 Apply laminated plastic liner sheet to interior of cabinetry unless indicated otherwise.

.14 Where cutouts are required in countertops for items that butt to underside of top only, trim edges of opening with postforming laminate. Use radiused corners and chamfer edges around cutouts to avoid chipping laminate. Where item covers cutout, apply uniform coating of sealer to cut edges.

.15 Assemble work, true and square. Arrange adjacent parts of continuous laminate work to match in colour and pattern.

2.3 MOISTURE CONTENT

.1 Moisture content of interior woodwork shall be between 8% and 12%.

2.4 FINISHES

.1 Finishes shall match approved finished samples of wood treatment submitted by this section for each species of wood required. Wood items provided under this section shall be finished as part of the work of this section.

.2 Apply stain to items where scheduled, indicated or as directed Consultant, providing uniform required stain colour(s).

.3 Provide finishes as indicated in the Finishes Materials Legend on Drawing A3.3.

3 Execution

3.1 EXAMINATION

.1 Inspect available spaces and check surfaces over which the work of this section is dependent for any irregularities detrimental to the application and performance of the work.

.2 Notify Consultant in writing of all conditions which are at variance with those on the Contract Documents and/or detrimental to the proper and timely installation of the work of this section. The decision regarding correct measures shall be obtained from the Consultant prior to proceeding with the affected work.

.3 Check humidity in building with moisture reading instruments if doubt exists that building is sufficiently dry and ready to receive millwork. Do not proceed until unsatisfactory conditions are corrected.

.4 Commencement of work indicates acceptance of surfaces and conditions.

3.2 INSTALLATION - GENERAL

.1 Provide and fit in place all furring, strapping, battens, grounds and blocking required to provide adequate properly placed fixing for all finish carpentry work and as required for the work of other sections.

.2 Refer to drawings and coordinate with drywall, the painting and floor covering sections to establish sequence of installation or execution of each others' work. Pay particular attention to areas where materials are supplied by others and installed under this Contract.

.3 All nails where their use is permitted, shall be long enough so that at least half their length penetrates into the second member. Splitting of wood members shall be minimized by staggering the nails in the direction of the grain and by keeping nails well in from edges.

.4 Unless otherwise permitted by Consultant, fasten finish carpentry components in concealed manner.

.5 Plastic laminate work shall be free of cracks and chipped or broken edges. Replace damaged components.

.6 Fitments shall be installed level, plumb and true and complete in all respects.

.7 Fit small scribe moulds of same material as fitment to hide voids at junction of fitment to fitment and fitment to walls, partitions, ceilings, furrings.

.8 Provide and install all pass-thru doors, cable entry plugs, computer paper feed slot guides, casters, wall mounted standards with brackets and accessories as indicated on drawings, secure, plumb, level and true to line to adjacent surfaces and items.

3.3 PRIMING

.1 Immediately in instances where primed work is cut (as for fitting), a coat of primer shall be applied to the resulting raw surfaces.

3.4 INSTALLATION - CABINET HARDWARE

.1 Install cabinet hardware in shop wherever possible.

.2 Install cabinet hardware secure, plumb, level, true to line, and in accordance with hardware manufacturers' instructions.

.3 Cut and fit to finish carpentry and millwork for proper installation and operation of cabinet hardware.

.4 Size cutouts so that hardware item completely covers cutouts.

.5 Adjust and lubricate cabinet hardware as required for smooth and efficient operation without binding.

END OF SECTION

1 General

1.1 SUMMARY

.1 Section Includes:

.1 Labour, Products, equipment and services necessary to complete the work of this Section.

.2 Maintain the existing building watertight at all times.

.3 Provide required temporary protection, and enclosures. Seal off or temporarily dam open roof edges to prevent any incidence of water into existing building or structure.

1.2 QUALITY ASSURANCE

.1 Tie-in new work with adjacent existing roofing system in accordance with the manufacturer's recommendations for the products used. All products to be compatible with the existing and new roofing system components.

.2 Do work to maintain existing roof warranty.

.3 All work shall meet the requirements of the Canadian Roofing Contractors Association (CRCA), including all amendments.

.4 Applicators: Member in good standing of the Canadian Roofing Contractors Association and which has a minimum of five (5) years of proven satisfactory experience in the Work of this Section.

.5 Ensure surfaces to receive work of this Section are clean, level, smooth, solid and dry before commencing work each day.

.6 Ensure temperatures during application are not less than the minimum recommended by the material manufacturer. Do not perform work during inclement weather conditions.

.7 Stop work when temperature remains consistently below recommended temperature.

.8 Use only dry materials and apply only during weather that will not introduce moisture into roofing system.

.9 Arrange for roofing material manufacturer's representative to visit the site and discuss roofing application and any special requirements, prior to commencement of work.

1.3 SUBMITTALS

.1 Provide submittals specified and as required to assess conformance with the Contract Documents and Division 01.

.2 Shop Drawings: Provide shop drawings showing complete details of all conditions, construction and interfacing with work of other Sections.

.3 Product Data: Submit three (3) copies of the manufacturers' recommended roofing inspection and maintenance procedures for inclusion in the maintenance instructions and data book.

1.4 PROTECTION

.1 Provide all necessary protection measures to prevent fumes, dust particles, odours and other foreign matter created or caused by roofing operation from entering the building, including the return air ducts.

.2 Provide temporary protection at work areas or access to work areas with minimum ½" plywood underlaid with 1" polystyrene insulation board extending 3' beyond work area. Remove protection at completion of work.

.3 Prevent bitumen, precipitation and debris entering openings and drains during work.

.4 Cover walls and adjacent work where materials hoisted or used. Locate kettles so that smoke and fumes will not discolour the building or adjacent buildings or become a nuisance to adjacent owners or the public.

.5 Use warning signs and barriers. Maintain in good order until completion of work.

.6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed work and materials out of storage.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in original containers, sealed, with labels intact.

.2 Do not store insulation in direct contact with the earth, road surface, or roof deck. Place suitable supports under the insulation upon delivery to protect it from absorbing dampness from the surrounding terrain or deck.

.3 Store materials to manufacturer's instructions. Provide and maintain dry, off-ground weatherproof storage. Take particular care to prevent materials from absorbing moisture. Remove unsatisfactory materials promptly and provide new dry materials.

.4 Deliver fasteners in boxes or kegs and keep in protective storage until used. Do not oil or grease fasteners.

.5 Remove materials only in quantities required for same day use.

.6 Remove and replace damaged, wet or broken materials.

.7 Cover gravel during inclement weather.

.8 Store materials away from open flame or ignition sources.

1.6 WARRANTY

.1 Provide Canadian Roofing Contractors Association (CRCA) Standard Form of Warranty, complete with a copy of the CRCAs Preventative Maintenance Manual or similar written warranty acceptable to the Owner and the Consultant. The warranty shall be for a period of two (2) years from date of Substantial Performance.

.2 Provide material and material/labour warranties offered by the material manufacturers.

.3 Repair defects within twenty-four (24) hours of notification.

.4 Inspect the roof thirty (30) days before expiry of warranty and correct defects within fifteen (15) days of inspection. This inspection shall be performed at no additional cost to the Owner.

.5 Carry out repair work required under the warranty in accordance with the recommendation of the Consultant.

2 Products

2.1 MATERIALS

.1 Roofing products: Matching and compatible with existing installed materials.

.2 Roof Pavers:

.1 Provide pavers at all traffic concentration points (i.e. roof hatches, access doors, rooftop ladders, etc.), regardless of traffic frequency or whether or not these are explicitly indicated on Drawings.

.2 Concrete Roof Pavers: CSA A231.2, 30 MPa, precast concrete pavers, complete with smooth face non-slip finish and chamfered edges; Containing between 4% - 6% air entrainment.

.1 Size: 610 mm x 610 mm x 64 mm (24" x 24" x 2-1/2").

.3 Paver Support Pedestals:

.1 Pedestal Paver System: Grid-like structure with integral spacer ribs on top surface, incorporating through-drainage and air ventilation.

.2 Composition: High density polyethylene, ultraviolet stabilized.

.3 Levelling plates: Pedestal base size x 1/8 inch (3 mm) thick.

.4 Colour: Black.

.5 Basis of Design Materials: Pave-El Paver Pedestals by Envirospec Inc.

3 Execution

3.1 EXAMINATION

.1 Examine site conditions and surfaces to ensure that they are in satisfactory condition for the commencement of the work of this section. Do not proceed with work until surfaces are satisfactory.

.2 Examine existing work to ensure materials used for work of this Section are compatible with and matching existing roofing system.

3.2 ROOFING INSTALLATION

.1 Remove only areas of the existing roofing system which can be replaced, complete with membrane flashings, on the same day.

.2 Adequately install cants at junctions between horizontal and vertical surfaces. Provide tight flush joints between length of cants and mitre corners.

.3 Provide roofing and flashing construction to matching existing.

.4 Install sheet metal work in accordance with CRCA specifications, using concealed fastenings except where approved before installation.

.5 Fabricate metal flashings and other sheet metal work to details shown. Form pieces in 8’ maximum lengths. Make allowance for expansion at joints.

.1 Hem exposed edges on underside ½”. Miter and seal corners with sealant.

.2 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.3 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

.4 Counterflash membrane flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips.

.5 Lock end joints and caulk with sealant.

3.3 PAVER AND SUPPORT PEDESTAL INSTALLATION

.1 Install paver pedestal system in accordance with manufacturer’s instructions.

.2 Where dead level paver surface is required utilize levelling plates and multiple stacking of pedestals to achieve level surfaces. Locate levelling plates on top of upper pedestal.

.3 Locate first row of pavers at an exterior edge, using 1/2 pedestals at edges and 1/4 pedestals at corners and partial angled paver locations.

.4 Run subsequent rows of pavers parallel to first row.

.5 Place pedestals with projecting ribs facing up. Place pavers tight to spacer ribs.

.6 Lower pavers horizontally without nosing into position.

.7 Align and shim pavers as work progresses.

.8 Maximum variation in height between adjacent pavers for walking surfaces: 3mm (1/8”).

3.4 CLEANING

.1 Remove all existing debris from all roof areas.

.2 Clear out roof drains, scuppers, eaves troughs and down spouts of debris resulting from work of this Section and ensure they are free draining at project completion.

.3 Daily as the work proceeds and on completion, remove all surplus materials and debris resulting from work.

.4 Remove stains, caulking or other adhesive from all affected surfaces.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes supply and installation of a self-adhering modified bitumen waterproofing for foundation walls, complete with primer, drainage board, and protection course required for a complete system installation.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 American Society for Testing and Materials (ASTM):

.1 ASTM D412, Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers - Tension

.2 ASTM D882, Standard Test Method for Tensile Properties of Thin Plastic Sheet

.3 ASTM D1970/D1970M, Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection

.4 ASTM E96/E96M, Standard Test Methods for Water Vapour Transmission of Materials

.5 ASTM E154/E154M, Standard Test Methods for Water Vapour Retarders Used in Contact with Earth Under Concrete Slabs, on Walls or as Ground Cover

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals:

.1 Product Data:

.1 Submit copies of the most current technical data sheets, describing materials physical properties, and explanations about product installation, including installation techniques, restrictions, limitations and other manufacturer recommendations.

.2 Submit membrane manufacturer’s standard details that will be utilized for this project, indicate changes that must be made to make the details project specific for review by the Consultant.

.2 Samples: Provide samples of all materials required for work of this Section.

.3 Safety Data Sheets: Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on Site for reference by workers.

1.4 QUALITY ASSURANCE

.1 Subcontractor executing work of this Section shall have a minimum of five (5) years continuous Canadian experience in successful application of bituminous sheet membrane waterproofing work of type as indicated on drawings and specified herein. Submit proof of experience upon Consultant's request.

.2 All membrane waterproofing products to be manufactured by or, approved by one manufacturer, which includes but is not limited to the following:

.1 Primers,

.2 Mastics and membranes,

.3 Asphaltic protection boards,

.4 Composite drainage boards,

.5 Expansion joint membranes.

.3 Work of this Section shall be executed by workers especially trained and experienced in this type of work. Have a full time, senior, qualified representative at the Site to direct the work of this Section at all times.

.4 Subcontractor executing work of this Section shall ensure that manufacturer's representative shall inspect substrates prior to commencement of work of this Section, during application of bituminous sheet membrane waterproofing and upon completion of work of this Section.

.5 Subcontractor executing work of this Section shall ensure that manufacturer's representative shall provide technical assistance to applicator and assist where required in correct application of bituminous sheet membrane waterproofing materials.

.6 Submit copies of the membrane manufacturer’s current ISO certification including the manufacturing of the membrane, primer, mastics, adhesives and asphaltic protection board.

1.5 PREINSTALLATION MEETING

.1 Arrange a preconstruction meeting in accordance with Division 1 requirements.

.2 Review requirements for waterproofing, including surface preparation specified under other Sections, substrate condition and pre-treatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.6 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off the ground, under cover storage area. Do not load any area beyond the design limits.

.2 Material shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable waterproof coverings.

.3 Deliver and store waterproofing materials in the manufacturer's original containers and wrappers with seals intact.

.4 Store solvent based materials in safe areas well away from open flames or excessive heat.

.5 Do not permit materials to freeze. Store materials at temperatures above 10 deg C.

.6 Do not permit traffic of any kind over unprotected waterproof membranes. Do not allow backfill to be placed against unprotected waterproof membranes. Apply drainage board/protection board as soon as possible after installation of membrane.

1.7 COMPATIBILITY

.1 All waterproofing membranes materials must be provided by the same manufacturer to ensure compatibility between products used for the different applications identified in this Section.

.1 Crystalline Waterproofing: Section 07 16 16

1.8 PROJECT CONDITIONS

.1 Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer.

.2 Apply waterproofing to dry substrates, when relative humidity is less than 85%, and when surface and ambient temperatures are 4 deg C above dew point.

.3 Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are imminent during application and curing period.

.4 Maintain adequate ventilation during application and curing of waterproofing materials.

1.9 WARRANTY

.1 Warrant that the work of this Section shall remain free from leaks and from defects in materials and workmanship in accordance with the Contract Requirements, but for a period of five (5) years.

.2 Promptly make good defects within the warranty period without cost to the Owner.

.1 Warranty is inclusive for procedures to gain access to waterproofing membrane including removal and reinstallation of earthwork, protection board, drainage panels, and insulation.

2 Products

2.1 MANUFACTURERS

.1 Compatibility: Verify that waterproofing systems identified in this Section are provided by a single manufacturer to ensure compatibility at intersections. Multiple manufacturers providing waterproofing systems on this project will not be accepted.

.2 Provide a written declaration to the Consultant, from the waterproofing manufacturer, that the waterproofing materials and components are compatible, and that warranty period specified above will be upheld at junctions between waterproofing systems required to waterproof the areas outlined in the Specifications and Drawings.

.3 Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

.1 W.R. Meadows

.2 Henry Company

.3 Hydrotech

.4 Grace Construction Products

2.2 MATERIALS

.1 Bituminous Sheet Membrane:

.1 Rolled, Self-Adhering Waterproofing Membrane: Polymeric waterproofing membrane protected by release paper on cross-laminated polyethylene carrier film with exposed polymeric membrane strips on both sides protected by pull-off release strips.

.1 Compliance: AREMA Specification Chapter 29 - Waterproofing.

.2 Thickness:

.1 Carrier Film: 4 mils.

.2 Polymeric Membrane: 56 mils.

.3 Tensile Strength, ASTM D412, Die C:

.1 Carrier Film: 5,900 psi (40.71 MPa) minimum.

.2 Polymeric Membrane: 460 psi (3.23 MPa) minimum.

.4 Elongation, ASTM D412, Die C: Polymeric Membrane: 971 % minimum.

.5 Peel Adhesion, ASTM D903: 11.8 lbf/in. (2068 N/m).

.6 Lap Adhesion, ASTM D1876: 8.62 lbf/in. (1508 N/m)

.7 Water Vapor Permeability, ASTM E96, Method B: 0.036 perms.

.8 Water Absorption, ASTM D570: 0.1 percent, 72 hours maximum.

.9 Resistance to Hydrostatic Head: Equivalent to 230.9 feet (70.3 m) of water.

.10 Puncture Resistance, ASTM E154: 48.2 lbf (214.6 N).

.11 Exposure to Fungi, Soil Test: Pass, 16 weeks.

.2 Basis of Design Product: MEL-ROL Waterproofing System by W.R. MEADOWS, or approved alternate by Henry Company, or Hydrotech, or Grace Construction Products.

.2 Surface Conditioner:

.1 Temperatures Above 40 deg F (4 deg C): Mel-Prime Water Base Primer by W.R. MEADOWS.

.2 Temperatures Above 0 deg F (-18 deg C): Mel-Prime VOC Compliant Solvent Base Primer by W.R. MEADOWS.

.3 Flashing and Fillets: MEL-ROL LIQUID MEMBRANE by W.R. MEADOWS.

.4 Termination Sealant: As recommended by membrane manufacturer.

.5 Drainage Board:

.1 High impact polypropylene core board with polypropylene fabric attached, having the following physical properties:

.1 Flow Rate: 223L/min/m,

.2 Compressive Strength: 15,100 psf,

.3 Thickness: 10mm (3/8")

.6 Drainage Board Adhesive: As recommended by membrane manufacturer to ensure compatibility between drainage board and waterproofing.

.7 Drainage Board Accessories:

.1 Moulding Strip: Continuous 90mm (3-1/2") wide “Z” flashing strip to fit over exposed top edge of drain board.

3 Execution

3.1 EXAMINATION

.1 Examine the vertical surfaces to which membrane is to be applied. Ensure that concrete has cured for at least 28 days, that all slabs slope to drains, that all surfaces are sufficiently smooth (plywood formed or wood float) and that surfaces to which membrane is to be applied are clean of waxy or oily substances, dust, dirt or other extraneous materials or any substance which might impair bond.

.2 Do not apply membrane to damp or frosty surfaces. Ensure that all items penetrating the membrane, such as pipes, conduits, drains, and the like, are in place and rigidly fastened.

.3 Report any defects of any conditions which might impair the performance of the membrane. Do not apply the membrane until defects have been corrected.

.4 Commencement of work of this Section implies acceptance of surfaces and conditions.

.5 Ensure that any required skim/mud slabs are placed in ample time and at correct levels.

3.2 PREPARATION

.1 Priming:

.1 Apply primer in strict accordance with manufacturer's recommended rate.

.2 Prime only areas which shall be covered with bituminous sheet membrane waterproofing in same working day.

.3 Reprime areas contaminated with dust or, not covered with membrane within 24 hours.

.4 Allow minimum 30 minute open time.

.2 Joint and Crack Treatment:

.1 All cracks in concrete 1.5mm to 3mm (1/16" to 1/8") wide are to be pre-treated with a 1.5 mm (60 mil) coating of liquid membrane 50 mm (2") wide centred on the crack. Alternately, apply a 150 mm (6") wide strip of waterproofing membrane centred over crack. Provide 75 mm (3") end laps.

.2 Horizontal to vertical inside corner transition areas are to be pre-treated with a liquid membrane fillet extending 19 mm (3/4") vertically and horizontally from the corner. Apply a minimum 229 mm (9") strip of waterproofing membrane centred at the joint.

.3 All outside corners are to be pre-treated with a minimum 229 mm (9") strip of waterproofing membrane centred at the joint.

.4 Where three or more planes come into contact reinforce with cut sections of waterproofing membrane reinforcing sheet as per manufacturer's instructions.

3.3 INSTALLATION - BITUMINOUS SHEET MEMBRANE WATERPROOFING

.1 Installation of bituminous sheet membrane waterproofing shall be in strict accordance with manufacturer's written instructions.

.2 Corner Detailing:

.1 Form 19mm (3/4") fillet of liquid membrane at all inside corners and cover with minimum 305mm (12") wide sheet membrane strip centered on corner prior to installation of bituminous sheet membrane waterproofing.

.2 Apply minimum 305mm (12") wide sheet membrane strip centered on all outside corners prior to installation of bituminous sheet membrane waterproofing.

.3 Horizontal Surfaces:

.1 Apply bituminous sheet waterproofing membrane from low point to high point so that laps shed water.

.2 Stagger all end laps and overlap all seams minimum 75 mm (3").

.3 Provide double thickness of bituminous sheet waterproof membrane over construction joints and cracks up to 3mm (1/8") wide.

.4 Roll membrane in its entirety immediately following placement to ensure continuous adhesion to slab.

.5 Tie-in under floor bituminous sheet membrane waterproofing with bituminous sheet membrane waterproofing system applied to walls, overlapping existing a minimum 457 mm (18"). Seal junction with continuous liquid membrane, minimum 3mm (1/8") thick and 25mm (1") wide.

.6 Seal all "T" joints and sheet membrane terminations with liquid membrane, minimum 3mm (1/8") thick and 25mm (1") wide.

.4 Vertical Surfaces:

.1 Apply bituminous sheet membrane waterproofing vertically in full lengths.

.2 Stagger all end laps and overlap all seams minimum 75mm (3").

.3 Provide double thickness of bituminous sheet waterproofing membrane over construction joints and cracks up to 3mm (1/8") wide.

.4 Roll membrane in its entirety immediately following placement to ensure continuous adhesion to walls.

.5 Install securement bars at horizontal terminations, edges with liquid membrane.

.6 Tie-in bituminous sheet membrane waterproofing with existing waterproofing system, overlapping existing a minimum 305mm (12"). Seal junction with continuous liquid membrane, minimum 3mm (1/8") thick and 25mm (1") wide.

.7 Seal all "T" joints and sheet membrane terminations with liquid membrane, minimum 3mm (1/8") thick and 25mm (1") wide.

.5 Protrusions:

.1 Apply bituminous sheet membrane waterproofing to within 25mm (1") of base of protrusion. Apply liquid membrane around protrusion, minimum 3mm (1/8") thick and minimum 75mm (3") on to sheet membrane.

.6 Drains:

.1 Apply collar of membrane to drains, collar to extend minimum 6" beyond drain opening.

.2 Apply full coverage of bituminous sheet waterproofing membrane over the collar. Cut out drain opening so that the membrane extends under the clamping ring.

.3 Place a continuous bead of liquid membrane between the membrane waterproofing and clamping ring.

.7 Repairs:

.1 Inspect bituminous sheet waterproofing membrane thoroughly and make any repairs before covering.

.2 Patch tears and inadequately lapped seams with bituminous sheet membrane waterproofing. Slit "fishmouths" and repair with bituminous sheet membrane waterproofing extending min 150 mm (6") in all directions of slit.

.3 Seal all repairs with liquid membrane.

3.4 INSTALLATION - DRAINAGE BOARD

.1 Align and hang drainage up to foundation wall. Position bottom edge of drainage board to be in moderate contact with weeping tile system.

.2 Secure drainage board to foundation wall with board adhesive. Apply adhesive using saw tooth notched trowel having 3mm (1/8") notches or apply a 6mm (1/4") diameter bead on 150mm (6") centres in a serpentine pattern.

.3 Align and install termination strip along top edge with nails spaced 305mm (12") o/c and seal with termination sealant.

.4 Align and install moulding strip over completed top edge detail.

.5 Overlap end laps, pull back loose fabric to expose drain core and position core of second panel over the overlap flange of first panel.

.6 Bend drain board to create inside corners and cut board to create outside corners, provide 75mm (3") of extra fabric to wrap corner.

.7 Stagger or offset joints of drain board sheets.

.8 Place all subsequent sheets in an overlapping single fashion.

.9 Backfill bottom edge in conjunction with weeping tile system.

3.5 FIELD QUALITY CONTROL

.1 An independent inspection and testing company appointed and paid for by the Owner will carry out inspection and testing in accordance with the General Conditions.

.2 Arrange site meeting with inspection company representative three weeks prior to commencement of work of this Section on Site. Obtain inspector's instructions and procedures to be followed.

.3 Co-operate with the inspector and afford all facilities necessary to permit full inspection of the work of this Section and testing of materials prior to their use. Act immediately on instructions given by the inspector.

END OF SECTION

1 General

1.1 SUMMARY

.1 Work of this section includes, but is not limited to supply and installation of Crystalline Waterproofing of concrete substrates, using surface application, in the following locations:

.1 Dry side of elevator pits.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 American Society for Testing and Materials (ASTM):

.1 ASTM C39/C39M, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

.2 ASTM C267, Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacings and Polymer Concrete

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Product Data: Submit manufacturer's product data, with complete general and specific installation instructions, recommendations, and limitations affecting installation.

.3 Provide representative samples of the following for review by Consultant: Crystalline waterproofing.

.4 Provide certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical requirements; and that waterproofing system and components; materials are supplied by a single source manufacturer.

.5 Provide written certification that installer has current approved applicator status with waterproofing material manufacturer when requested by Consultant.

.6 Provide written report summarizing manufacturer’s observations, and indicating results of final inspection and any corrective action required for changes arising from deficiencies or site conditions.

1.4 QUALITY ASSURANCE

.1 Manufacturer Qualifications: A firm with not less than ten (10) years experience manufacturing crystalline waterproofing of the type specified, able to provide test reports showing compliance with specified performance characteristics, and able to provide on-site technical representation to advise on installation.

.2 Installer Qualifications: Experienced in work of the type specified in this section and approved in writing by waterproofing manufacturer.

.3 Pre-installation Meeting: Before installation, conduct meeting with waterproofing installer, installers of adjacent work and work penetrating waterproofing, and waterproofing manufacturer's representative to verify project requirements, substrate conditions, manufacturer’s installation instructions, and manufacturer’s warranty requirements; notify Owner and Consultant at least one week in advance of meeting.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Deliver materials in factory sealed and labelled packaging, and handle and store as per the manufacturer's instructions, recommendations and material safety data sheets.

.2 Store materials in accordance with manufacturer’s instructions, and as follows:

.1 Do not double stack pallets during shipping or storage.

.2 Protect waterproofing materials from moisture, excessive temperatures and sources of ignition.

.3 Provide cover to top, bottom and sides for materials stored on site, allowing for adequate ventilation.

.3 Handle materials in accordance with manufacturer’s instructions, and as follows:

.1 Protect from construction operation related damage, damage from weather, excessive temperatures and prolonged sunlight.

.2 Remove damaged material from site and dispose of in accordance with applicable regulations.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Perform work only when existing and forecasted weather conditions are within guidelines established by the manufacturer for installation of waterproofing materials.

.2 Do not apply waterproofing materials into standing or ponding water conditions.

1.7 WARRANTY

.1 Provide manufacturer’s written system warranty for a period of five (5) years starting from substantial performance of the Project, covering materials and labour.

.2 Installer's Warranty: Provide warranty signed by installer that reads as follows:

.1 Installer warrants that, upon completion of the work, surfaces treated with crystalline waterproofing will be and will remain free of water leakage resulting from defective workmanship or materials for a period of ten (10) years from Date of Substantial Performance.

.2 In the event that water leakage occurs within the warranty period from such causes, the installer shall, at his own expense, repair, replace, or otherwise correct such defective workmanship and materials.

.3 Installer shall not be liable for consequential damages.

.4 Installer's liability shall be limited to repair, replacement, or correction of defective workmanship and materials.

.5 This warranty excludes leaks or other defects due to causes beyond the installer's control, including but not limited to structural failure, movement of the structure, fire, earthquakes, tornadoes, and hurricanes.

2 Products

2.1 MANUFACTURER

.1 Subject to compliance with requirements specified in this Section, manufacturers’ products that may be incorporated into the Work include, but are not limited to, the following:

.1 Tremco, Permaquik Crystalline Waterproofing Systems

.2 Xypex Chemical Corporation

.3 Krystol T2 Waterproofing System By The Kryton Group of Companies

2.2 MATERIALS

.1 Waterproofing Products: Provide installed products that comply with following, when tested using cured concrete samples made without admixtures, with two 1.27mm (0.05") thick coats of waterproofing:

.1 Penetration: At least 50mm (2") penetration of crystal-forming material, evidenced by scanning electron microscope photographs.

.2 Permeability: No measurable leakage through waterproofed concrete, when tested in accordance with COE CRD-C 48 at 123.4 m (405 feet) of head or 1200 kPa (175 psi) using 50 mm (2") thick, 13.8 MPa (2000 psi) compressive strength concrete.

.3 Chemical Resistance: No detrimental effects when tested using (27.6 MPa) compressive strength concrete in accordance with ASTM C 267-01 (2006) using hydrochloric acid (pH of 3.5), brake fluid, transformer oil, ethylene glycol, toluene, and caustic soda as test mediums for duration of 84 days each; minimum of 14 percent increase in concrete compressive strength when tested in accordance with ASTM C39.

.4 Potable Water Contact Approval: NSF certification for use on structures holding potable water, based on testing in accordance with NSF 61.

.2 Waterproofing: Modified single coat crystalline waterproofing; proprietary compound of Portland cement, silica sand and active chemicals, mixed with water in proportions recommended by manufacturer to achieve full coverage with application method used.

.3 Patching Compound: Single component, fast-setting, nonshrink, high bond strength hydraulic cement; with admixture where needed for increased bond strength to existing concrete.

3 Execution

3.1 CONDITIONS OF SUBSTRATES

.1 Surfaces shall be clean and free of oil, grease, paint, loose dust and laitance.

.2 Surfaces and ambient temperature shall be minimum 50 deg. C for a period of 24 hours before the installation, during and after the installation.

3.2 PREPARATION

.1 Slabs:

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

.2 Apply dry shake powder to fresh horizontal concrete surfaces at rate recommended by manufacturer. Incorporate powder into surface during concrete finishing process.

.2 Defective Surfaces:

.1 Remove defective concrete to a depth where sound concrete is found; fill tie holes, reglets, honeycombed areas and routed out cracks with mortar.

.3 All Surfaces:

.1 Wash all surfaces thoroughly with water and let dry to a damp condition.

.4 Construction Joints: Apply sealing strips at each construction joint by filling grooves coinciding with construction joint.

.1 If grooves have not been preformed, at least 19mm (3/4") wide and minimum 25mm (1") deep, saw cut and chip grooves to that dimension.

.2 Apply specified slurry coat to slot at rate recommended by manufacturer.

.3 Fill and form surfaces using specified dry pack repair compound while slurry coat is still green, but after slurry coat has reached initial set.

.4 Compact tightly using pneumatic packer or hammer and block.

3.3 APPLICATION

.1 Provide cementitious waterproofing in elevator pits and sump pits as indicated on drawings. Install mortar cove at junction of walls to slabs.

.2 At slabs and toppings broadcast cementitious waterproofing material dry at time of initial set of concrete and float thoroughly into concrete or apply by slurry coat method.

.3 Apply cementitious waterproofing material to walls with brush, broom or suitable spray equipment. Where two coat application is required, apply second coat while first coat is still green.

.4 Fill reglets at construction joints and other locations, with mortar. Give surfaces a smooth, dense and uniform finish.

3.4 CURING

.1 Curing: Cure exposed waterproofing treatment using a mist fog spray of clean water after coating has hardened sufficiently not to be damaged by spray; do not use plastic sheeting laid directly on waterproofing; air circulation is required.

.1 If water curing is not possible, follow manufacturer's recommendations for curing using chemical curing agent approved by manufacturer.

.2 Avoid coating damage with spray operation. Spray treated surface 3 times a day for two (2) to three (3) days.

.3 In hot climates, spray treated surfaces at intervals recommended by waterproofing manufacturer.

.4 During curing period, protect treated surfaces from rainfall, ambient temperature below freezing, and puddling of water.

.5 Provide supplementary air circulation as recommended by waterproofing manufacturer.

.2 Comply with waterproofing manufacturer's recommendations for sequencing construction operations after waterproofing applications to avoid conditions detrimental to performance of waterproofing application.

3.5 CLEANING AND PROTECTION

.1 Clean spillage and overspray from adjacent surfaces using appropriate cleaning agents and procedures.

.2 Protect installed product from damage during construction; do not allow traffic on unprotected waterproofed surfaces.

.3 Do not backfill against waterproofed surfaces for at least thirty-six (36) hours after installation; use moist backfill material when backfilling occurs less than seven (7) days after installation.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply and installation of the following:

.1 Foundation and Underslab Insulation Board

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering

.5 American Society for Testing and Materials (ASTM):

.1 ASTM D1621, Standard Test Method for Compressive Properties of Rigid Cellular Plastics

.2 ASTM D2842, Standard Test Method for Water Absorption of Rigid Cellular Plastics

.6 Canadian General Standards Board (CGSB):

.1 CGSB 71-GP-24M, Adhesive, Flexible for Bonding Cellular Polystyrene Insulation

.2 CAN/CGSB-37.5, Cutback Asphalt Plastic Cement

.7 Canadian Standards Association (CSA):

.1 CSA A123.3, Asphalt Saturated Organic Roofing Felt

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Affidavits:

.1 In lieu of samples and inspection procedures when required by CGSB and CAN/ULC Standards, submit affidavits, if requested, that materials supplied under these requirements meet CGSB and CAN/ULC Standards.

.3 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on site for reference by workers.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Store insulation materials in dry areas, protected from wetting, sunlight and traffic. Store insulation board flat, on a flat surface, and to prevent edge damage and placing of materials on top of stored boards.

.2 Ensure that insulation board and adhesives are stored at a minimum temperature of 4 deg C for twelve (12) hours before installation, and that freezable adhesives are stored only at temperatures above 0 deg C at all times.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design Products: Products named in this Section were used as the basis-of-design for the project; additional manufacturers offering similar products may be incorporated into the work of this Section provided they meet the performance requirements established by the named products and provided they submit requests for substitution five (5) days in advance of Bid Closing.

.2 Acceptable Manufacturers: Subject to compliance with requirements specified in this Section, manufacturers offering products that may be incorporated into the Work include the following:

.1 ROCKWOOL Inc.

.2 Owens-Corning Canada

.3 Dupont

2.2 MATERIALS

.1 Foundation and Underslab Insulation Board:

.1 Closed-cell, cellular, foamed, smooth skin, extruded expanded polystyrene, having 30 psi compressive strength, thicknesses as indicated on drawings and specified herein, conforming to CAN/ULC S701, Type IV.

.1 Basis of Design Materials:

.1 Styrofoam Brand SM by Dupont.

.2 Celfort 300 by Owens-Corning Canada Inc.

.3 (Or approved equivalent).

.2 Provide underslab insulation board with shiplapped edges.

2.3 ACCESSORIES

.1 Insulation Fasteners:

.1 Mechanical Fasteners: High quality, impact resistant plastic fastener system specifically designed for installation of board insulation materials; 38mm (1-1/2”) diameter, shaft length to suit insulation thickness and hot dipped galvanized fastener to suit substrate.

.2 Insulation Clips: Impale type, perforated 50mm x 50mm (2” x 2”) cold rolled carbon steel 1mm (1/32”) core metal thickness, adhesive back; 1.6mm (1/16”) diameter annealed steel wire spindle, length to suit insulation, 25mm (1”) diameter self locking washers.

.2 Adhesive:

.1 Trowelable Polystyrene Insulation Adhesive: Trowel consistency, synthetic rubber based insulation adhesive compatible with polystyrene insulation in accordance with CGSB 71-GP-24M; suitable for application to temperature of -10 deg C or lower, as approved by insulation board supplier.

.3 Felt Slip Sheet: No. 15 asphalt saturated, organic, unperforated felt conforming to CSA A123.3.

.4 Slip Sheet Mastic: Cut back asphalt plastic cement conforming to CAN/CGSB-37.5.

3 Execution

3.1 EXAMINATION

.1 Before commencing work, ensure that all surfaces to which perimeter insulation board is applied are clean, reasonably smooth with no abrupt changes in plane, free of grease, and with protruding fins of mortar or concrete removed, and that the surfaces are otherwise acceptable for insulation application as specified.

3.2 PREPARATION

.1 Clean substrates of substances harmful to insulations; remove projections that interfere with insulation attachment.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

.1 Install insulation and accessories in accordance with manufacturer's written instructions applicable to products and application indicated and as follows:

.1 Use insulation that is undamaged, dry, and unsoiled.

.2 Maintain continuous thermal insulation, vapour barrier and air tightness for building spaces and elements, and as follows:

.1 Saw cut and trim insulation neatly to fit spaces; fill voids with foamed-in-place insulation compatible with installed insulation.

.2 Butt edges and ends tight. Fit insulation tight against mechanical, electrical and other items protruding through the plane of insulation.

.3 Use insulation free of broken or chipped edges.

.4 Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise specifically shown or required to make up total thickness.

.5 Fit insulation firmly against substrate using mechanical fasteners spaced in accordance with manufacturers recommended spacing and pattern; in addition, adhere insulation to uneven substrate surfaces and provide additional fasteners to eliminate air spaces between insulation and substrate.

.6 Mechanically fasten insulation boards 50mm (2”) in from edges at 305mm (12”) centers.

.2 Leave insulation joints unbonded over line of expansion and control joints; bond a continuous 150mm (6”) wide strip of primary vapour membrane over expansion and control joints using compatible adhesive

.3 Protect insulation from damage until it is covered; replace any broken, sunburned, crushed or dented insulation immediately prior to covering; coordinate with back-filling operations.

.4 Board Insulation: Install board insulation to vertical surfaces with adhesive applied in accordance with manufacturer's written instructions, and as follows:

.1 Exterior Application: Extend boards as indicated on Drawings to top of footing, installed on exterior face of perimeter foundation wall.

.2 Apply adhesive to the substrate by the "dab" method not less than (3/8” x 3/4") size at 150mm (6”) centers; bed the insulation in the adhesive before the adhesive loses its tack or skins over.

.3 Protect below grade insulation on vertical surfaces from damage during backfilling by applying protection board; set in adhesive according to insulation manufacturer's written instructions.

.5 Foundation and Under Slab Insulation: Extend boards a minimum of 1220mm (4') in from perimeter foundation wall, unless otherwise indicated on Drawings, and as follows:

.1 Lay boards on level compacted fill.

.2 Insulate structural slabs at entrances with insulation placed horizontally underneath the concrete, and insulate surrounding slabs on grade in the same way for a distance of 1220mm (4') in every direction from the perimeter of the structural slab; omit perimeter insulation on adjacent foundations for the width of the structural slab.

3.4 PROTECTION

.1 Protect installed board insulation from damage due to harmful weather exposures, physical abuse, and other causes.

.2 Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

1 General

1.1 SUMMARY

.1 Spray application of medium-density, closed-cell polyurethane foam insulation to provide continuous thermal insulation and air/vapour barriers to substrates indicated on drawings and specified herein.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 American Society for Testing and Materials (ASTM):

.1 ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

.2 ASTM E84: Test Method for Surface Burning Characteristics of Building Materials

.3 ASTM E96: Standard Test Methods for Water Vapor Transmission of Materials

.4 ASTM E283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

.5 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S705.1, Standard for Thermal Insulation - Spray-applied Rigid Polyurethane Foam, Medium Density: Material Specification.

.2 CAN/ULC S770, Standard Test Methods for Determination of Long-term Thermal Resistance of Closed-Cell Thermal Insulating Foams.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Product Data for each type of insulation product specified.

.3 Product test reports performed by a qualified third-party testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water-vapor transmission, and other properties, based on comprehensive testing of current products.

.4 Manufacturer’s certificate certifying insulation provided meets or exceeds specified requirements.

.5 Installer’s certificate showing manufacturers installation certification for quality assurance.

1.4 QUALITY ASSURANCE

.1 Contractor executing work of this section shall have a minimum of five (5) years continuous experience in successful installations. Provide proof of experience to Consultant upon request.

.2 Single Source Responsibility: Single source product from one manufacturer.

.3 The insulating material must be applied by personnel who are certified by manufacturer. These certified individuals must have their certification cards in their possession and available for presentation upon request.

.4 A copy of the manufacturer's installation manual or guide for the application of sprayed on polyurethane foam must be kept on site.

.5 Tests must be conducted daily on both core density and cohesion/adhesion to the substrate, following procedures established by the manufacturer. The results of these tests must be entered in the daily report forms provided by the manufacturer.

.6 Fire-Test-Response Characteristics: Provide materials specified as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

.1 Surface-Burning Characteristics: ASTM E84.

.7 Submit copy of all completed forms to Consultant prior to making application for payment.

.8 Toxicity/Hazardous Materials:

.1 Provide products that contain no urea**-**formaldehyde.

.2 Provide products that contain no PBDEs.

.3 Provide products that are "Low-emitting".

1.5 SEQUENCING AND SCHEDULING

.1 Co-ordinate the work of this section with installation of associated work specified under other sections.

1.6 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Co-ordinate deliveries to comply with construction schedule. Comply with manufacturers written instructions for handling and protection prior to and during installation.

.2 Store material as recommended by manufacturers written instructions in original, undamaged containers with manufacturers seals and labels intact. During cold weather, store raw materials in heated storage.

.3 Protect adjacent surfaces and equipment from damage by overspray.

2 Products

2.1 MATERIALS

.1 Sprayed Polyurethane Foam Insulation:

.1 CFC free formulation, closed-cell sprayed polyurethane foam type insulation and conforming to CAN/ULC 705.1.

.2 Basis of Design Materials:

.1 Walltite CM01 by BASF, as represented by Building Resource Inc;

.2 ICYNENE MD-C-200 by Icynene Inc.;

.3 SEALTITE PRO HFO by Carlisle;

.4 Or approved equivalent.

.3 Provide primers in accordance with manufacturers recommendations if required for surface conditions.

2.2 EQUIPMENT

.1 Use equipment as recommended by sprayed polyurethane foam insulation manufacturer for types of applications required.

3 Execution

3.1 EXAMINATION

.1 Verify that surfaces and conditions are suitable to accept work of this section.

.2 Report in writing, defects in surfaces or conditions which may adversely affect the performance of products installed under this section to the Contractor, prior to commencement of work of this section.

.3 Do not commence work of this section until defects have been corrected.

.4 Commencement of work of this section implies acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Mask and cover adjacent areas to protect from overspray.

.2 Apply primers for special conditions as required by sprayed polyurethane foam manufacturer.

.3 Clean work area prior to commencing spray operations.

.4 Coordinate with work of other sections.

3.3 APPLICATION

.1 Apply sprayed polyurethane foam insulation to clean surfaces in accordance with manufacturers written instructions. Use primers where recommended by manufacturer.

.2 Thicknesses of sprayed polyurethane foam insulation shall be minimum 66mm (2-5/8") and thicker as indicated on drawings, with a maximum tolerance from required thickness of 6mm (1/4").

.3 Fill in gaps and spaces around structural steel, steel deck and other locations with sprayed polyurethane foam insulation to form continuous air/vapour and thermal barriers.

END OF SECTION

1 General

1.1 SUMMARY

.1 This section includes requirements for supply and installation of under-slab vapour retarder required for the following:

.1 Below-grade Areas.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals:

.1 Samples: Submit samples of materials to Consultant for review and acceptance as follows:

.1 305 mm x 305 mm (12” x 12”) sample for review and acceptance.

.2 Data Sheets: Manufacturer's descriptive literature and recommended method of installation.

.3 Certificates: Manufacturer's certificates attesting that products meet specification requirements.

.3 Informational Submittals:

.1 Product Data: Submit manufacturer’s product literature for each product listed including manufacturer’s recommended installation procedures and any modifications required to suit installation conditions.

1.3 QUALITY ASSURANCE

.1 Contractor executing work of this Section shall employ installers having a minimum of five (5) years continuous Canadian experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 The below-grade vapour retarder shall be inspected by the Consultant prior to concrete work.

1.4 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Deliver materials on manufacturer's original skids, or in original unopened protective packing.

.2 Protect materials during transportation, storage and installation to avoid physical damage.

2 Products

2.1 MATERIALS

.1 Plastic Sheet Vapour Retarder: Polyethylene sheet in accordance with ASTM E1745-11, including manufacturer’s recommended seam tape, pipe boots and vapour proofing mastic forming a complete system, and as follows:

.1 Vapour Permeance: 0.3 Perm maximum

.2 Water Vapour Transmission Rate: 17 ng/(s·m2·Pa) maximum

.3 Tensile Strength: Class A

.4 Thickness: Not less than 15 mil in accordance with ACI 302R recommendations.

.5 Acceptable Materials:

.1 Perminator 15 mil by W.R. Meadows, Perminator 15 mil.

.2 Stego Wrap Vapour Barrier by Stego Industries.

3 Execution

3.1 INSPECTION

.1 Check graded subgrade for conformity with elevations and cross-sections before placing material.

.2 Check for unstable areas and areas requiring additional compaction.

.3 Notify Consultant of unsatisfactory surfaces and conditions.

.4 Do not begin installation of material until deficiencies have been corrected.

3.2 INSTALLATION

.1 Coordinate placement with other drainage materials and install in accordance with manufacturer's written instructions.

.2 Before placing concrete for slabs on grade, water compacted base; do not use polyethylene. Place interior slabs on premoulded vapour retarder membrane, installed in accordance with manufacturer's written instructions.

.3 Overlap sheet membrane seams 150mm (6") and tape using manufacturer's recommended 100mm (4") seam tape. Tape membrane edge to foundation wall to prevent membrane from moving and ensuring a continuous below-grade vapour retarder.

3.3 PROTECTION

.1 Take extreme care during trenching operations, installation of materials and backfilling not to damage or displace materials or other utilities.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for a non-combustible mineral-filled core, an aluminum composite material (ACM) and forming an integrated rain screen assembly vented horizontally and vertically including; but not limited to, the following:

.1 Exterior Panel Cladding: Anchorages, shims, furring, fasteners, girts, flashings and adapters, and moulding enclosures.

1.2 DEFINITIONS

.1 Professional Engineer: The professional engineer hired or contracted to the fabricator or manufacturer to design specialty elements, produce submittals and shop drawings to meet the requirements of the Project; who is registered in the province of the Work; and who is not the Consultant.

1.3 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards

.4 American Architectural Manufacturers Association (AAMA)

.1 AAMA 508, Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems

.2 AAMA 620, Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Aluminum Substrates

.5 American National Standards Institute (ANSI)

.1 ANSI H35.1, Standard Alloy and Temper Designation Systems for Aluminum

.6 American Society for Testing of Materials (ASTM)

.1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.2 ASTM B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

.7 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.108, Bituminous Solvent Type Paint

.8 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.2 CAN/ULC S134, Standard Method of Fire Test of Exterior Wall Assemblies

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate work of this Section with work of other sections that may have items supported by or built into aluminum panel assemblies including; but not limited to, supports and connectors to structure, doors and windows, building signage, mechanical and electrical penetrations, erection tolerances and as follows:

.1 Flashings for Other Work of the Contract: Coordinate work of this section for supply of prefinished sheet metal flashing materials to other Sections of the Work with installation by other Sections of the Work.

.2 Pre-Construction Meetings: Arrange meeting before starting work in this Section to discuss expectations for fit and finish of aluminum composite panel assemblies, quality of workmanship for installation of air and vapour retarders and transitions, continuity of insulation and relationship of wall system to adjacent components.

.1 Participants: Arrange for attendance by Contractor and Subcontractor for this Section; Subcontractor of affected components of the Work, manufactures representative and Consultant.

1.5 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Shop Drawings:

.1 Submit shop drawings showing construction and anchorage of preformed aluminum panels including, details of all elements of assembly and construction.

.2 Related items shown on shop drawings which are not intended to be supplied as part of the work of this section, shall be so identified. All dimensions shall be clearly noted and methods of fastening and anchoring detailed. Show accurately and identify all adjacent materials.

.3 Shop drawings shall bear the seal and signature of a professional Engineer registered in the place of the Work and experienced in the design and fabrication methods used.

.4 Do no fabrication work until shop drawings are approved by the Consultant.

.3 Design Calculations:

.1 Submit design calculations bearing the seal and signature of the professional Engineer who stamped the shop drawings.

.2 Design calculations shall include all test reports and other pertinent supporting data.

.3 Submit design calculations at the same time as shop drawings.

.4 Samples:

.1 Submit two (2) 305mm x 305mm (12" x 12") samples showing finishes and profiles for Consultant's approval.

.2 Submit one (1) sample of clips, caps, battens, fasteners, closures, and other exposed panel accessories used in final panel assembly.

.5 Maintenance:

.1 On completion of work of this Section, supply maintenance instructions for insertion into Operating and Maintenance Manual.

.6 Quality Assurance Submittals: Submit the following:

.1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical requirements.

.3 Manufacturer's Instructions: Manufacturer's installation instructions.

.4 Manufacturer's Field Reports: Manufacturer's field reports.

1.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Use a manufacturer that has completed wall and soffit panel assemblies having similar extent and complexity as required for the Work of this Contract.

.2 Installers Qualifications: Use experienced installers having experience with panel projects similar in material, design and extent as required for Work of this Contract with a record of successful in-service performance.

.3 Professional Engineer: Retain a professional engineer, registered in the province of the Work, to design fabrication and erection of the Work of this Section in accordance with applicable Building Code and Contract Documents requirements including; but not limited to, the following:

.1 Seal and signature to shop drawings and design submittals.

.2 Site review and certification of installed components.

.3 Manufacturers Engineering Recommendations: Perform composite wall panel work in accordance with written recommendations from panel manufacturer.

.4 Verify panel thickness based on maximum deflections provided in this Section and to suit building location and configuration.

1.7 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Co-ordinate deliveries to comply with construction schedule and arrange ahead for strategic off the ground, under cover storage locations. Do not load any areas beyond the design limits.

.2 Handle and store materials in accordance with manufacturer's recommendations.

.3 Provide dry storage areas. Protect panels and panel support system materials from damage.

.4 Adequately protect and crate all components against damage, dirt, disfigurement and weather.

.5 Exercise extreme care in handling units to prevent damage and scratched surfaces.

.6 Cover and protect the work of other trades in the area of work from damage. Make good all damage to the satisfaction of the Consultant.

.7 Be responsible for damage to the work of this section until the building is complete and accepted by the Owner. In case of damage, material shall be completely removed and replaced with new.

.8 Provide safe and adequate equipment on the site to execute the work of this section, hoisting, scaffolding, staging, safety protection equipment, tools, plant and other equipment required for the completion of the work of this section.

1.8 SITE CONDITIONS

.1 Site Measurements: Verify locations of structural members and opening dimensions by site measurements before fabrication and indicate measurements on shop drawings for aluminum panel assemblies that are indicated to fit other construction; coordinate fabrication schedule with construction progress to avoid delaying the Work.

.2 Established Dimensions: Establish dimensions and proceed with fabricating panels without site measurements where site measurements cannot be made without delaying the Work; coordinate construction to ensure that actual site dimensions correspond to established dimensions; allow for trimming and fitting.

1.9 WARRANTY

.1 Warrant the work of this section in accordance with General Conditions but for a period of ten (10) years and agree to repair or replace faulty materials or work which becomes evident during the warranty period without cost to the Owner and at the Owner's convenience.

.2 Special Finish Warranty: Submit a written warranty, signed by manufacturer, covering failure of the factory-applied exterior finish on aluminum panels within the specified warranty period and agreeing to repair finish or replace wall panels that show evidence of finish deterioration.

.1 Deterioration of finish includes, but is not limited to, colour fade, chalking, cracking, peeling, and loss of film integrity for a period of thirty (30) years from date of Substantial Performance.

2 Products

2.1 MANUFACTURERS

.1 Basis of Design Products: Products named in this Section were used as the basis of design for the project; additional manufacturers offering similar products may be incorporated into the work of this Section.

.2 Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:

.1 Alpolic

.2 Intrabond

.3 Alucobond

.4 Kanalco Ltd.

.5 Or approved equivalent.

2.2 PERFORMANCE REQUIREMENTS

.1 Design, fabricate and install preformed aluminum panels, free of defects in material and workmanship affecting appearance and performance.

.2 Employ engineering staff experienced in the design, fabrication and erection methods of preformed aluminum panels and support system design.

.3 Assume responsibility for the adequacy of designs, proper provision for and use of all proprietary materials and components from other suppliers forming part of the work of this section.

.4 Design preformed aluminum panels and support system accommodate anticipated thermal movement of the building structure. Include expansion joints to accommodate movement in panel system, and between panel system and structure caused by structural movements without permanent distortion, or damage to panels, or racking of joints, or breakage of seals or water infiltration and penetration in any form.

.5 Design pattern of joints in preformed aluminum panels to strictly follow pattern as indicated on drawings. Where panel sizes indicated exceed economical panel sizes, provide intermediate concealed 'hairline' joints.

.6 Design preformed aluminum panel support/mounting system to be non-progressive type, allowing removal of any individual panel without causing damage to adjacent work of other sections. Design preformed aluminum panel support/mounting system to be resistant against unauthorized removal of panels.

.7 Design preformed aluminum panels and support system to withstand wind loads, wind gusts, snow loads, snow load build-up and temperature range expected in the geographical area for this project, under the Ontario Building Code (latest edition) climatic information for 30 year probability without any detrimental effects on appearance and performance.

.8 Drainage: Provide for positive drainage to the exterior of all water entering or condensation occurring within the system in accordance with NRC Rain Screen Principles.

2.3 COMPOSITE PANEL MATERIALS

.1 Aluminum Composite Panel: AA3105-H14 aluminum alloy conforming to ASTM B209-10, with special hardness for flat panels.

.1 Panel Thickness: 4mm (5/32”).

.2 Face Sheet Thickness: 0.5mm (25 gauge).

.3 Core: Non-combustible mineral filled core conforming to performance and design requirements when fabricated into thermally bonded composite assembly.

.4 Basis-of-Design Material: Alpolic FR by Alpolic, or approved equivalent.

.2 Aluminum Welding Materials: Conforms to CSA W59.2-M1991 (R2008).

2.4 SYSTEM BACK-UP MATERIALS

.1 Girts: Fabricated from minimum 1.27 mm thickness galvanized steel to ASTM A653/A653M-11, Grade 230 with Z275 coating; finish material visible after assembly of wall panel to match aluminum panels.

.2 Sub-Girts: Structural quality steel to ASTM A653/A653M-11, with Z275 zinc coating to ASTM A792/A792M-10, adjustable double-angle profile as indicated to accept panel with structural attachment to building frame.

.3 Panel Accessories and Extrusions: Provide accessories, and clips required for complete installation of wall and soffit panels, as indicated in manufacturers written instructions. Finish materials visible after assembly of panels to match aluminum panels.

.4 Fasteners: Non-corrosive fasteners as recommend by panel manufacturer, and as follows:

.1 Attachment panel system to primary panel structural supports using manufacturer's recommended concealed fasteners.

.2 Use concealed fasteners for typical joinery.

.3 Obtain Consultants acceptance where exposed fasteners are required in isolated conditions; Consultant will permit a limited number of exposed fasteners obscured within panel joinery using stainless steel fastenings, or in the face of panels using colour matched fastenings.

.5 Flashings: Fabricate flashing from 1/32" minimum thickness aluminum sheet, coloured to match panel where exposed to view; provide lap strip under flashing at butted conditions, with lapped surfaces sealed in a full bed of non-hardening sealant.

.6 Isolation Tape: Manufacturers standard material for separating dissimilar metals from direct contact.

.7 Sealants and Gaskets: Panel system components as recommended by panel manufacturer to meet performance requirements.

.8 Bituminous Paint: Conforms to CAN/CGSB-1.108, Type 2.

.9 Butyl Tape: Extruded, high grade macro-polyisobutylene tape of width and shore hardness to suit conditions.

2.5 FABRICATION

.1 Maximum allowable panel tolerances to be as follows:

.1 Panel bow: 0.5% of panel dimensions length or width.

.2 Width: +/- 2mm (5/64”)

.3 Length: +/- 4mm (5/32”)

.4 Thickness (4mm Panel): +/- 0.2mm (0.012”)

.5 Squareness: Maximum 5mm (3/16”)

.6 Edges: Square and trimmed.

.2 Form all panels to specified dimensions with tolerances to accommodate expansion and contraction between panels and structural members. Radii of curved panels to be accurately formed in manufacturer's plant.

.3 Weld and grind smooth all panels corners prior to finishing. Weld aluminum in accordance with CSA W59.2-M1991 (R2008).

.4 Factory fabricate accessory and trim components, ready for installation.

2.6 FINISHES

.1 Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

.2 Protect finish with strippable protective film.

.3 High Performance Organic Finish:

.1 2 Coat PVDF or FEVE Coating:

.1 Manufacturer's standard 2 coat, thermo-cured system consisting of specially formulated inhibitive primer and colour topcoat, and apply coating to exposed metal surfaces in accordance with AAMA 2605 and with coating and resin manufacturers' written instructions.

.2 Colour: To match adjacent composite aluminum panels on the building, as approved by the Consultant.

.3 Basis of Design Materials: PPG Duranar.

.4 Steel (Concealed):

.1 Hot-dip galvanized in accordance with CAN/CSA-G164, with minimum coating of 2 oz./sq.ft., or zinc rich paint.

.5 Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact. Use bituminous paint, butyl tape or other approved divorcing material.

3 Execution

3.1 INSPECTION AND PREPARATION

.1 Surfaces to receive panel system shall be even, smooth, sound, clean, dry and free from defects.

.2 Take field measurements from actual structure and verify prior to commencement of fabrication.

.3 Allow for dimensional tolerances and deviations from true planes permissible in the structural frame. Excessive deviations shall be reported to the Consultant in writing for correction. Commencement of the work implies acceptance of surfaces and conditions.

3.2 INSTALLATION

.1 Install girts in accordance with manufacturer's instructions. Provide additional metal framing as may be required to conform to Performance Requirements.

.2 Install girts attached to structural support or wall framing, using recommended fasteners.

.3 Install fasteners into wall framing; do not remove fastener where fastener does not penetrate framing; removal of fastener will damage integrity of air/vapour membrane, realign fastener location and install new fastener in close proximity to original fastener so that it penetrates wall framing.

.4 Install flashings to divert all moisture and condensation to exterior. Trim and flash around doors, louvers, and windows.

.5 Apply bituminous paint or caulking tape to insulate between the dissimilar materials and aluminum materials. Factory applied protective paint or G-90 galvanized steel is considered adequate insulation.

.6 Install panels are aligned vertically and horizontally, and flush between adjacent panels to within tolerances indicated; with weep holes and drainage channels free of dirt and sealants that could impede the function of the rain screen assembly.

.7 Assemble and secure wall system so stresses on sealants are within manufacturers' recommended limits.

3.3 SITE QUALITY CONTROL

.1 Perform final inspection of completed work shall carried out by the manufacturer's representative; prepare a written report and submit to Consultant certifying that installation meets manufacturers requirements and detailing for systems described in this Section.

.2 Perform final inspection with Consultant, Contractor and Subcontractor, present; provide a minimum of 72 hours notice so that all parties can confirm their attendance.

3.4 CLEANING

.1 Remove and replace panels that are damaged and cannot be repaired; coordinate with Contractor for responsibility of repairs not caused by work of this Section.

.2 Remove strippable film coating or masking as soon as possible after surrounding material is installed.

.3 Remove excess materials, debris, and equipment at completion.

.4 Clean all panels clean and free of all grime and dirt.

.5 Touch-up damaged finishes with manufacturers recommended touch-up paint.

END OF SECTION

1 General

1.1 SUMMARY

.1 Furnish labour, materials and other services to complete the fabrication and installation of the following:

.1 Cap and base flashing; curb flashings,

.2 Roof edge flashing,

.3 Flashing at intersection of roof with vertical surfaces,

.4 Break metal flashings where shown,

.5 Prefinished flashings where indicated,

.6 Any other flashing as indicated on the drawings or as required, including all materials and fitments required for the operation of any unit furnished, in the manner, direction and performance shown on the shop drawings and specified herein.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 American Society for Testing and Materials (ASTM):

.1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.

.5 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.108-M, Bituminous Solvent Type Paint

.2 CAN/CGSB-1.181, Ready Organic Zinc-Rich Coating

.3 CAN/CGSB-19.24-M, Multicomponent, Chemical-Curing Sealing Compound

.6 Canadian Roofing Contractors Association

.1 CRCA Specifications Manual

1.3 SUBMITTALS

.1 Provide submittals specified and as required to assess conformance with the Contract Documents, in accordance with Division 01.

.2 Submit shop drawings indicating material, thickness and finish.

.3 Submit duplicate 4 sq.in. samples of each type of sheet metal material, colour and finish for review by Consultant prior to fabrication.

1.4 QUALITY ASSURANCE

.1 Fabricator and tradesmen executing the work of this Section shall have had a minimum five (5) years continuous experience in successful manufacture and installation of Work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Erection of metal flashing systems shall be by workmen especially trained and experienced in this type of work. Have a senior, qualified representative at the job site to direct the work of this Section at all times.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Store materials flat at site under protection to prevent staining from the work of other trades or from collection of water on material and secured against wind damage.

.2 Carefully store preformed sheet metal work in such a manner as to prevent twisting, bending and rubbing.

.3 Protect sheet metal work from corrosive materials and dissimilar metals.

1.6 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with General Conditions, but for a period of two (2) years. Agree to promptly make good defects which become evident during warranty period without cost to the Owner.

.2 Without restricting the generality of the Warranty, defects shall include deformation, buckling, leakage, weather tightness, failure of anchors and fastenings, failure of paint coating and sealants.

.3 Promptly make good defects and/or failures in the work of this Section upon written notification by the Owner that such exist. Remedy shall include labour, materials, equipment and services required to make good defective work, and to replace components and finishes and Owner's property damaged or disturbed in the course of remedying defects.

2 Products

2.1 MATERIALS

.1 Sheet Metal Materials: Prefinished galvanized sheet steel to ASTM A653/A653M-11 Grade A with G90 designation zinc coating to ASTM A653/A653M-11, factory precoated with Series 8000 paint finish, minimum 26 gauge.

.2 Hold-down, fastener clips - 20 ga. galv. steel sheet as above, unpainted.

.3 Nails, bolts screws and rivets: Material - galvanized steel, stainless steel or same metal as material to be fastened. Type - to approved samples.

.4 Bituminous Paint: Conforming to CAN/CGSB-1.108-M, Type 2.

.5 Field Touch-Up Paint: Zinc rich anti-corrosion primer, conforming to CAN/CGSB-1.181-92, 'Galvafroid, Grade SB' by W.R. Meadows of Canada Limited and top coating of type and colour to match finish sheet.

.6 Underlay for metal flashing: Asphalt laminated 3.6 to 4.5 kg kraft paper.

.7 Sealant: Multi-component, chemical curing epoxidized polyurethane type sealant conforming to CAN/CGSB-19.24-M90, 'DYmeric 240' by Tremco (Canada) Ltd., or approved equal. Colour as selected later by Consultant. Provide primers, bond breakers and cleaning agents as recommended by the sealant manufacturer.

.8 All other materials not specifically described but required for a complete and proper installation of the work of this Section shall be new first quality of their respective kinds and subject to the approval of the Consultant.

2.2 FABRICATION

.1 Fabricate metal flashings and other sheet metal work to applicable CRCA 'FL' series specifications and as detailed.

.2 Form flashings, counter flashings, scuppers and copings as required to suit each condition. Use prefinished sheet steel in all locations. Form pieces in 8'-0" maximum lengths. Make allowance for expansion at joints.

.3 Fabricate sheet metal components with lines, arrises and angles sharp and true and plane surfaces free from objectionable wave, warp or buckle.

.4 Mitre and seal corners with sealant. Form drip edging at 45 deg angle, secure with a continuous 20 ga. hold-down clip.

.5 Exposed edges of sheet metal shall be folded back to form a 13mm (1/2") wide hem on the side concealed from view. Prefabricate corner pieces for flashings and copings. The workmanship and methods employed for forming, anchoring, cleating and the provision for expansion and contraction of sheet metal work shall be to the approval of the Consultant.

.6 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.7 Fabricate scuppers and overflow scuppers to applicable CRCA 'FL' Series details and as detailed.

.8 Apply two coats of bituminous paint to metal surfaces to be in contact with masonry, concrete, mortar or dissimilar metals.

2.3 FINISHING

.1 Provide 8000 series finished sheet for all work.

.2 Colour: As selected by the Consultant from the manufacturers standard colour offering.

3 Execution

3.1 EXAMINATION

.1 Inspect substrate surfaces on which the work of this Section is erected for any irregularities detrimental to the application and performance of the Work. Confirm conditions satisfactory before proceeding. Report to Consultant in writing, defects of work prepared by other trades and unsatisfactory site conditions. Commencement of work implies acceptance of surfaces and conditions.

3.2 INSTALLATION

.1 Metal flashing shall be in compliance with best sheet metal trade practice and shall in no way be contrary to sheet metal practice that will qualify for the Guarantee Certificate specified. Install with "S" lock expansion joints or standing seams incorporated on end of flashing length and all joints sealed with mastic.

.2 Provide continuous starter strips to present true, non-waving leading edge. Provide clips and anchor to backup in an approved manner to provide rigid, secure installation. Conceal fastenings in completed flashing. Lap, lock and seal all seams.

.3 Provide underlay under sheet metal. Secure in place and lap joints 100mm (4").

.4 Install sheet metal flashings, cap flashings and copings as indicated on drawings using flat lock seams. Make joints to permit thermal movement. Make surfaces free from buckling, warp, wave, dents, oil canning or other defects. Make corners square and surfaces straight and in true planes. Equally space joints in cap flashings to suit wall panel module. Space seams not farther apart than 2439mm (8').

.5 All sheet and strip flashing to be held in place by 14 gauge galvanized iron clips of a size and type to be determined by the construction requirements, except where specifically detailed on the drawings.

.6 Caulk flashing at cap flashing with sealant.

.7 Lock end joints and caulk with sealant.

.8 Use rubber-asphalt sealing compound for joints between sheet metal and bitumen.

.9 Supply rigid flashing, copings and sheet metal back-up to other trades where required to be built into other work at doors, windows, block openings, curbs and where shown on drawings.

.10 Take careful note of fans, vents, etc., on mechanical drawings to determine whether flashing and counter flashing is required or whether units are self-counter flashing.

.11 Caulking shall be installed as per written manufacturer's recommendations.

.12 Exposed fastenings will be permitted where indicated or where concealed fastening is not possible. Obtain Consultant's approval of exposed fastenings and methods of making same.

.13 If exposed screws or bolts are used, use cupped neoprene washers.

.14 Install scupper drains and overflow scupper drains as indicated on drawings, in strict accordance with CRCA manual.

3.3 CLEANING

.1 Remove, as the work progresses, all excess or foreign material which would set up or become difficult to remove from finished surfaces.

.2 Do all final cleaning upon completion of the Work of this Section. Leave building and Work in condition to meet the approval of the Consultant.

.3 Remove excess sealant by the moderate use of mineral spirits or other solvent acceptable by the sealant manufacturer.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install materials in accordance with published 'Through-Penetration Firestop Systems' in UL's Fire Resistance Directory or the publication of another approved independent laboratory.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S115, Standard Method of Fire Tests and Firestop Systems

.5 American Society for Testing and Materials (ASTM):

.1 ASTM E814, Standard Test Method for Fire Tests of Penetration Firestop Systems

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Shop Drawings:

.1 Provide details indicating all reinforcing, anchorages, fastening and proposed method of installation for the various conditions within the project.

.3 Samples:

.1 Submit samples of each type of firestop and smokeseal material and accessory.

1.4 QUALITY ASSURANCE

.1 Applicator shall be licensed by the manufacturer of fireproofing materials.

.2 Conform to flame and temperature ratings established by CAN/ULC-S115 and ASTM E814.

.3 Submit manufacturer's certification that materials meet or exceed specified requirements.

.4 Maintain flame and temperature ratings equal to surrounding materials.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Deliver materials in original, unopened packages bearing name of manufacturer and product identification.

.2 Store materials off ground, under cover, and away from damp surfaces.

1.6 SITE CONDITIONS

.1 Do not apply materials when temperature of substrate material is below 4 deg C and surrounding air temperature is below 4 deg C, for 24 hours prior to application.

2 Products

2.1 MATERIALS

.1 Bears UL, ULC or Warnock Hersey label and confirmation of compliance with ASTM E814 or CAN/ULC-S115.

.2 Provide fire stopping and smoke sealing systems in accordance with CAN/ULC-S115 and shall also conform to special requirements in part 3.5 of the Building Code.

.3 Fire-resistant rating of fire stopping material assemblies must meet or exceed the fire-resistance rating of the floor or wall section being penetrated.

.4 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control shall be elastomeric seal type. Do not use a cementitious, or rigid seal at such locations.

.5 Primers shall be to manufacturer's recommendation for specific material, substrate, and end use.

.6 Damming and backup materials, supports and anchoring devices shall be to manufacturer's recommendations, and in strict accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.7 Sealants for vertical joints, shall be non-sagging type.

3 Execution

3.1 PROTECTION

.1 Mask adjacent work of other Sections as necessary to avoid spillage onto adjoining surfaces. Remove stains on adjacent surfaces as required.

3.2 PREPARATION

.1 Examine sizes and conditions to establish correct thickness and installation of backup materials. Ensure surfaces are dry and frost free.

.2 Clean bonding surfaces of deleterious substances including dust, paint, rust, oil, grease and other foreign matter which may otherwise impair effective bonding.

.3 Do not apply firestops and smokeseals to surfaces previously painted or treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Prepare surfaces in accordance with manufacturer's instructions.

.5 Priming and Sealing: Prime surfaces in accordance with manufacturer's instructions.

3.3 APPLICATION

.1 Mix materials in accordance with manufacturers' written instructions.

.2 Apply in strict accordance with ULC certification and manufacturer's recommendations to provide a temperature and flame rated seal equal as a minimum to the rating of the wall or floor surrounding.

.3 Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

.4 Seal all joints to ensure an air and water resistant seal, capable to withstand compression due to thermal, wind or seismic joint movement.

.5 Consult with Mechanical Engineer and project manager prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

.6 Apply to mechanical and electrical service through-penetrations, to formed, sleeved, or cored openings in smoke and fire rated masonry, or gypsum wallboard stud walls and structural floors and ceilings.

.1 Coordinate with plumbing, HVAC and electrical contractors to ensure proper firestopping application, providing smokeseal around penetrations through fire rated assemblies. Ensure that end joints between lengths of firestopping material have been properly sealed.

.7 Apply to head of smoke and fire rated gypsum wallboard stud wall abutting underside of structure (concrete or steel deck).

.8 Apply to control joints in rated stud walls.

.9 Apply to penetrations for passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire rated vertical barriers (walls and partitions), horizontal beams (floor/ceiling assemblies) and vertical service shaft walls and partitions.

.10 Apply to safing slots gaps between edge of floor slabs and curtain walls.

.11 Apply to openings between structurally separate sections of walls and floors.

.12 Apply to gaps between tops of walls and ceiling or roof assemblies.

.13 Apply to expansion joints in fire rated walls and floors.

.14 Apply to openings and penetrations in fire rated partitions or walls containing fire doors.

.15 Apply to openings around structural members which penetrate fire rated floors or walls.

.16 Apply firestop and smokeseal materials in accordance with manufacturer's directions, with sufficient pressure to properly fill and seal openings.

.17 Tool or trowel exposed surfaces.

.18 Remove excess compounds promptly as work of this Section progresses and upon completion of work of this Section.

3.4 CURING

.1 Cure materials in accordance with manufacturer's instructions.

.2 Do not cover up materials until proper curing has taken place.

3.5 IDENTIFICATION

.1 Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

.1 The words: "Warning: Through-Penetration Firestop System - Do Not Disturb"

.2 Contractor's name, address and telephone number.

.3 Designation of applicable testing and inspection agency.

.4 Date of installation.

.5 Manufacturer's name for firestop materials.

3.6 CLEAN UP AND REPAIRS

.1 Clean adjacent surfaces immediately and leave work neat and clean.

.2 Remove excess materials using recommended procedures, as work progresses.

.3 Remove dams after initial set of firestops and smokeseals as required.

.4 Correct staining and discolouring of adjacent surfaces as directed by Consultant.

.5 Remove all debris and excess materials entirely from the site and leave the work in a neat and tidy condition.

.6 Perform one simulated smoke test for each penetration type once per day. Simulate smoke at a rate of four seconds/100 cubic feet (2.8 cubic metres) and maintain the fog density until inspection is complete.

.7 After inspection is complete, repair all defective firestopping and smokeseals and test again. Continue this procedure until all firestopping and smokeseals passes test.

END OF SECTION

1 General

1.1 SUMMARY

.1 Read other Sections of the Specification for extent of sealant specified in those Sections. Do all other sealing indicated, specified or required.

.2 Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on drawings and/or herein, including all labour, materials, equipment and incidentals necessary and required for the completion of the sealant.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 American Society for Testing and Materials (ASTM):

.1 ASTM C509, Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material

.2 ASTM C920, Standard Specification for Elastomeric Joint Sealants

.3 ASTM C1382, Standard Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints

.4 ASTM D2240, Standard Test Method for Rubber Property - Durometer Hardness

.5 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-19.13, Sealing Compound, One-Component, Elastomeric, Chemical Curing

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Manufacturer's Data: Submit manufacturer's literature describing each material to be used in the work of this Section. Literature shall contain a statement that the material complies with the specified standard.

.2 Samples: Submit for approval and colour selection sample of each type of compound, recommended primers and joint filler or fillers proposed to be used.

.3 Mock-Up:

.1 If requested by the Consultant, construct mock-ups where directed to show location, size, shape, colour and depth of joints complete with back-up material, primer and sealant. Mock-up may be part of finished work.

.2 Allow 24-hours for inspection of work before proceeding with work.

.4 Safety Data Sheets: Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on Site for reference by workers.

1.4 QUALITY ASSURANCE

.1 Adhere to Manufacturer's recommendations for mixing or preparation of materials listed in this Section.

.2 Pot life or installation times shall not be exceeded.

.3 Integral materials which compose a joint detail shall be compatible.

.4 Component parts, where possible, shall have the same manufacturer.

.5 A representative of sealant material manufacturer shall visit the site during application to ensure that all Work is carried out according to the manufacturer's printed instructions.

1.5 SITE CONDITIONS

.1 Apply sealants only to completely dry surfaces, and at air, substrate and material temperatures above minimum established by manufacturer's written specifications.

1.6 DELIVERY, STORAGE HANDLING AND PROTECTION

.1 Deliver all materials to the jobsite in their original, unopened containers, with all labels intact.

.2 Receive and store materials as recommended by materials manufacturer.

.3 Maintain containers and labels in undamaged condition.

1.7 WARRANTY

.1 Provide a written warranty endorsed and issued in the name of the Owner stating that all sealant work of this Section is warranted against leakage, cracking, crumbling, melting, running, deterioration, shrinkage, loss of cohesion, loss of adhesion, staining of adjoining or adjacent work or surfaces, or failure to provide intended seal for a period of five (5) years from the Date of Substantial Performance of the Work, and that any defects will be made good including, related materials and installation at no additional cost to the Owner.

2 Products

2.1 MATERIALS

.1 Joint Cleaner:

.1 Non-corrosive solvents as recommended by sealant manufacturer for applicable substrate material(s).

.2 Primer:

.1 Non-staining type as recommended by sealant manufacturer, for use on substrate conditions outlined, and compatible with specified sealant being applied.

.3 Joint Back-Up – Backer Rod:

.1 Round, open cell, reticulated foam, 50% compression, compatible with sealant and primer, non-adhering to sealant.

.4 Bond Breaker:

.1 Pressure sensitive plastic tape, not bondable to sealant as recommended by sealant manufacturer.

.5 Sealant Type "A" – Joints around Interior Door Frames, Windows and Under Exterior Thresholds:

.1 One-part, low or medium modulus, neutral curing 100% silicone joint sealant, conforming to ASTM C920-11, Type S, Grade NS, Class 35.

.1 DC CWS by Dow Corning.

.2 SWS by GE

.3 SikaSil WS-305CN by Sika

OR

.2 One component, low modulus, moisture curing, polyurethane joint sealant, conforming to ASTM C920-11, Type S, Grade NS, Class 25.

.1 Dymonic FC by Tremco Ltd., division of RPM Company.

.2 Sikaflex 1A by Sika Canada Inc.

.3 Sonolastic NP1 by BASF.

.4 Pourthane NS by W.R MEADOWS

.6 Sealant Type "G" – Exterior Wall Joints:

.1 Air-seal sealant: One part, silicone, shore A hardness 15-25, conforming to CGSB 19-GP-13M, classification C-1-40-B-N and C-1-25-B-N and ASTM C920-11, Type S, Grade NS, Class 25. Use NT, M, G, A and O:

.1 DC 791 by Dow Corning

.2 UltraPruf II SCS 2902 by GE

.3 Spectrum 3 by Tremco

.4 SikaSil N-Plus by Sika

.7 Sealant Type “I” – HVAC Sealant:

.1 One-part, RTV, acetoxy-cure silicone sealant for heating, ventilation, air conditioning and refrigeration applications:

.1 Dow Corning HVAC Silicone Sealant

.8 Sealant Type “J” – Electrical Sealant:

.1 One-part, white, non-flowing moisture cure adhesive for electrical applications:

.1 Dow Corning 738 Electrical Sealant

.9 Sealant Type “K” - Interior Acoustical Sealant:

.1 Non-skinning, non-hardening, single component synthetic rubber sealant, conforming to CAN/CGSB-19.21-M:

.1 Tremco Acoustic Sealant

.2 Chemtron Metaseal

.10 Preformed Compression Seal:

.1 Compartmental open cell neoprene extrusion type conforming to ASTM C509-06(2011), complete with liquid lubricant adhesive recommended by manufacturer.

3 Execution

3.1 INSPECTION

.1 Verify at site that joints and surfaces conditions provided will not adversely affect execution, performance or quality of completed work.

.2 Ensure masonry and concrete have cured 28 days minimum.

.3 Ascertain that sealers and coatings applied to substrates are compatible with sealant used and that full bond of the sealant and substrate is attained. Request samples of the sealed or coated substrate from their fabricators for testing of compatibility and adhesion, if necessary.

.4 Verify that specified recommended environmental conditions are present before commending work.

.5 Defective work resulting from application to unsatisfactory joint conditions will be considered the responsibility of those performing the work of this section.

.6 Do not start work of this Section until conditions are satisfactory.

3.2 PREPARATION

.1 Clean joint surfaces using joint cleaner as necessary, to remove dust, paint, loose mortar, and other foreign matter and dry joint surfaces.

.2 Remove dust, silt, scale and coatings from ferrous metals by wire brush, grinding or sandblasting.

.3 Remove oil, grease and other coatings from non-ferrous metals with approved cleaning solvent.

.4 Ensure surfaces are free of frost, rust, lacquers, laitance, release agents, moisture or other matter which might adversely affect adhesion of sealant.

.5 Examine joint sizes and correct as required to allow for anticipated movement and to achieve proper width/depth ratio per manufacturer's written recommendations for specified sealant.

.6 Support joint filler on horizontal traffic surfaces against vertical movement which might result from traffic loads or foot traffic.

.7 Prepare surfaces as recommended by sealant manufacturer.

.8 Fully remove existing sealant scheduled to be removed and replaced with new sealant, in areas indicated on the Drawings.

.1 Follow manufacturers procedures for removal of existing sealant and test areas for adhesion of new sealant. Provide the Consultant with field report identifying results of adhesion testing.

.9 Install joint backing material or apply bond breaker tape to achieve correct joint depth and prevent three-sided adhesion.

.10 To protect adjacent surfaces, mask adjacent surfaces with tape prior to priming and/or sealing.

.11 Prime sides of joints using two cloth method in accordance with manufacturer's directions immediately prior to sealing.

.12 Before any sealing is commended, a test of the material shall be made for indications of staining, poor adhesion or other undesirable effects.

.13 Seal joints in surfaces to be painted before painting. Where surfaces to be sealed are prime painted in shop before sealing, check to make sure prime paint is compatible with primer and sealant. If incompatible inform Consultant, consult the manufacturer, and change primer and sealant to approved compatible types.

.14 Check form release agent used on concrete for compatibility with primer and sealant. If incompatible inform Consultant and change primer and sealant to approved compatible types or clean concrete to Consultant's approval.

3.3 APPLICATION

.1 Apply sealant in accordance with manufacturer's directions, using a gun with proper nozzle size, ensuring to fill voids and joints completely, to leave a weathertight, airtight installation. Superficial pointing with skin bead is not acceptable.

.2 Neatly tool surface to a slight concave profile. Surface of sealant shall be smooth, free from ridges, wrinkles, sags, air pockets and embedded impurities.

.3 Clean adjacent surfaces immediately and leave Work neat and clean. Remove excess sealant and droppings, using recommended cleaners as Work progresses. Remove masking tape after tooling of joints.

3.4 CLEANING AND PROTECTION

.1 Remove all waste materials from site. Sealant shall be cleaned of all foreign material as recommended by the sealant manufacturer. Leave work in a condition satisfactory to the Consultant.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply and installation of the following:

.1 Interior Steel Doors and Frames

.2 Sidelight Frames

.3 Fire Rated Door and Frame Assemblies

1.2 DEFINITIONS

.1 Base Metal Thickness: Thickness dimensions are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic coated steel sheets.

.2 Opening Sizes: Standard metric door sizes indicated on Drawing A10.1 Door and Frame Schedule, are considered nominal dimensions, measured from frame rabbet width and height, with allowances for nominal clearances between head, jamb and door bottom in accordance with CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames.

1.3 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 American National Standards Institute (ANSI):

.1 ANSI/SDI A250.7, Nomenclature for Standard Steel Doors and Steel Frames

.2 ANSI/SDI A250.11, Recommended Erection Instructions for Steel Frames.

.5 American Society for Testing and Materials (ASTM):

.1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.2 ASTM A879/A879M, Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface

.3 ASTM A924/A924M, Standard Specification for General Requirements for Sheet Steel, Metallic-Coated by the Hot-Dip Process.

.6 Canadian General Standards Board (CGSB):

.1 CAN/CGSB 1.132-M, Primer, Zinc Chromate, Low Moisture Sensitivity

.2 CAN/CGSB 41-GP-19Ma, Rigid Vinyl Extrusions for Windows and Doors

.3 CAN/CGSB 82.5-M, Insulated Steel Doors

.7 Canadian Standards Association (CSA):

.1 CSA W59, Welded Steel Construction (Metal Arc Welding)

.8 Canadian Steel Door Manufacturers Association (CSDMA):

.1 Recommended Dimensional Standards for Commercial Steel Doors and Frames; latest edition

.2 Fire Labelling Guide

.9 National Fire Protection Association (NFPA):

.1 NFPA 80, Fire Doors and Windows

.2 NFPA 252, Fire Tests of Door Assemblies

.10 Underwriters Laboratories Canada (ULC):

.1 CAN/ULC S104-M, Fire Tests of Door Assemblies

.2 CAN/ULC S105, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC S104

.3 CAN/ULC S106, Standard Method for Fire Tests of Window and Glass Block Assemblies

1.4 SUBMITTALS

.1 Provide requested information in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data:

.1 Submit product data for each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, fire resistance ratings, and finishes.

.2 Shop Drawings:

.1 Show each type of frame, door, hardware blanking, reinforcing, tapping and drilling arrangements, metal gauges, thicknesses and finishes.

.2 Show details of doors including vertical and horizontal edge details.

.3 Submit door and frame schedule identifying each unit. Each unit shall bear a legible identifying mark corresponding to that listed in the door and frame schedule.

.3 Samples:

.1 Supply for Consultant's review, if requested, sample of frame corner showing construction, workmanship and finish.

.4 Informational Submittals: Provide the following submittals when requested by the Consultant:

.1 Source Quality Control Submittals: Submit information on zinc coating treatment and primer spot treatment, including instructions for surface treatment before site painting and any restrictions or special coating requirements.

.5 Certificates: Submit the following certificates or letters of compliance:

.1 Oversize Compliance: Submit oversize construction evidence indicating compliance with fire labelling for door and frame assemblies required to be fire protection rated and exceeding size limitations of labelled assemblies.

1.5 QUALITY ASSURANCE

.1 Manufacturer: Obtain hollow metal doors and frames from single source of supply and from a single manufacturer, and as follows:

.1 Fabricate work of this Section to meet the requirements of the Canadian Steel Door and Frame Manufacturer's Association, Manufacturing Specification for Doors and Frames as a minimum, and as further modified in this section.

.2 Fabricator shall be a member in good standing of the Canadian Steel Door and Frame Manufacturer's Association.

.2 Supplier: Obtain hollow metal doors and frames from single source of supply and from a single manufacturer.

.3 Installer: Use installers who are experienced with the installation of hollow metal doors and frames of similar complexity and extent to that required for the Project.

.4 Testing Agencies: Provide doors produced under label service program of a testing agency acceptable to Authorities Having Jurisdiction, and as follows:

.1 Steel Fire Rated Doors and Frames: Labelled and listed by an organization accredited by Standards Council of Canada for ratings specified or indicated.

.2 Provide fire labelled frame products for those openings requiring fire protection ratings, as scheduled:

.1 List by nationally recognized agency having factory inspection service and construct as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.2 Fabricate all rated doors, frames and screens to labelling authority standard.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Adequately protect units against rust and damage during manufacture, delivery and storage.

.3 Store materials on planks in a dry area and cover to protect from damage. Make good immediately any damage done. Clean scratches and touch-up with rust-inhibitive primer.

1.7 SITE CONDITIONS

.1 Site Measurements: Verify actual dimensions of openings by site measurements before fabrication and indicate measurements on shop drawings; coordinate fabrication schedule with construction progress to avoid delaying the Work.

.2 Established Measurements: Establish dimensions and proceed with fabricating doors and frames without site measurements where site measurements cannot be made without delaying the Work; coordinate construction to ensure that actual site dimensions correspond to established dimensions.

2 Products

2.1 MATERIALS

.1 Sheet Steel:

.1 Interior Doors and Frames (Normal Humidity): Electrolytic zinc coated steel sheets in accordance with ASTM A879/A879M, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher levelled standard of flatness.

.2 Gauges:

.1 Door and Screen Frames:

.1 Gauge: 16 msg

.2 Doors (Honeycomb or Polystyrene Core):

.1 Door Faces:

.1 Gauge: 18 msg.

.3 Top and Bottom End Channels:

.1 Gauge: 18 msg.

.4 Reinforcements:

.1 Lock and Strike Reinforcements:

.1 Gauge: 16 msg.

.2 Hinge Reinforcements:

.1 Gauge: 10 msg.

.3 Flush Bolt Reinforcements:

.1 Gauge: 16 msg.

.4 Door Closer or Holder Reinforcements:

.1 Gauge: 12 msg.

.3 Anchors:

.1 As required to suit condition.

.4 Rubber Bumpers:

.1 3 per door.

.5 Weatherstrip:

.1 Extruded aluminum with vinyl insert #W13 for head and jambs and #W5 for pairs of doors without mullions, manufactured by KN. Crowder Ltd.

.6 Door Cores:

.1 Interior doors, except fire rated doors: Structural small cell; 25mm (1") maximum, kraft paper honeycomb; minimum weight 36 kg/ream; minimum density 16.5 kg/m^3; sanded to required thickness.

.7 Adhesives:

.1 Core Adhesive: Heat resistant, single component adhesive recommended by manufacturer.

.8 Touch-Up Primer: Rust inhibitive primer meeting CAN/CGSB 1.132, touch up zinc coatings using shop applied primer; grey or red coloured primer, clear primer not acceptable; provide additional primer for site touch-up to repair damaged zinc and shop applied coatings.

.9 Accessories:

.1 Glazing Stops:

.1 Glass mouldings: Formed steel having 0.8mm (1/32") metal core thickness, screw fixed.

.2 Accurately fit and butt at corners glazing trim and stops; located on secure side of door, or interior of room window frame.

.2 Sealant: As specified in Section 07 92 00.

.3 Glazing: As specified in Section 08 80 00.

.4 Door Silencers (Bumpers or Mutes): Manufacturer's standard black or grey neoprene silencers; three silencers on strike jambs of single door frames; two silencers on heads of double-door frames; stick on bumpers are not acceptable.

.10 Materials for fire rated doors shall conform to ULC or ULI requirements.

2.2 FABRICATION AND MANUFACTURE

.1 Gauges of metal shall be as specified. No deviations or substitutions will be accepted

.2 Reinforcing specified is the minimum acceptable. Provide additional reinforcement where required to ensure a permanent, rigid, trouble free installation able to withstand the stresses of heavy commercial usage.

.3 Cut, shear, straighten and work the steel in manner to prevent disfigurement of the finished work.

.4 Punch frames for rubber door bumpers.

.5 Fill seams, joints and weld depressions with epoxy metal filler, disc sand to a smooth, flat, uniform scratch-free surface, with all arrises sharp and true to line. Drilled and punches holes shall be reamed and have all burrs removed.

.6 Finished work shall be free of warp, open seams, buckles, weld and grind marks and other surface defects detrimental to the production of a good paint finish.

.7 Fastenings shall be concealed except those required for loose glazing stops.

.8 Welding shall conform to CSA W59.

.9 Hardware Requirements:

.1 Blank, mortise, reinforce, drill and tap doors and frames to receive templated hinges and other hardware as required. Check hardware lists for requirements.

.10 Frames:

.1 Fabricate frames to profiles shown. Frames shall be fabricated to suite the header conditions of masonry work. Mitre corners of frames. Cut frame mitres accurately and weld continuously on inside of frame. Fabricate header frame to suit. Where site welding or splicing is required due to size of unit, the location of field joints shall be shown on the shop drawings and strictly adhered to.

.2 Protect strike and hinge reinforcements and other openings with mortar guard boxes welded to frame.

.3 Cutouts in doors for mortise lock sets shall be fitted with leaf spring clips and back limit stop to facilitate easy positioning and setting of locksets.

.4 Weld floor clip angles to inside of each jamb profile, two holes in each for anchorage to floor. Where required provide adjustable type floor clip angles.

.5 Fit frames with channel or angle spreaders, two per frame, to ensure proper frame alignment. Install stiffener plates or spreaders between frame trim where required, to prevent bending of trim and to maintain alignment when setting and during construction.

.6 Where frames occur in masonry provide and adjustable T-strap type or wire type anchor for every 610mm (24") of jamb length. Special anchors for frames to be set in concrete shall be as detailed.

.7 Construct door frames of labelled fire doors as approved by ULC or ULI. Ratings for frames shall match doors. Locate label on the frame jamb midway between the top hinge and the head of door frame so that it is concealed when the door is closed.

.8 Provide continuous weatherstripping at head and jambs of exterior door frames. Properly secure in place with screws and adjust as required.

.11 Doors:

.1 Fabricate doors to present one continuous face free from joints, tool markings and abrasions.

.2 Reinforce, stiffen honeycomb doors with small cell honeycomb core laminated to the inside faces of panels. The core shall completely fill the inside hollow of the door.

.3 Reinforce around frame openings required for glazing or louvers. Provide glazing stops with countersunk oval head screws.

.4 Reinforce door edges with channel reinforcing. Bevel stiles 3mm (1/8"). Assemble by tack welding and fill.

.5 Fabricate fire rated door assemblies in accordance with ULC or ULI requirements. Provide labels for all fire rated doors. Locate label on the door midway between the top hinge and the head of the door so that it is concealed when the door is closed.

.6 Provide cutouts in doors for glazed lites as indicated on drawings and schedules. Glazing stops shall be square formed steel in single piece lengths sized to suit. Accurately mitre corners and finish in proper plane. Secure stops in place with flush, countersunk screws.

.12 Finishing:

.1 Shop apply zinc rich primer to repair damaged zinc coatings arising from fabrication; cure primer fully before shipping to site; include compatible primer for site finishing and correction of surface abrasions to zinc coatings and factory applied primer.

.2 Remove weld slag and splatter from exposed surfaces.

.3 Fill and sand smooth tool marks, abrasions and surface blemishes to present smooth uniform surfaces.

3 Execution

3.1 EXAMINATION

.1 Examine substrates, door swing arcs, areas of installation and conditions affecting installation for compliance with requirements for manufacturer’s installation tolerances and other conditions affecting performance of work of this Section.

.2 Verify roughing-in for embedded and built-in anchor locations before installing frames.

.3 Verify door and frame size, door swing and ratings with door opening number before installing frames.

.4 Installation of hollow metal doors and frames will denote acceptance of site conditions.

3.2 INSTALLATION

.1 Install steel doors, frames, and accessories in accordance with reviewed shop drawings, ANSI A250.11, CSDMA Installation Guide, manufacturer's data, and as specified in this Section.

.2 Door Frames:

.1 Remove temporary spreaders before installing door frames, leaving exposed surfaces smooth and undamaged.

.2 Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set; limit of acceptable frame distortion 1.6mm (1/16”) out of plumb measured on face of frame, maximum twist corner to corner of 3mm (1/8”); align horizontal lines in final assembly.

.3 Brace frames rigidly in position until adjacent construction is complete; install wooden spreaders at third points of frame rebate to maintain frame width, install centre brace to support head of frames 1220mm (4’) and wider in accordance with ANSI A250.1; do not use temporary metal spreaders for bracing of frames.

.4 Install glazing materials and studded door silencers.

.5 For frames over 1220mm (4’) in width, provide vertical support at the centre of head.

.3 Frame Tolerances: Install frames to tolerances listed in ANSI A250.11, and as follows:

.1 Squareness: Maximum 0.8mm (1/32”) measured across opening between hinge jam and strike jamb.

.2 Plumbness: Maximum 0.8mm (1/32”) measured from bottom of frame to head level.

.3 Alignment: Maximum 0.8mm (1/32”) measured offset between face of hinge jamb and strike jamb relative to wall construction.

.4 Twist: Maximum 0.8mm (1/32”) measured from leading edge of outside frame rabbet to leading edge of inside frame rabbet.

.4 Doors:

.1 Fit hollow metal doors accurately in frames within clearances required for proper operation; shim as necessary for proper operation.

.2 Install hardware in accordance with manufacturers' templates and instructions.

.3 Adjust operable parts for correct clearances and function.

.4 Install glazing materials and door silencers. Install louvers and vents.

.5 Install fire rated doors within clearances specified in NFPA 80.

.5 Adjusting and Cleaning:

.1 Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of air-drying primer compatible with factory applied primer, and as follows:

.1 Clean exposed surfaces with soap and water to remove foreign matter before site touch-up.

.2 Finish exposed site welds to a smooth uniform surface and touch-up with site applied rust inhibitive primer.

.3 Site apply touch-up primer on exposed surfaces where zinc coating or factory applied primer has been damaged during installation or handling.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install door hardware listed in the Door Hardware Schedule on Drawing A2.1, establishes the quality standards, finishes, manufacturers and functions.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Submission of Substitutions: Materials other than the named products for the Project may be acceptable to the Consultant. Submit manufacturer's names and complete catalogue number of alternative hardware types proposed for supply and submit this list for review before preparing shop drawings.

.2 Consultant will review all proposed alternates prior to close of bids when submitted no later than five (5) days prior to bid closing date

.3 Substitutions for materials of this section will be considered after the close of bids.

.4 Pre-installation Conference: Arrange a preconstruction meeting to discuss the following:

.1 Keying Conference: Conduct keying conference at Project site and incorporate decisions into final keying schedule after reviewing door hardware keying system.

.5 Coordination: Obtain and distribute templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Coordinate with shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware.

1.3 SUBMITTALS

.1 Provide required information in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit product data indicating installation details, material descriptions, dimensions of individual components and profiles, and finishes.

.2 Shop Drawings: Submit shop drawings indicating details of electrified door hardware including, but not limited to, the following:

.1 Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer installed and site installed wiring.

.3 Samples:

.1 Submit samples of complete line of hardware and finishes, if and when requested, to accompany any proposal for substitution. Fully label each sample as to manufacture, type, size and location for use proposed.

.4 Hardware Schedule: Submit door hardware schedule prepared by Architectural Hardware Consultant (AHC), detailing fabrication and assembly of door hardware.

.3 Do not order hardware from manufacturers until samples have been approved. Hardware and finishes supplied shall be identical with approved samples.

1.4 PROJECT CLOSEOUT SUBMISSION

.1 Operation and Maintenance Data: Provide operations and maintenance information in accordance with Division 01.

.2 Spare Parts and Tools: Submit unique parts and tools for maintaining hardware system in accordance with Division 01.

1.5 DELIVERY, HANDLING AND PROTECTION

.1 Pack hardware in suitable wrappings and containers to protect from injury during shipping and storage. Enclose accessories, fastening devices and other loose items with each item. Mark packages for easy identification as indicated on approved delivery schedule. Hand over hardware to designated installer.

1.6 WARRANTY

.1 Warrant door closers to remain free from defects in materials and workmanship in accordance with the General Conditions, but for a period of five (5) years, and locks and locksets for two (2) years. Agree to promptly make good defects which become apparent within warranty periods without cost to Owner.

2 Products

2.1 GENERAL

.1 Supply to the job site all items of finishing hardware as indicated in the Hardware Scheduled appended to this Section. All items to be supplied with complete and adequate fixing and anchoring devices necessary for satisfactory installation into or upon the various surfaces to which it is to be affixed.

.2 Cooperate with all trades using hardware supplied under this Section.

.3 Render a complete service to the metal fabrication contractor wherein full cooperation is assured them of the supply of hardware information, and templates as requested.

.4 Supply for installation by others where specified, as scheduled or indicated on the drawings.

.5 In case of dispute the Consultant's decision will be binding in all cases.

.6 Provide six, (6) copies of the hardware specification for field construction and office use.

.7 All hardware shall be of the best quality and design, construction and finish, free from all defects.

.8 All blank strikes shall be ASA with no lip.

.9 Lock strikes shall be ASA with lip.

.10 All deadlock strikes shall be ASA with no lip.

.11 Where door pulls are scheduled on one side of door and a push plate on the other side, the contractor shall be responsible for fixing, so that the pull shall be secured through the door from the reverse side and the push plate installed to cover the thru bolts which will be countersunk flush with door.

.12 All door closers shall be non sized and where possible non handed. They shall be sized and adjusted by the installer to suit the site conditions.

.13 Panic sets are to be of style specified and completely plated.

.14 Before installing any hardware, carefully check all architectural drawings of Work requiring hardware, verify door swings, door and frame material and operating conditions. Ensure hardware will fit Work.

.15 Provide ULC approved hardware to ULC labelled doors.

.16 Check shop drawings and frame and door lists affecting hardware type and installation. Certify to correctness or advise Consultant in writing of required revisions.

.17 Templates:

.1 Check hardware schedule, drawings and specifications. Furnish promptly to applicable trades any patterns, templates, template information and manufacturer's literature required for proper preparation for and application of hardware, in ample time to facilitate progress of Work.

.2 Exposed screws for installing hardware shall have Phillips or Robertson heads.

.3 All door closers shall have back-checking features and shall be of proper size to operate door efficiently.

.4 Use no wall stops on drywall.

.5 Rim Panic Device strikes shall be mortise type application. Equip panic devices with hex bolts.

.18 Hinges

.1 Provide mortise type hinges, steel based for interior doors and stainless steel or brass for exterior doors or interior doors exposed to moisture.

.2 Provide hinges with stainless steel pins; non removable for exterior and public interior exposure, non rising for non security exposure.

.3 Provide full length continuous geared hinges, continuous pin and barrel hinges or full mortise type heavy weight butt hinges on all high frequency use or extreme weighted doors.

.4 Where doors are required to swing 180 degrees, provide ball bearing type swing clear hinges sufficient to clear trim.

.19 Locks, Cylinders, Latches and Bolts

.1 Locks are to be ANSI Grade 1 mortise type unless specified otherwise.

.2 Equip all locks with anti-friction latches with auxiliary latch guard. All fire rated doors must have a minimum latch throw as indicated on the fire door label.

.3 Where lever trim is required, provide levers containing concealed mounting and constructed of solid cast or forged material.

.4 Locks must be lever type.

.5 Provide locks in accordance with current barrier free accessibility requirements as set out by the OBC or by the jurisdiction having authority, when located in the barrier free path of travel.

.6 Strikes shall be ANSI standard size with curved lip strikes for latch bolts and no lip strikes for deadlocks. Provide complete with wrought iron boxes finished to match strike.

.7 Provide Cylinders and thumb turns with the correct cam or tailpiece to operate hardware correctly.

.8 Automatic flush bolts are to be equipped on all fire rated pairs of doors with regular use. Provide a coordinator in conjunction with automatic flush bolts.

.9 Provide a filler bar when using coordinators for a clean architectural appearance.

.20 Exit Device

.1 All exit devices installed on labelled fire doors shall carry a ULC or Warnock Hersey Label.

.2 Coordinate exit devices with astragals, coordinators, carry open bars and thresholds for correct and safe operation.

.3 All exit devices shall have exposed metal to match architectural finishes used on other hardware.

.4 Exit devices are push pad style only.

.5 Provide non-fire rated exit devices with hex key dogging feature (Cylinder dogging may be required in lieu of hex key dogging).

.6 Provide Power supplies of same manufacturer when using electrified exit devices.

.7 Match style and finish of trims on exit devices for locksets used.

.21 Closers

.1 All closers shall be hydraulically controlled and full rack and pinion in operation.

.2 All closers shall be fully adjustable including the following features: back check, speed control, and latch speed control.

.3 Provide mounting plates where required on special frame applications.

.4 Install all necessary attaching brackets, mounting channels, and cover plates where necessary for correct application of door closers.

.5 Supply to the Owner any special keys and wrenches as usually packed with door closers.

.6 Closers complete with a cover unless specified otherwise by the Consultant. Provide cover of matching architectural finish to the other hardware used in the project.

.7 Coordinate closers with overhead stops & holders.

.22 Push Plates and Door Pulls

.1 Provide and install stainless steel plates in type #304 stainless steel and install secure with screw fastening.

.2 Length of kick plates shall be 1-1/2" less than door width for single doors and 1" less than door width for doors in pairs.

.3 All stainless steel plates are 0.050" thick, free of rough or sharp edges. Corners and edges to have slight radiuses. Install kick plates and armor plates on both sides of the door with 3M tape or counter sunk screws as specified.

.4 Where door pulls are scheduled on one side of door and push plates on other side, issue installations instructions to ensure that the pull is secured through door from reverse side and countersunk flush with door installation of push plate. Locate push plate to cover fasteners for door pulls.

.23 Door Stops and Holders

.1 Wall stops are only to be used on wall conditions such as block or masonry. If necessary to mount on drywall, provide proper backing to ensure no damage to the wall.

.2 Supply floor stops of sufficient height to suit floor conditions and the undercut of the door.

.3 Provide gray rubber exposed resilient parts.

.4 Surface mount overhead door stops may be used unless they conflict with the door closer. All overhead stops are to be set to 90 degree opening unless stated otherwise.

.24 Door Seals

.1 Perimeter seals must be provided that fully seal all gaps between the floor, door and frame. Perimeter seal must protect against weather, smoke and sound.

.2 Frame gasketing must be constructed of neoprene. The aluminum housing must have a rib to prevent against distortion during installation.

.3 Provide aluminum frames with felt inserts by door supplier.

2.2 HARDWARE FINISHES

.1 P - Primed

.2 32D - Brushed Stainless Steel

.3 AL - EN - Aluminum Paint

.4 26D - Brushed Chrome

.5 15 - Brushed Nickel

.6 28 - Anodized Aluminum

.7 CAD - Cadmium Plated

.8 26 - Polished Chrome

.9 3 - Polished Brass

.10 EAB - Brass Paint

.11 BRN – Brown

.12 630 – Stainless Steel

3 Execution

3.1 INSTALLATION

.1 Subcontractor installing the hardware shall carefully follow manufacturers' instructions for installation of all finish hardware.

.2 For mounting heights of various hardware items refer to the following, unless otherwise indicated on the Draiwngs:

.1 Locksets: 1024mm (40-5/16") from centre of knob to finished floor.

.2 Deadlocks: 1220mm (48") from centre of cylinder to finished floor.

.3 Mortise Night Latches: 1024mm (40-5/16") from centre of cylinder to finished floor.

.4 Panic Bolts: 1024mm (40-5/16") from centre of crossbar to finished floor.

.5 Push Plates: 1143mm 45" from centre of plate to finished floor.

.6 Guard Bars: 1024mm (40-5/16") from centre of bar to finished floor.

.7 Door Pulls: 1067mm (42") from centre of pull to finished floor.

.8 Blank Strike: 1024mm (40-5/16") from centre of strike to finished floor.

.9 Blank Fronts: 1024mm (40-5/16") from centre of strike to finished floor.

3.2 PERFORMANCE

.1 Adjustment and Cleaning:

.1 Provide services of competent mechanic without additional cost to Owner. Mechanic shall inspect installation of all hardware furnished under this Section and supervise all adjustments (by trades responsible for fixing) necessary to leave hardware in perfect working order.

END OF SECTION

1 General

1.1 SUMMARY

.1 Furnish glazing materials and accessories to complete the fabrication and installation of:

.1 Float Glass

.2 Tempered Glass

.3 Laminated Safety Glass

.4 Wired Glass

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards

.4 American Society for Testing and Materials (ASTM):

.1 ASTM C542, Standard Specification for Lock-Strip Gaskets

.2 ASTM C920, Standard Specification for Elastomeric Joint Sealants

.3 ASTM C1172, Standard Specification for Laminated Architectural Flat Glass

.5 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-12.1, Tempered or Laminated Safety Glass

.2 CAN/CGSB-12.3, Flat, Clear Float Glass

.3 CAN/CGSB-12.11, Wired Safety Glass

.4 CGSB-12.20, Structural Design of Glass for Buildings

.6 National Fire Protection Association (NFPA):

.1 NFPA 80, Standard For Fire Doors and Other Opening Protectives

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit manufacturer's product data for each type of product specified. Data shall indicate compliance with specification and installation recommendations of manufacturer of products being used.

.2 Samples: Submit samples of materials if required by Consultant before commencing work of this section. Samples shall be clearly labeled with manufacturer's name and type.

.3 Shop Drawings: Submit shop drawings, to the Consultant for review prior to fabrication.

.4 Samples for Verification: Submit samples for verification including sample sets showing the full range of variations expected where products involve normal colour variations.

.5 Maintenance Data: Upon completion of installation, supply instructions covering re-glazing, adjustments and other relevant maintenance data.

1.4 QUALITY ASSURANCE

.1 Conform to the requirements of the Flat Glass Marketing Association Glazing Manual, latest Edition.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: Deliver packaged materials in their original containers with manufacturer's labels and seals intact.

.2 Storage and Handling Requirements: Store vertically, blocked off the floor in a weatherproof enclosure in original containers with manufacturers labels and seals intact until read for installation, and as follows:

.1 Install glass as soon as possible after delivery to site.

.2 Handle glass carefully to its place of installation.

.3 Prevent damage to glass, adjacent materials and surfaces.

1.6 SITE CONDITIONS

.1 Ambient Conditions: Maintain temperature, humidity and solar exposure conditions of Glass Glazing materials during shipping, storage and site installation as required by manufacturer to maintain warranty and performance of installed products.

1.7 WARRANTY

.1 Provide manufacturer’s warranty for the following types of glass listed, against defects in materials and workmanship for the period indicated, commencing from the date of Substantial Performance of Work:

.1 Seal Failure: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions.

.2 Evidence of Failure: Obstruction of vision by dust, moisture, or film on interior surfaces of glass.

.3 Allowable Specific Exclusions: Breakage resulting from thermal stress will be accepted as a limitation to the warranty in accordance with CAN/CGSB 12.20.

.4 Warranty Period: Ten (10) Years.

2 Products

2.1 MATERIALS

.1 Float Glass (FG1): In accordance with CAN/CGSB-12.3, glazing quality and as follows:

.1 Clear Glass: No tint

.2 Tempered Glass:

.1 Clear, conforming to CAN/CGSB-12.1, Type 2, Class 'B'. Tempering shall be performed using horizontal tong free method.

.3 Laminated Safety Glass (TG1): In accordance with CAN/CGSB-12.1 and ASTM C1172 as follows:

.1 Glass: Clear, tempered glass.

.2 Type: 1 - Laminated.

.3 Class: B - Float Glass.

.4 Category: II - Fully Tempered.

.4 Wired Glass(GWG): For use in doors and wall applications with fire rating requirements of 45 minutes with hose stream test in locations where fire safety is of prime importance.

.1 Wired Safety Glass: In accordance with CAN/CGSB-12.11 and as follows:

.1 Type: 1 – polished both sides, transparent.

.2 Wire Mesh Style: 3 – Square.

.5 Gaskets:

.1 Neoprene/EPDM thermoplastic rubber type gaskets of sufficient thickness to be compressed 25% when installed, having 2,000 psi tensile strength, with 50 durometer shore A hardness plus/minus 5, maximum 30% resistance to permanent set, resistance to ozone without cracking, minimum elongation at break of 300% and conforming to ASTM C542.

.2 Colour - "Black".

.6 Sealant:

.1 One component, silicone base, solvent curing sealant conforming to ASTM C920. Colour as selected Later by Consultant.

.7 Glazing Compound:

.1 Non-hardening modified oil type glazing compound.

.8 Setting Blocks:

.1 Neoprene/EPDM rubber type, 4" long, with 40 to 50 durometer shore A hardness plus/minus 5; resistant to sunlight, weathering, oxidation and permanent deformation under load and wide enough to extend from fixed stop to opposite face of glass of thickness suitable to glazing condition to provide adequate glazing "bite".

.9 Spacer Shims:

.1 Neoprene/EPDM rubber type, with 40 to 50 durometer shore A hardness plus/minus 5; resistant to sunlight, weathering, oxidation and permanent deformation under load and of adequate thickness to provide correct glass to face clearance at least 1/8".

.10 Glazing Tape:

.1 Macro-polyisobutylene preformed glazing tape, 'Polyshim' or 'Vision Strip' by Tremco Ltd., division of RPM Company, or approved equal.

2.2 FABRICATION AND MANUFACTURE

.1 Label each light of glass with the registered name of the product and the weight and quality of the glass.

.2 Check dimensions on site before cutting materials.

.3 Minimum bite or lap of glass on stops and rabbets as recommended by glass manufacturer. Finish surfaces shall be free of tong marks.

.4 Cut glass true to dimensions, square, plumb and level. Verify all dimensions prior to fabrication.

.5 Distortion, pock marking or defects detrimental to appearance and/or performance, as determined by the Consultant, will be rejected.

.6 Cut wired glass so that wires are parallel with edges both vertically and horizontally.

3 Execution

3.1 EXAMINATION

.1 Examine areas of work affecting the work of this section. Report in writing all defects, errors and discrepancies immediately to the Consultant.

.2 Commencement of work implies acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Openings shall be free from moisture, frost, rust, dirt and foreign matter.

.2 Clean surface 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.

3.3 INSTALLATION

.1 Conform to the recommendation of the glazing manual, Flat Glass Marketing Association, latest edition and as specified herein.

.2 Unless otherwise indicated on drawings otherwise, provide tempered glass at all doors, transoms, sidelights and vision lites within 2'-6" of grade and/or finished floor.

.3 Glaze doors scheduled to be glazed. Set sheet glass with draw lines horizontal.

.4 Glaze interior openings using compound or glazing tapes or gaskets.

.5 Install removable stops. Insert spacer shims between glass and stops at 24" O.C. and not less than 1/4" below "sight lines". Fill remaining voids with sealant or glazing compound to "sight lines" and trim sealant/glazing compound to produce clean, sharp, straight lines without voids or depressions.

.6 Replace loose stops in their original positions, tighten all screws. Refer to drawings and door and frame schedule for locations of each type of glass.

3.4 INSTALLATION – WIRED GLASS

.1 Install wired glass to locations indicated.

.2 Install wired glass where glazing is indicated in fire resistant closures (e.g. fire doors, steel framed openings in fire rated walls).

.3 Install wired glass with wires parallel to frame opening.

3.5 CLEANING

.1 Repair all defects caused by the work of this section. Remove as work progresses, all excess or foreign materials or droppings which would set or become difficult to remove from surfaces at time of final cleaning.

.2 Immediately prior to acceptance of work of this section by Consultant, remove temporary protection, clean and polish exposed surfaces of all work of this section. Use proper cleaning materials and methods to prevent damage to surfaces, finishes, sealer or work of other trades. Make good such damage to Consultant's satisfaction.

.3 Do not use steel wool, wire brushes or steel scrapers on any finished surfaces.

.4 Replace or make good to Consultant's satisfaction, upon completion of work of this section, all defective, scratched or damaged work, at no extra cost to the Owner.

END OF SECTION

1 General

1.1 SUMMARY

.1 Section Includes the following:

.1 Non-load-bearing steel framing systems for interior partitions.

.2 Suspension systems for interior ceilings.

.3 Grid suspension systems for gypsum board ceilings.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards

.4 American Society for Testing and Materials International (ASTM):

.1 ASTM A641/A641M, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

.2 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.3 ASTM A792/A792M, Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

.4 ASTM A875/A875M, Specification for Steel Sheet, Zinc-5% Aluminum Alloy-coated by the Hot Dip Process

.5 ASTM A1003/A1003M, Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members

.6 ASTM C645, Standard Specification for Nonstructural Steel Framing Members

.7 ASTM C754, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

.8 ASTM C840, Standard Specification for Application and Finishing of Gypsum Board

.9 ASTM C954, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

.10 ASTM C955, Standard Specification for Cold-Formed Steel Structural Framing Members

.11 ASTM C1002, Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

.5 Canadian Standards Association (CSA):

.1 CSA S136, North American Specification for the Design of Cold Formed Steel Structural Members

.6 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-7.1, Lightweight Steel Wall Framing Components

.7 Canadian Sheet Steel Building Institute (CSSBI):

.1 CSSBI S6 (Latest), Guide Specification for Lightweight Steel Framing

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit manufacturer's product data for each materials specified including recommended application rates and methods of installation.

.3 Informational Submittals: Provide the following submittals during the course of the work:

.1 Product Certificates: For each type of code-compliance certification for studs and tracks.

.2 Shop Drawings: Submit shop drawings showing the design, construction and relevant details of furring, enclosures and partitions which require a fire rating.

1.4 QUALITY ASSURANCE

.1 Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association (SSMA).

.2 Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, enclosed, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

.2 STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 FRAMING SYSTEMS

.1 Framing Members, General: Comply with ASTM C754 for conditions indicated.

.1 Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.

.2 Steel sheet components shall comply with ASTM C645 requirements for metal, unless otherwise indicated.

.3 Steel for non-loadbearing members shall have metallic coats that conform to ASTM A653M or ASTM A792M with minimum metallic coating weighs (mass) of Z120 and AZM150 respectively.

.4 Framing members shall comply with the CAN/CSA S136 - North American Specification for the Design of Cold Formed Steel Structural Members, for conditions indicated.

.5 Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact. Use bituminous paint, butyl tape or other approved divorcing material.

.2 Studs and Tracks: ASTM C645.

.1 Steel Studs and Tracks:

.1 Minimum 0.0179" (25 gauge), screwable with crimped web and returned flange. Provide knockout openings in web at 150mm (6") O.C. to accommodate (if required) horizontal mechanical and electrical service lines, and bracing. Widths as indicated on drawings. Provide structural studs where indicated.

.2 Framing behind all fire resistant gypsum board shall be minimum 0.0329" (20 gauge).

.3 Where metal stud framing forms walls are to be thermally insulated as indicated on drawings, provide metal studs with integrated fastening system for glass fibre/mineral fibre insulation.

.4 Provide special shapes indicated on drawings as part of steel stud/drywall assemblies.

.3 Slip-Type Head Joints: Where indicated, provide one of the following:

.1 Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 2” (51-mm) minimum vertical movement.

.2 Double-Track System: ASTM C645 top outer tracks, inside track with 2” (51 mm) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.

.3 Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

.4 Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

.1 Minimum Base-Steel Thickness: As indicated on Drawings.

.5 Cold-Rolled Channel Bridging: Steel, 0.0538” (1.367 mm) minimum base-steel thickness, with minimum ½” (13 mm) wide flanges.

.1 Depth: As indicated on Drawings.

.2 Clip Angle: Not less than 1-1/2” x 1-1/2” (38 mm x 38 mm), 0.068” (1.72 mm) thick, galvanized steel.

.6 Hat-Shaped, Rigid Furring Channels: ASTM C645.

.1 Depth: As indicated on Drawings.

.7 Resilient Furring Channels: ½” (13 mm) deep, steel sheet members designed to reduce sound transmission.

.1 Configuration: hat shaped.

.8 Cold-Rolled Furring Channels: 0.053" (1.34 mm) uncoated-steel thickness, with minimum ½" (13 mm) wide flanges.

.1 Depth: As indicated on Drawings

.2 Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329" (0.8 mm).

.3 Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062" (1.59 mm) diameter wire, or double strand of 0.048" (1.21 mm) diameter wire.

.9 Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4" (32 mm), wall attachment flange of 7/8" (22 mm), minimum uncoated-steel thickness of 0.0179" (0.455 mm), and depth required to fit insulation thickness indicated.

2.3 GYPSUM BOARD SUSPENSION SYSTEMS

.1 Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062" (1.59 mm) diameter wire, or double strand of 0.048" (1.21 mm) diameter wire.

.2 Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16" (4.12 mm) in diameter.

.3 Flat Hangers: Steel sheet, in size indicated on Drawings.

.4 Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538" (1.367 mm) and minimum ½" (13 mm) wide flanges.

.1 Depth: As indicated on Drawings.

.5 Furring Channels (Furring Members):

.1 Cold-Rolled Channels: 0.0538" (1.367 mm) uncoated-steel thickness, with minimum ½" (13 mm) wide flanges, ¾" (19 mm) deep.

.2 Steel Studs and Tracks: ASTM C645.

.1 Depth: As indicated on Drawings.

.3 Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch (22 mm) deep.

.4 Resilient Furring Channels: 1/2"' (13 mm) deep members designed to reduce sound transmission.

.1 Configuration: Hat shaped.

.6 Grid Suspension System for Gypsum Board Ceilings (CA2): ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.

2.4 AUXILIARY MATERIALS

.1 General: Provide auxiliary materials that comply with referenced installation standards.

.1 Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

.2 Isolation Strip at Exterior Walls: Provide one of the following:

.1 Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.

.2 Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8" (3.2 mm) thick, in width to suit steel stud size.

3 Execution

3.1 EXAMINATION

.1 Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

.1 Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

.2 Coordination with Sprayed Fire-Resistive Materials:

.1 Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24” (610 mm) o.c.

.2 After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

.1 Installation Standard: ASTM C754.

.1 Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

.2 Install framing and accessories plumb, square, and true to line, with connections securely fastened.

.3 Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

.4 Install bracing at terminations in assemblies.

.5 Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

.1 Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

.2 Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

.3 Install studs so flanges within framing system point in same direction.

.4 Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

.1 Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

.2 Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

.1 Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

.3 Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

.4 Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

.5 Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

.5 Direct Furring:

.1 Screw to wood framing.

.2 Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

.6 Z-Shaped Furring Members:

.1 Erect insulation, vertically and hold in place with Z-shaped furring members spaced 24” (610 mm).

.2 Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24” (610 mm) o.c.

.3 At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12” (305 mm) from corner and cut insulation to fit.

.7 Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8” (3 mm) from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

.1 Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

.1 Hangers: 48” (1219 mm).

.2 Carrying Channels (Main Runners): 48” (1219 mm)

.3 Furring Channels (Furring Members): 24” (610 mm), unless otherwise indicated on the Drawings.

.2 Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

.3 Suspend hangers from building structure as follows:

.1 Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

.1 Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

.2 Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

.1 Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

.3 Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.

.4 Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.

.5 Do not attach hangers to steel roof deck.

.6 Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.

.7 Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.

.8 Do not connect or suspend steel framing from ducts, pipes, or conduit.

.4 Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

.5 Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

.6 Installation Tolerances: Install suspension systems that are level to within 1/8” in 12’ (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirement for supply and installation of components required for a complete gypsum board assembly with proprietary components as follows:

.1 Gypsum Board Panels:

.1 Standard Gypsum Board

.2 Gypsum Ceiling Board

.3 Impact/Abuse Resistance Gypsum Board

.2 Gypsum Wallboard Accessories:

.1 Screws, tape, joint compound and all other accessories required for gypsum board ceiling and wall partitions.

.2 Access Panels.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 American Society for Testing and Materials International (ASTM):

.1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.2 ASTM C475/C475M, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board

.3 ASTM C840, Standard Specification for Application and Finishing of Gypsum Board

.4 ASTM C954, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

.5 ASTM C1002, Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

.6 ASTM C1047, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base

.7 ASTM C1396/C1396M, Standard Specification for Gypsum Board

.8 ASTM C1629/C1629M, Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

.9 ASTM D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

.10 ASTM D3274, Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation

1.3 QUALITY ASSURANCE

.1 Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified.

.2 Submit proof of experience upon Consultant's request.

1.4 SUBMITTALS

.1 Provide submittals in accordance with the requirements of Division 01.

.2 Shop Drawings: Submit shop drawings showing the design, construction and relevant details of furring, enclosures and partitions which require a fire rating.

.3 Product Data: Submit manufacturer's current technical literature for each component.

.4 Samples: Supply for Consultant's review, if requested, samples of the following:

.1 Board: Submit sample of each panel product specified, 150mm (6") square.

.2 Trim: Submit sample of each type of trim specified, 305mm (12") long.

.5 Quality Assurance Submittals:

.1 Design Data, Test Reports: Provide manufacturer's test reports indicating product compliance with indicated requirements.

.2 Manufacturer's Instructions: Provide manufacturer's written installation instructions.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, enclosed, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Protect bagged products from excessive moisture or wetting. Store metal component sections in crates to prevent damage to material. Do not use bent or deformed material.

1.6 PROJECT CONDITIONS

.1 Establish and maintain environmental conditions for application and finishing gypsum wallboard to comply with ASTM C 840 and in accordance with manufacturer's written instructions.

.2 In cold weather (outdoor temperatures less than 13 deg. C, controlled heat in the range of 13 deg. C to 21 deg. C must be provided. Recommended temperature must be maintained twenty-four (24) hours before, during, and after entire gypsum board joint finishing and until the permanent heating system is in operation or the building is occupied.

.1 Minimum temperature of 10 deg. C shall be maintained during gypsum board application.

.3 Ventilate building spaces to remove excess moisture and humidity during the drying process. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

2 Products

2.1 MATERIALS - WALLBOARD

.1 Standard Gypsum Board:

.1 Conforming to ASTM C1396, ivory paper faced, tapered edges, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, 13mm (1/2") thick, unless otherwise indicated on Drawings.

.2 Acceptable Materials and Manufacturers:

.1 Sheetrock Brand Gypsum Panels by CGC Inc.

.2 ProRoc Regular by CertainTeed.

.3 ToughRock Gypsum Wallboard by Georgia-Pacific Canada.

.4 Or approved equivalent.

.2 Gypsum Ceiling Board:

.1 Sag Resistant Gypsum Board: Meeting requirements of ASTM C1396M, ceiling board manufactured to have more sag resistance than regular type gypsum board with long edges tapered, and as follows:

.1 Location: Ceiling surfaces.

.2 Acceptable Materials:

.1 Sheetrock Interior Ceiling Board by CGC Inc.

.2 Tough Rock CD Ceiling Board by Georgia Pacific Canada.

.3 ProRoc Interior Ceiling Board by CertainTeed.

.3 Impact/Abuse Resistant Gypsum Board:

.1 Manufactured to produce greater resistance to surface indentation and impact penetration resistance than standard gypsum panels:

.1 Gypsum panels with glass fibre reinforced core, tapered edges, minimum 5/8” thickness, conforming to ASTM C1396M and tested to the following performance ratings.

.2 Acceptable Materials:

.1 Sheetrock Abuse Resistant by CGC Inc.

.2 Abuse Resistant by CertainTeed.

.3 ToughRock Abuse Resistant by Georgia Pacific Canada.

2.2 ACCESSORIES

.1 Concrete Anchors:

.1 Self-drilling tie wire anchors, "Red-Head No. T-32" by Phillips Drill Company, Division of ITT Industries of Canada Ltd., or approved equal.

.2 Concrete Inserts:

.1 Hot-dip galvanized "turtle back" type concrete inserts to suit conditions as approved by Consultant, by Acrow-Richmond National Concrete Accessories, Division of Premetalco Inc., or approved equal.

.3 Gypsum Wallboard Accessories:

.1 In general, gypsum wallboard accessories shall conform to ASTM C1047.

.2 Corner Beads:

.1 Made from galvanized steel sheet conforming to ASTM A653, minimum 0.0179" (25 gauge). Minimum width of flanges 28mm for 13mm (1-1/8" for 1/2") thick wallboard and 32mm for 16mm (1-1/4" for 5/8") thick wallboard.

.3 Casing Beads:

.1 Made from galvanized steel sheet conforming to ASTM A653, minimum 30 gauge, U-shaped designed for finishing with joint compound.

.4 Control Joints:

.1 Made from galvanized sheet steel conforming to ASTM A653, minimum 0.0179" (25 gauge), or roll-formed zinc-alloy to resist corrosion, with expansion joint material perforated flanges.

.5 Reveals:

.1 Galvanized sheet steel conforming to ASTM A653, minimum 0.0179" (25 gauge), in profiles as indicated on drawings.

.4 Wallboard Screws:

.1 Corrosion resistant, self-drilling, self-tapping gypsum wallboard screws conforming to ASTM C1002 (Type S) and ASTM C954 (Type S-12), 25mm (1") long No. 6 for single layer application, 41mm (1-5/8") long No. 7 for double layer application.

.5 Joint Compound for Interior Gypsum Board:

.1 Conforming to ASTM C475 and as recommended by gypsum wallboard, fire-rated gypsum wallboard and exterior wallboard manufacturers to suit conditions.

.6 Joint Compound for Abuse-Resistant Panels:

.1 ToughRock™ Sandable Joint Compound, by Georgia-Pacific.

.2 Durabond/Sheetrock Setting-Type Joint Compound, by CGC Canada Inc.

.7 Resilient Sponge Tape:

.1 Closed cell neoprene sponge type tape with self-sticking adhesive on one side. 'Permastik 122X' by Jacobs and Thompson Ltd., or foamed vinyl type tape, 'Arnofoam' by Arno Adhesive Tape Incorporated.

.8 Adhesive:

.1 Conforming to CGSB 71-GP-25M, and as recommended by manufacturer and compatible with contacted surfaces.

.9 Access Panels:

.1 Standard Access Panels: Supply 610mm x 610mm (24" x 24") self framing metal access panels with integral locks as approved by Consultant, where required for access to concealed controls and equipment, by Le Hage Metal Ltd., or Acudor Products Limited, or approved equal.

3 Execution

3.1 EXAMINATION

.1 Examine gypsum wallboard panels for damage and existence of mould. Install only undamaged panels.

.2 Examine gypsum wallboard in accordance with GA-231 for water damage.

.3 Examine areas and substrates, with installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

.4 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

.2 Coordinate installation of gypsum board suspension systems with installation of acoustical ceiling tiles (ACT) suspension systems. Where gypsum board suspension systems abut ACT systems, ensure that ceiling tiles grid fit into gypsum grid without affecting overall design and appearance.

.3 Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION - GENERAL

.1 Conform to ASTM C840, except as otherwise specified herein. Cooperate with mechanical, electrical and other trades to accommodate fixtures, fittings and other items in wallboard areas.

.2 Review extent of temporary heat provided. Carry out the work of this Section only when temperature is maintained and controlled in the range of 13 deg. C to 21 deg. C for at least twenty-four (24) hours before installing gypsum board and shall be maintained until joint compound and adhesives are dried or cured.

.3 Bring gypsum board into contact, but do not force into place.

3.4 GYPSUM WALLBOARD - SINGLE LAYER APPLICATION

.1 Metal Studs:

.1 Apply gypsum wallboard with screws. Erect wallboard with long dimension at right angles to supports. Locate end joints over supporting members.

.2 Locate vertical joints at least 305mm (12") from the jamb/head/sill lines of openings.

.3 For parallel application space screws at 200mm (8") O.C. at board edges at 305mm (12") O.C. on board fields.

.2 Fasteners:

.1 Perimeter screws shall be not less than 10mm (3/8") from edges and ends and shall be opposite the screws on adjacent boards.

.2 Screws shall be driven with a power screw gun and set with countersunk head slightly below the surface of the board.

.3 Joints: Finish all joints.

3.5 CONTROL JOINTS

.1 Install control joints using metal control joint strip as specified where:

.1 A partition, furring or column fireproofing abuts a structural element, dissimilar wall or partition assembly, or other vertical penetration, or ceiling.

.2 A ceiling or soffit abuts a structural element, dissimilar wall or partition assembly or other vertical penetrations.

.3 Wings of "L", "U" and "T"-shaped ceiling/soffit areas are joined;

.4 Construction changes within the plane of the partition or ceiling or soffit.

.5 Partition, restrained ceiling or furring run exceeds 9144mm (30').

.6 Unrestrained ceiling dimensions exceed 15240mm (50') in either direction.

.7 Expansion or control joints occur in the base exterior wall.

.8 Wallboard is installed over masonry control joints.

.9 And elsewhere as indicated on the drawings.

.2 Install in accordance with manufacturer's instructions. Where application is on furring members and double furring members at control joints, place one furring member on each side of the control joint.

3.6 BULKHEADS

.1 Fur out bulkheads in areas indicated and as required to conceal mechanical, electrical or other services in rooms where drywall finishes are scheduled, and elsewhere if called for on drawings.

.2 Ensure hangers are installed as to prevent splaying.

3.7 ACCESS DOORS

.1 Access doors supplied by this Section and Mechanical and Electrical shall be built-in by this Section where required in gypsum board installations, in accordance with manufacturer's recommendations, to match and blend with surrounding surfaces.

.2 Refer to drawings for locations.

3.8 THERMAL BREAK

.1 Install self-sticking resilient sponge tape at edges of wallboard in contact with metal windows and exterior door frames to provide a thermal break.

.2 Adhere tape to casing bead and compress during installation.

3.9 FINISHING

.1 Before proceeding with installation of finishing materials ensure the following:

.1 Wallboard is fastened and held close to framing and furring.

.2 Fastening heads in wallboard are slightingly below surface in dimple formed by driving tool.

.2 Levels of Gypsum Wallboard Finish:

.1 Level 0: Temporary construction only.

.2 Level 1: Plenum areas and above ceilings.

.3 Level 2: Areas of water resistant gypsum backing board under tile, exposed areas where appearance is not critical.

.4 Level 3: Service corridors and areas to receive heavy or medium textured coatings or heavy-duty wall coverings.

.5 Level 4: Areas to receive light textured coatings or lightweight wall coverings.

.6 Level 5: Areas to receive gloss, semi-gloss or flat sheen paints and critical lighting conditions. Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat over entire surface for corridors, long hallways, walls and ceilings longer than 7500 mm or walls higher than 3600 mm , and for all curved or angled wall surfaces.

.3 Finish gypsum wallboard in strict accordance with ASTM C840, GA-214 and GA-216 and as follows:

.1 Fill and tape joints and internal corners and fill screw depressions in board face and smooth out along corner beads and metal strip with joint compound. Mix joint compound (powder) in accordance with manufacturer's written instructions.

.2 Prefill "V" grooves of rounded edges with special setting type joint compound using a 127mm to 150mm (5" to 6") joint finishing knife. Finish flush with tapered surface ready for tape reinforcing application. Allow prefill material to dry thoroughly before application of embedding compound and tape.

.3 Apply joint compound in thin uniform layer. Embed reinforcing tape accurately centred on joint and securely pressed in, leaving sufficient compound under tape to provide proper bond. Immediately apply skim coat over tape application. Allow to dry thoroughly before application of next coat.

.4 Apply fill coat finishing the tapered depression flush with board surfaces. Allow to dry thoroughly before application of finish coat.

.5 Apply finish coat extending slightly beyond the filler coat and feathered out onto the board surface. Do not apply finish coat to gypsum board scheduled to be sprayed with acoustic surfacing finish. Sand between coats and following the finishing coat, where necessary, and leave surface smooth and ready for painting.

.6 Finish screw depressions with filler material and finish coat as specified above. Joint and depression finish shall in no case protrude beyond the plane of the board surface.

.7 Furnish corner beads and metal trim flush with board surface using filler and finishing coats feathered out approximately 50mm (2") and 100mm (4") respectively onto the board surface.

.8 Provide metal casing beads at exposed edges, at junctions of gypsum/cement board with dissimilar material, at control joints and at junction with columns. Casing beads are required at perimeter of gypsum/cement wallboard ceilings and soffits. Fasten with screws at 305mm (12") O.C. along entire length.

.9 Finish gypsum board to receive a Level 4 finish, unless indicated on the Drawings as a Level 5 finish.

3.10 REPAIRS

.1 After taping and finishing has completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.

.2 Patch holes or openings 13mm (1/2") or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.

.3 Repair holes or openings over 13mm (1/2"), or equivalent size, with 16mm (5/8") thick gypsum wallboard secured in such a manner as to provide solid substrate equivalent to undamaged surface.

.4 Tape and refinish scratched, abraded or damaged finished surfaces including cracks and joints in non-decorated surface to provide smoke tight construction, and STC equivalent to the sound rated construction.

3.11 PROTECTION

.1 Protect installed products from damage during remainder of construction period.

.2 Remove and replace panels that are damaged.

END OF SECTION

1 General

1.1 SUMMARY

.1 The work in this section includes supply and installation for the following:

.1 Porcelain Wall Tile.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 Applicable Standards

.1 American National Standards Institute/Ceramic Tile Institute (ANSI/CTI):

.1 ANSI/CTI A108.1, Specification for the Installation of Ceramic Tile: Collection of 20 ANSI/CTI A108, A118 and A136 Series of Standards on Tile Installation

.2 American Society for Testing and Materials (ASTM):

.1 ASTM C241/C241M, Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic

.2 ASTM C920, Standard Specification for Elastomeric Joint Sealants

.3 ASTM C1178/C1178M, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-75.1-M, Tile, Ceramic

.4 Terrazzo, Tile and Marble Association of Canada (TTMAC):

.1 2019-2021 Specification Guide 09 30 00, Tile Installation Manual

.2 Hard Surface Maintenance Guide

1.3 EXAMINATION

.1 Examine all areas and conditions affecting work of this Section and report any discrepancies or defects which would affect finished results.

1.4 SUBMITTALS

.1 Submit submittals in accordance with Division 01.

.2 Samples:

.1 Submit sample panel of each type and colour tile, 610mm x 610mm (24" x 24").

.2 Adhere to a rigid board with setting compound, grout and a dummy control joint showing sealant as specified. Identify samples by project number, date, name of sub-contractor and tile type.

.3 Tile and grout used in the building shall correspond to appearance of approved samples in all respects. Do not install tile until samples are approved.

.4 Upon Consultant's request submit samples of base, trim and fittings.

.3 Material Lists:

.1 Prior to ordering any materials submit list of products to be used. Products proposed must be recommended by their manufacturer for purpose intended. Upon Consultant's request submit evidence of manufacturer's endorsement.

.2 Take care to ensure compatibility of all materials. Consult the manufacturers in case of doubt.

.3 The supplementary materials shall come from the same production batch as installed materials.

.4 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on Site for reference by workers.

.5 Maintenance Instructions:

.1 Upon completion of the Work, furnish Consultant with copies of maintenance instructions, containing complete detailed and specific instructions for maintaining, preserving and keeping clean the surfaces of this Work and in particular, giving adequate warning of maintenance practices of materials detrimental to the work of this Section for inclusion in the Operation and Maintenance Manual.

.6 Maintenance Materials:

.1 Supply five percent (5%) extra of each colour of tile and of each tile type for future repairs by the Owner.

.2 Place maintenance materials where directed by the Owner and store in their original containers.

1.5 QUALITY ASSURANCE

.1 Subcontractor executing work of this Section shall employ installers having a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Work of this Section shall be executed by workers especially trained and experienced in this type of work. Have a full time, qualified representative at the Site to direct the work of this Section at all times.

.3 Ensure proper use of proprietary materials in strict accordance with the material manufacturer's directions. It shall be the responsibility of the material manufacturer or supplier to furnish these directions to the Contractor and to check periodically at the site to ensure that they are being carried out.

1.6 PRE-INSTALLATION CONFERENCE

.1 Contractor shall hold pre-installation conference two (2) weeks prior to commencing work of this Section. Conference shall be attended by the Contractor, Owner, Consultant, concrete finishing subcontractor, tile installers and tile manufacturer's representative, setting bed and grout manufacturer's representative to discuss the following, but not limited to the following;

.1 Substrate conditions, non-structural cracks, structural cracks and preparation requirements;

.2 Floor and wall surface irregularities and levelness tolerances, including all remedial requirements;

.3 Installation of anti-fracturing membranes and setting bed materials;

.4 Installation of tiles and grouting;

.5 Edge details and treatments;

.6 Installation of tile and grout sealers.

.2 Contractor shall ensure that manufacturer's representatives issues written installation instructions at the pre-installation conference, to all parties attending the pre-installation conference and the Consultant, for all tile types, setting beds, grouts and sealers required for the work of this Section.

.3 Contractor shall within seventy-two (72) hours of the pre-installation conference, prepare minutes of the conference, and issue minutes to all parties attending the pre-installation conference and the Consultant. Contractor shall clearly indicated required actions and by which party.

1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Co-ordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Restrict traffic by other trades during installation.

.5 Provide adequate protection of completed tiled surfaces to prevent damage by other trades until final completion of this project. Minimum protection shall consist of 4 mil polyethylene sheets lapped 100mm (4") and taped.

1.8 SITE CONDITIONS

.1 Ambient Conditions: Apply tile after completion of work by other Sections is complete; to surfaces sufficiently dry, clean, firm, level, plumb and free from oil or wax or any other material deleterious to tile adhesion and as follows:

.1 Temperature: Maintain tile materials and substrate temperature between TTMAC recommended minimum and maximum temperature range; unless indicated otherwise by manufacturer, for forty-eight (48) hours before and during installation until materials are fully set and cured; provide additional heat during winter months or at any other time when there is a risk that surface temperatures may drop below minimum recommended temperatures.

.2 Ventilation: Maintain adequate ventilation where Work of this Section generates toxic gases or where there is a risk of raising relative humidity to levels that could damage building finishes and assemblies.

1.9 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions, but for a period of five (5) years, and agree to promptly make good defects which become evident during the warranty period without cost to the Owner.

.2 Defects shall include but not be limited to the following:

.1 Cracking and crazing;

.2 Discolouration and staining;

.3 Pitting, splitting, and;

.4 Deformation of tiles and grout.

2 Products

2.1 MATERIALS

.1 Porcelain Wall Tiles (PORT-1):

.1 Size, Colour, Pattern, Finish, Installation Method, Series and Manufacturer: As indicated in the Finish Material Legend on Drawing A3.3.

.2 Control Joint Caulking:

.1 As supplied by the Grout Manufacturer.

.2 Colour: To match adjacent grout, as approved by the Consultant.

.3 Metal Transition Strip (TS):

.1 Colour, Finish, Series and Manufacturer: As indicated in the Finish Material Legend on Drawing A3.3.

2.2 MORTAR SETTING MATERIALS

.1 Manufacturers: Mortar and grout materials listed in this Section shall be of a uniform quality for each mortar, and grout component from a single manufacturer and each aggregate from one source or producer as follows:

.1 Flextile Ltd.

.2 MAPEI Inc.

.3 Custom Building Products Ltd.

.4 Laticrete International Inc.

.2 Interior Thin Set Wall System: Dry set mortar meeting or exceeding the requirements of ANSI A108.1 formulated for thin set applications of ceramic biscuit tile, factory sanded mortar consisting of portland cement, sand and additives requiring only potable water to be added for installation:

.1 Acceptable mortar materials:

.1 #51 Floor and Wall Mix by Flextile Ltd.

.2 Kerabond by MAPEI Inc.

.3 Premium Blend Thinset by by Custom Building Products.

.4 Laticrete 317 Mortar by Laticrete International Inc.

2.3 GROUT MATERIALS

.1 Grout Colours: As indicated in the Finish Material Specifications in Schedule D7, Finish Specifications and Room Finish Schedules.

.2 Portland Cement Grout for Wall and Floor Joints ≤3mm (1/8”) Interior Only: factory blended polymer modified mixture meeting requirements of ANSI A108.1:

.1 Acceptable Materials:

.1 500 Series Unsanded Grout by Flextile Ltd.

.2 Ker 800 Unsanded Grout by MAPEI Inc.

.3 Polyblend Unsanded Grout by Custom Building Products.

.4 Peracolor Grout Laticrete International Inc.

2.4 ACCESSORY MATERIALS

.1 Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers and as follows:

.1 Job Site Cleaner: Phosphoric acid/nitric acid based cleaning solution mixed in accordance with cleaner manufacturer's recommendations and as recommended by tile manufacturer. Separately

.2 Maintenance Cleaner: Non-toxic, electrolytic, biodegradable, non-ammonia containing, pH controlled cleaning solution mixed in accordance with manufacturer's recommendations.

3 Execution

3.1 EXAMINATION

.1 Maintain minimum temperature of 13 deg C at tile installation area for twenty-four (24) hours prior to curing and for twenty-four (24) hours after installation. Do not apply work to frozen surfaces.

.2 Examine carefully surfaces to which tile is to be installed and report any defects to the Consultant.

.3 Commencement of installation shall signify complete acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Surface Preparation:

.1 Make backing surfaces level and true to a tolerance in plane of 3mm in 2439mm (±1/8" in 8') for walls and 3mm in 3048mm (±1/8" in 10') for floors using levelling bed mortar.

.2 Surfaces shall be structurally sound, well fastened, clean and free from dust, oil, grease, paint, tar, wax, curing agents, primers, sealers, form release agents or any deleterious substances that may act as bond barriers.

.3 Backing surfaces shall be dry and fully cured. Dampness must not exceed five percent (5%) by volume.

.2 Work of other trades that are required before new tile installation (i.e. electrical conduit installed below ceramic tile) shall be installed, complete and approved before tile installation.

3.3 INSTALLATION - GENERAL

.1 Unless otherwise specified, execute tile work according to the latest issue of Specification Guide 09 30 00, Tile Installation Manual - published by Terrazzo, Tile and Marble Association of Canada, as the minimum standard except as varied by this Specification.

.2 Thoroughly clean surfaces to which tile is to be applied.

.3 Neatly cut tile around fitments, fixtures, access panels, and the like. Splitting of tile is expressly prohibited except where no alternative is possible. Form intersections, corners and returns accurately.

.4 Finish surfaces flat and level or, sloped and graded as required.

.5 Joint Widths: Install tile with the following joint widths, unless indicated on drawings:

.1 Wall Tile: 1.6mm (1/16").

.2 Make joints consistent width and alignment within tile area.

.3 Maintain 2/3 of grout joint depth free of setting material.

.6 Joints in base shall match floor patterns. Joints shall be watertight without voids, cracks or excess grout.

.7 Lay out tile so that fields or patterns are centred on wall areas or architectural features and so that no tile less than 1/2 size occurs.

.8 Arrange and set recessed accessories in tile work so that they are evenly spaced, centred with joints and set true with correct projection. Rigidly install accessories.

.9 Provide manufacturer's standard trim pieces at changes of direction and at terminations. Unless otherwise indicated provide the following corner and edge conditions:

.1 Internal horizontal corners: Coved.

.2 External vertical and horizontal corners: Bullnosed.

.3 Internal vertical corners and unexposed edges: Square.

.10 Install tiles in patterns and locations as indicated on drawings.

.11 Install wall tile full wall height unless shown otherwise.

.12 Coordinate work of this Section with work of other Sections for items requiring to be recessed into work of this Section.

.13 Sound tiles after setting and remove and replace tiles not fully bedded.

.14 Re-point joints after cleaning to eliminate imperfections. Avoid scratching tile surfaces.

.15 Finished tile work shall be clean and free of tiles which are pitted, chipped, cracked or scratched. All damaged tile shall be removed and replaced.

3.4 MORTAR APPLICATION METHOD

.1 Thin-Set Application Method:

.1 Install wall tile to gypsum wallboard and moisture resistant wallboard in dry areas using latex modified thin-set setting bed and latex modified wall grout in strict accordance with tile manufacturers written installation instructions as per the pre-installation conference.

.2 Apply floor tile and prepare floor slabs in strict accordance with tile manufacturers written installation instructions as per the pre-installation conference.

3.5 GROUTING

.1 Grout tiles in accordance with ANSI A108.10 and as specified herein.

.2 When grouting a fresh laid floor, make certain that traffic and grouting will not cause movement of floor in setting bed. Protect floor by using kneeling boards or gypsum board to defend floor against traffic while grouting.

.3 Mix grouts and install in strict accordance with the manufacturer's instructions.

.4 Excess grout shall be removed from the surface of tiles using the edge of a rubber float held at a 45 deg angle, moving it diagonally to the joints. Fill all gaps and air holes.

.5 Do not allow grout to harden on face of tile. Refer to manufacturer's instructions for thorough removal.

3.6 CONTROL JOINTS AND SEALING

.1 Control joints of a flexible caulking material shall be placed every 4877mm to 6096mm (16’ to 20') apart, directly over existing control joints and/or where indicated on drawings or as required in accordance with TTMAC Detail No. 301MJ-2019-2021, Details E, F and G, whichever is applicable.

.2 Control joints shall be placed around the floor perimeter at walls, around columns, and where tile abuts other hard materials or vertical surfaces. Saw cutting of tile after installation is prohibited. Tile shall be cut if required and installed along each side of control joints.

.3 Locate expansion, control, contraction, and isolation joints, as indicated below, unless specifically indicated otherwise on the Drawings:

.1 Interior: 4877mm (16') maximum: 6mm (1/4") joint width.

.4 Joints around fixtures, pipes or other fittings shall be sealed with a sealant. Refer to Section 07 92 00 for type of sealants to be used.

.1 Colour of sealant shall match grout as selected later by Consultant.

3.7 CLEANING AND PROTECTION

.1 Clean tiled areas after grouting has cured, using compatible solutions and methods as recommended by the manufacturer.

.2 Remove grout residue from tile as soon as possible.

.3 Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation.

.4 Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning.

.5 Flush surface with clean water before and after cleaning.

.6 Leave finished installation clean and free of cracked, chipped, broken, unbonded, or other tile deficiencies.

3.8 INSTALLATION SCHEDULE

.1 Install tiles according to TTMAC's "Specification Guide 09 30 00 Tile Installation Manual 2019-2021".

.2 Expansion and Control Joints: Movement Joints for Tile Installations: TTMAC Detail 301MJ-2019-2021.

.3 Wall Tile:

.1 Tile Installed Over Masonry or Concrete Walls – Thin-Set Method: TTMAC Detail 303W-2019-2021 Interior/Exterior.

.2 Tile Installed on Coated Glass Mat Backer Board, Detail B - Interior Wet/Dry Areas: TTMAC Detail 305W-2019-2021.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply and installation of ceilings consisting of the following, complete with exposed suspension system and trim:

.1 Acoustical tiles for interior ceilings.

.2 Fully concealed, direct-hung, suspension systems.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 American Society for Testing and Materials (ASTM):

.1 ASTM C635/C635M, Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings

.2 ASTM E1264, Standard Classification for Acoustical Ceiling Products

.5 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate layout and installation of acoustic tile ceiling and suspension system with other construction that penetrates ceilings or is supported by them including; but not limited to, light fixtures, HVAC equipment, fire suppression system, and partition assemblies, and as follows:

.1 Schedule and coordinate installation of ceiling to occur after completion of overhead mechanical and electrical work.

.2 Schedule and coordinate ceiling installation with mechanical and electrical trades building in components into ceiling finish panels.

.2 Pre-Installation Conference: Conduct conference at Project site in accordance with requirements of Division 01 to discuss coordination issues with Contractor, Subcontractor and Consultant present.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit product data for each type of product specified.

.2 Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling mounted items indicating the following:

.1 Ceiling suspension system members.

.2 Method of attaching suspension system hangers to building structure.

.3 Ceiling mounted items including light fixtures; air outlets and inlets; speakers; sprinklers; and special mouldings at walls, column penetrations, and other junctures of acoustic ceilings with adjoining construction.

.3 Samples for Initial Selection: Manufacturer's colour charts consisting of sections of acoustic panels, suspension systems, and trim showing the full range of colours, textures, and patterns available for each type of ceiling assembly indicated.

.4 Samples for Verification: Full size units of each type of ceiling assembly indicated; in sets for each colour, texture, and pattern specified, showing the full range of variations expected in these characteristics:

.1 150mm (6") square samples of each acoustic panel type, pattern, and colour

.2 Set of 305mm (12") long samples of exposed suspension system members, including trim, for each colour and system type required.

.5 Maintenance and Materials:

.1 Provide five percent (5%) of each type of acoustic ceiling panels and two percent (2%) of each suspension system and trim for future repairs. Identify cartons and place where directed by the Owner.

.2 Maintenance materials shall be of same production run as installed materials.

1.5 INFORMATIONAL SUBMITTALS

.1 Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

.1 Ceiling suspension-system members.

.2 Structural members to which suspension systems will be attached.

.3 Method of attaching hangers to building structure.

.4 Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.

.5 Size and location of initial access modules for acoustical tile.

.6 Items penetrating finished ceiling and ceiling-mounted items including the following:

.1 Lighting fixtures.

.2 Diffusers.

.3 Grilles.

.4 Speakers.

.5 Sprinklers.

.6 Access panels.

.7 Perimeter moldings.

.7 Show operation of hinged and sliding components adjacent to acoustical tiles.

.8 Minimum Drawing Scale: ¼” = 1’ (1:48).

1.6 QUALITY ASSURANCE

.1 The Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Single-Source Responsibility: Provide acoustic ceilings and grid components by a single manufacturer to ensure compatibility.

.3 Letter of Certification:

.1 Contractor together with manufacturer, shall submit a written confirmation, signed by manufacturer's registered professional Engineer, stating that the suspended ceiling system will provide adequate support for electrical fixtures.

1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

1.8 SITE CONDITIONS

.1 Ambient Conditions: Install acoustic unit ceilings only when building is enclosed, has sufficient heat, when overhead mechanical and electrical work is complete, and dust and moisture producing activities are complete; maintain uniform temperatures and relative humidity within range recommended by material manufacturer from the time of installation until Substantial Performance for the project; make adjustments to temperature and humidity gradually within tolerances indicated by manufacturer.

1.9 WARRANTY

.1 Acoustical Panel: Submit manufacturers standard ten (10) year written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:

.1 Panels: Sagging and warping.

.2 Grid System: Rusting and manufacturer’s defects.

2 Products

2.1 MANUFACTURERS

.1 Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section, manufacturers offering products that may be incorporated into the Work include the following:

.1 Armstrong World Industries, Inc.

.2 Chicago Metallic

.3 CertainTeed

.4 CGC Interiors, a USG Company

2.2 DESIGN CRITERIA

.1 Superimposed Loads: Determine superimposed loads applied to suspension systems by components of the building and verify that adequate hangers are installed to support additional loads in conjunction with normal loads of the ceiling system, and as follows:

.1 Maximum Deflection: Limit deflection to L/360 in accordance with ASTM C635 deflection test.

2.3 MATERIALS

.1 Acoustic Panels (ACT-1): Provide manufacturer's standard panels of configuration indicated in accordance with ASTM E1264 classifications as designated by the nominal values for types, patterns, acoustic ratings, and light reflectance class listed in this Section; with flame spread rating of 25 or less and smoke developed rating of 50 or less when tested in accordance with CAN/ULC S102 and as follows:

.1 Physical Properties: Type: A; Form: A1.2; Pattern: E; Fire Class: A.

.2 Dimensions: 610mm x 1220mm x 16mm (24" x 48" x 5/8”).

.3 Edge Profile: 15/16 Square Lay-In Edge.

.4 Colour: White.

.5 Acoustic and Visual Performance (Minimum Nominal):

.1 Noise Reduction Coefficient (NRC): 0.55

.2 Ceiling Attenuation Class (CAC): 35

.3 Light Reflectance: 0.80

.6 Basis of Design Materials: As indicated in the Finishes Materials Legend on Drawing A3.3.

.2 Metal Suspension System (CA1): Manufacturer's standard direct hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C635 requirements and as supplied by same materials supplier as acoustic panels for intermediate duty, exposed tee bar and as follows:

.1 Tee Bar Grid Face Width: 24mm (15/16").

.2 Module: Sized as appropriate to acoustic panel size.

.3 Hangers, Braces and Ties: Nominal 14 ga. diameter steel wire, galvanized.

.4 Exposed Finish: Manufacturer's standard satin, white finish.

.5 Corrosion Resistance: Hot-dip galvanized or stainless steel components.

.6 Metal Suspension System (for ACT-1):

.1 Tee Bar Grid Face Width: 24mm (15/16").

.2 Basis of Design Material: 15/16" Prelude XL by Armstrong World Industries, Inc.

.3 Tie Wire: Manufacturers standard 1.2mm (3/64") galvanized soft annealed steel wire.

.4 Accessories:

.1 Miscellaneous 'U' clips, splicers, screws, anchors, nails, wire, hold-down clips, and the like, for complete installation.

3 Execution

3.1 INSPECTION

.1 Examine the work upon which the work of this Section depends and report any defects to the Consultant. Do not commence installation until such time as all wet trades have been completed. Commencement of work implies acceptance of surface and conditions.

.2 Ensure that a uniform minimum temperature of 15 deg. C and humidity of 20 - 40% before, during and after installation is maintained.

3.2 INSTALLATION

.1 Cooperate with mechanical, electrical, drywall and other trades to accommodate fixtures, and the like. Examine mechanical and electrical drawings to establish hanger layout and ensure that ceiling hanger layout and furring are designed to span ducts, and the like, where required. Supply all hangers, including inserts for hangers and supplementary framing members as required for complete installation.

.2 Prior to installation of acoustic panels notify the Consultant for inspection and approval of suspension system.

.3 All installations shall be by skilled mechanics and in strict accordance with system manufacturer's printed directions to produce first-class, flush finished surface in true plane, free from drooping, warped, soil or damaged board or grid.

.4 Accurately space and level all runners and securely wire to main runner channels or hangers as applicable. Join cross tees to main runners by interlocking ends through preformed slots in web of main steel tees. Where joints occur in main tees, they shall be butted together flush and secured with interlocking tack. Tee-to-tee intersections and tee-to-edge mould connections shall be fitted tight, flush and parallel to ceiling plane without twists or gaps. Provide continuous runners each side of light fixtures and frame around all openings.

.5 Provide all additional supports, hangers and steel trapeze channel framing required to support fixtures located under mechanical ducts.

.6 Space hangers to support grid on 1220mm (48”) centres each way securely fastened to structure. Hangers shall not, under any circumstances, be secure to pipes, ducts or any electrical or mechanical items.

.7 Frame around recessed fixtures, grilles and openings with an allowance for movement.

.8 Grid systems shall be accurately spaced, square, true in line at correct elevations and level with water or laser beam to a tolerance of 3mm in 3048mm (1/8" in 10'). Grid shall be symmetrically laid so that border panels are not less than half size. Lay out panels square with walls. Obtain Consultant's approval of layout before proceeding.

.9 The suspension system shall support the ceiling assembly with a maximum deflection of 1/360 of the span.

.10 Install ceiling suspension system in accordance with ASTM C636 installation procedures.

.11 Anchors, where required, shall be self-drilling type, installed by means of an electrically powered drill specifically designed for this purpose. The anchor manufacturer shall evaluate the specific job conditions and advise in writing regarding anchor sizes necessary. The safe working load shall not exceed 25% of the manufacturer's stated average test loads for the anchor.

.12 Receive instruction from the anchor manufacturer regarding correct usage and comply with these requirements.

.13 "Ramset" or similar powder actuated fastening devices WILL NOT BE PERMITTED.

.14 Attach hangers to inserts and anchors where structural concrete occurs.

.15 Hangers shall be looped through the eye bolts of inserts and anchors and around steel joists, securely wire tie the loop of the hanger to the hanger in each case with two strands of tie wire for permanent securement.

.16 Do not attach hangers to or through steel deck. Attach hangers to steel joist. Where joist spacing is not suitable and where ducts and other equipment interfere, provide cross channels between joists and securely wire tie in position for support of hangers.

.17 Hangers shall be plumb and not pressed against ducts, pipes or conduits. Splayed hangers are not acceptable. Arrange hangers to cause as little interference as possible to ducts and piping.

.18 Form hangers tightly and sharply around main runner channels to prevent movement or rotation of the channel within the loop. Securely saddle tie channel to hanger and return loop leg of hanger to the hanger with two strands of tie wire in each case.

.19 Kinks or bends shall not be made in hangers as a means of levelling main runner channels.

.20 Assemble ceiling system in accordance with drawings. Install ceilings centered on room axis unless noted otherwise. Lay patterned ceiling panels in one direction with pattern parallel to the shortest room dimension.

.21 Cooperate with the mechanical contractor and cut ceiling panels as required to accommodate air handling diffuser throughout the work.

.22 Place panels on flanges of tees. Finish panels to all vertical surfaces with edge mouldings.

.23 Provide hold-down clips at acoustical system to hold units tight to grid system within 6096mm (20') of an exterior door and an operable window.

.24 Provide special cut furring members and access openings of required size to all locations where access to ceiling space is required.

.25 Install acoustic ceiling panel types as indicated on drawings and schedules.

3.3 CLEANING

.1 Thoroughly clean all acoustic ceiling surfaces upon completion of the installation.

.2 Promptly as the work proceeds and on completion, remove all surplus materials and debris resulting from the work of this Section.

END OF SECTION

1 General

1.1 SUMMARY

.1 The Work of this Section includes, but is not limited to the following:

.1 Liquid-applied penetrating vapour control system for existing concrete slab-on-grade substrates to receive adhesive applied floor coverings where on-site moisture vapour transmission exceeds the limitations of the floor covering manufacturer's published recommendations.

.2 Hydraulic Cement-based Self-Leveling Underlayment.

.3 Provide a complete vapour control system including all accessory items necessary, even if not specifically noted.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 Applicable Standards:

.1 American Society for Testing and Materials (ASTM):

.1 ASTM F2170 - Relative Humidity in Concrete Floor Slabs Using in situ Probes

.2 ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

.3 ASTM C1583 - Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension

.4 ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials

.5 ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes

.6 ASTM D2369 – Standard Test Method for Volatile Content of Coatings

.7 ASTM D4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method

1.3 DEFINITIONS

.1 pH: Used in this Section to mean "alkalinity" as described in ASTM F 710.

1.4 PRE-INSTALLATION CONFERENCE

.1 Contractor shall hold pre-installation conference two (2) weeks prior to commencing work of this Section. Conference shall be attended by the Contractor, Owner, Consultant, concrete finishing subcontractor, epoxy subcontractor, and vapour-control flooring treatment installers and manufacturer's representative to discuss the following, but not limited to the following;

.1 Substrate conditions, non-structural cracks, structural cracks and preparation requirements;

.2 Floor surface irregularities and levelness tolerances, including all remedial requirements;

.3 Field test results of moisture levels of concrete prior to application;

.4 Installation of vapour-control flooring treatment;

.5 Inspections during the work.

.2 Contractor shall ensure that manufacturer's representatives issues written installation instructions at the pre-installation conference, to all parties attending the pre-installation conference and the Consultant, for all vapour-control flooring treatment required for the work of this Section.

.3 Contractor shall within seventy-two (72) hours of the pre-installation conference, prepare minutes of the conference, and issue minutes to all parties attending the pre-installation conference and the Consultant. Contractor shall clearly indicated required actions and by which party.

1.5 SUBMITTALS

.1 Action Submittals:

.1 Product Data: For each type of product indicated, including but not limited to the following:

.1 Data to indicate compliance with specified requirements.

.2 List of system use and performance history, for the same formulation and system design, listing reference sources for a minimum of ten (10) years.

.3 Manufacturer's recommended installation procedures, including the basis for accepting or rejecting actual installation procedures used on the Project.

.2 Informational Submittals:

.1 Manufacturer Certificates: Manufacturer's certificate that certifies acceptance and exposure to continuous topical water exposure after final cure.

.2 Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

.3 Material Test Reports: Independent test results indicating compliance with the performance requirements.

.4 Moisture Testing Reports: Field test results of moisture testing prior to application.

.5 Field Quality-Control Report: Manufacturer's field reports indicating full compliance by the installer of the specified system and that the system was in full compliance with all requirements of this Section.

1.6 QUALITY ASSURANCE

.1 Installer's Qualifications: Engage an experienced Installer, approved and certified in writing by the manufacturer as qualified to install treatment in accordance with manufacturer's warranty requirements.

.2 Manufacturer's Qualifications: Formulates synthetic type treatments for vapour emission and alkalinity control installations of similar size and complexity with the system proposed for use.

1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Follow packaging, shipping and product handling requirements recommended by the manufacturer.

.2 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location. Do not load any area beyond the design limits.

.3 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.4 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact, protected from exposure to harmful weather conditions and at temperature levels as recommended by manufacturer.

.5 Restrict traffic by other trades during installation.

.6 Provide adequate protection of completed Work of this Section, to prevent damage by other trades.

1.8 SITE CONDITIONS

.1 Environmental Limitations: Comply with vapour-control flooring treatment manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting vapour-control flooring treatment application.

.2 Do not install vapour-control flooring treatment until installation areas are enclosed and conditioned.

.1 Do not apply vapour-control flooring treatment to unprotected surfaces, or when water is accumulated on the surface of the concrete.

.2 Do not apply vapour-control flooring treatment when temperature is lower than, 10 deg C (50 deg F) or expected to fall below this temperature within twenty-four (24) hours from time of application.

.3 Allow continuous ventilation and indirect air movement at all times during application and curing process of treatment.

.3 Close spaces to traffic during vapour-control flooring treatment application and for not less than twenty-four (24) hours after application unless manufacturer recommends a longer period.

1.9 WARRANTY

.1 Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace materials that fail in material or workmanship specified in "Performance Requirements" Article within specified warranty period.

.1 In the event moisture vapour emission rates exceed specified requirement during warranty period and cause flooring system damage, manufacturer and installer shall provide complete repair and replacement of damage flooring at no cost to Owner.

.2 Repair shall include new flooring, adhesives, patching compounds, required accessories and labor charges to provide an acceptable, Owner-approved flooring system.

.3 Installer shall warrant that installed system is compatible with specified flooring, and specified floor coverings require no additional cementitious materials, special adhesives or reapplications of system components at additional charge to Owner. Finish flooring installation shall remain standard for all specified flooring.

.2 Warranty Period: Ten (10) years from date of Substantial Completion.

2 Products

2.1 MATERIALS

.1 General: Non-corrosive, non-toxic, non-flammable, non-combustible and not labeled as a marine pollutant in liquid or mixed form.

.2 Source Limitations: Obtain components and accessories of concrete moisture-vapour control system through one source from a single manufacturer.

2.2 MOISTURE VAPOUR BARRIER

.1 Fast-Track, One-Component Moisture Vapor Barrier for Concrete:

.1 Basis of Design Materials: ARDEX VB 100 by ARDEX Americas.

.2 Performance and Physical Properties: (When cured at 21° C+/-3°C (70° F+/-3°F) and 50% +/-5% relative humidity):

.1 Application: Manual.

.2 Permeability (ASTM E96): <0.1 perms.

.3 14 pH solution (ASTM D1308): No effect.

.4 VOC: 0 g/L.

.5 Walkable: Approximately 60 minutes.

.6 Install Underlayment: Minimum 1 hour after second coat, maximum 24 hour.

.7 Container: Ready-to-use, resealable.

2.3 HYDRAULIC CEMENT UNDERLAYMENT

.1 Hydraulic Cement-based Self-Leveling Underlayment:

.1 Basis of Design Materials: ARDEX V 1200 by ARDEX Americas.

.2 Primer: No primer required.

.3 Performance and Physical Properties: Meet or exceed the following values for material cured at 21° C+/-3°C (70° F+/-3°F) and 50% +/-5% relative humidity:

.1 Application: Barrel Mix or Pump.

.2 Flow Time: 10 minutes.

.3 Final Set: Approx. 90 minutes.

.4 Compressive Strength: 4500 psi (315 kg/cm2) at 28 days, ASTM C109M.

.5 Flexural Strength: 1000 psi (70 kg/cm2) at 28 days, ASTM C348.

.6 VOC: 0

.4 Water shall be clean, potable, and sufficiently cool (not warmer than 70°F).

2.4 CRACK AND JOINT REPAIR ACCESSOIRS

.1 Low Viscosity Rigid Polyurethane Crack and Joint Repair:

.1 Basis of Design Materials: ARDEX ARDIFIX by ARDEX Americas.

.2 Semi-Rigid Joint Sealant:

.1 Basis of Design Materials: ARDEX ARDISEAL Rapid Plus Semi-Rigid Joint Sealant by ARDEX Americas.

3 Execution

3.1 EXAMINATION

.1 Prior to preparation of the Work under this Section, examine installed Work executed under other Sections which affect execution of work under this Section.

.2 Moisture Testing Procedures: Perform the following tests to determine if vapour-control flooring treatment is required.

.1 Testing Conditions: Do not conduct moisture testing until final building environmental conditions have been achieved. Maintain temperature between 18.3 to 29.4 deg C (65 to 85 deg F) and relative humidity between 40 to 60 percent for not less than seventy-two (72) hours prior to and throughout duration of testing.

.2 Perform concrete testing to determine conditions at a minimum of three tests for the 1000 sq. ft. and one (1) additional test for each 1000 sq. ft. thereafter for each of the following methods:

.1 Water Vapour Transmission: Not to exceed 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in twenty-four (24) hours per ASTM F1869.

.2 Internal Relative Humidity: Not to exceed 75 percent RH per ASTM F2170.

.3 Digital Alkalinity-pH: Not to exceed 9.0 pH per ASTM F2170.

.4 Provide test results with map of test locations and recommendations to the Consultant prior to installation of finish flooring.

.3 Upon receipt of written approval from Consultant to proceed with Work specified in this Section, examine substrates, areas, and conditions, with installer present, for compliance with requirements and conditions affecting performance of the Work.

.1 Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements.

.2 Inspect for previously applied treatments that may inhibit penetration or performance of vapour control flooring treatment.

.3 Verify that required repairs are complete, cured, and dry before applying treatment.

.4 Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Coordinate work under this Section with Work specified under other Sections to ensure proper and adequate interface of Work.

.2 Protect-adjacent surfaces from drips, spray, damage to walls and base, air pollution of surrounding environment, and other damage from work under this Section.

.3 Surface Preparation:

.1 Investigate and inform the treatment manufacturer if concrete additives such as chlorides, plasticizers, or other soluble compounds that can contaminate surfaces have been used in concrete mix.

.2 Before application of flooring treatment, clean substrate of substances that could impair penetration or performance of product according to flooring treatment manufacturer's written instructions.

.3 Shot-blast floors, using #420 shot, to remove defective materials and foreign matter such as dust, adhesives, leveling compounds, paint marks, dirt, floor hardeners, paint overspray, bond breakers, oil, grease, curing agents, form release agents, efflorescence, laitance, moisture testing adhesives and steel shot.

.4 Repair cracks, expansion joint, control joints, and open surface honeycombs and fill in accordance with manufacturer's recommendations.

.5 Provide an uncontaminated, absorptive, sound surface. Do not acid etch.

.6 Vacuum surfaces clean prior to application. Do not use clean sweeping agents, dust absorbers or chemical agents to clean concrete.

3.3 APPLICATION

.1 Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of flooring treatment and to instruct installer on the product and application method to be used.

.2 Apply in accordance with manufacturer's instructions and recommendations, unless specifically noted otherwise.

.1 Comply with regulatory requirements.

.2 Close areas to traffic during application and for time period after application recommended in writing by manufacturer.

.3 Apply treatment with manufacturer's representative present.

.4 Cure treatment according to manufacturer's written instructions. Prevent contamination during application and curing processes.

.5 Do not install floor coverings over treatment until after time period recommended in writing by vapour-control flooring treatment manufacturer.

3.4 APPLICATION – CRACK AND JOINT TREATMENT

.1 Pre-fill dormant control joints and dormant cracks greater than a hairline 0.8mm (1/32'') with low viscosity rigid polyurethane crack and joint repair.

.2 Once the dormant cracks and dormant control joints have been filled properly, broadcast sand to refusal, and allow these areas to cure thoroughly.

.3 Remove all excess sand prior to proceeding with applying the moisture vapour barrier.

.4 All moving joints and moving cracks must be treated by installing a fully flexible sealing compound designed specifically for use in moving joints, as recommended by the moisture vapour control manufacturer.

3.5 APPLICATION – MOISTURE VAPOR BARRIER

.1 Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

.2 Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.

.3 Mixing: Comply with manufacturer's printed instructions and the following:

.1 Stir the moisture vapor barrier with a wooden paint stirrer or similar prior to use to ensure that all components that have settled are in full suspension.

.4 Application: Comply with manufacturer's printed instructions and the following:

.1 Immediately apply the freshly stirred moisture vapor barrier to the prepared concrete.

.2 Saturate a 10mm (3/8”) nap roller and apply uniformly in a singular direction, and back roll. Once the first coat has dried, repeat this process in a perpendicular direction.

.3 Once an area has been coated completely, allow this to dry to a tack-free film approximately 45 minutes at 21°C (70°F) for the first coat and approximately 60 minutes at 21°C (70°F) for the second coat.

.4 Following the application of the moisture vapor barrier, install the hydraulic cement underlayment.

3.6 APPLICATION – HYDRAULIC CEMENT UNDERLAYMENT

.1 Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

.2 Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.

.3 Mixing: Comply with manufacturer's printed instructions.

.4 For pump installations, mix hydraulic cement underlayment using automatic mixing pumps as recommended by the manufacturer.

.5 When mixing sanded materials, use a vacuum complete with a HEPA dust extraction vacuum system. Additionally, each bag should be handled with care and emptied slowly to avoid creating a plume of dust.

.6 Application: Comply with manufacturer's printed instructions.

.7 Curing:

.1 The hydraulic cement underlayment requires no special curing and is walkable within 2-3 hours after installation.

.2 The dry time required prior to installing finish flooring will vary with the thickness of the hydraulic cement underlayment and the type of flooring being installed.

3.7 FIELD QUALITY CONTROL

.1 Testing and Inspection: Engage a qualified testing and inspection agency to perform the following:

.1 Schedule inspections and notify the Consultant, and other regulatory agencies, if any, of the time at least forty-eight (48) hours prior to the inspection.

.2 Validation Testing:

.1 After application of the treatment, test interior concrete floor surfaces scheduled to receive the vapour-control flooring treatment to establish system performance.

.2 Testing agency to provide validation calcium chloride testing of treated floor areas designated in accordance with ASTM F869 once the specified system has been installed.

.1 At a minimum, test interior slab-on-grade surfaces prior to finish flooring installation and after the spaces to receive finish flooring are brought to an environmental condition matching the designated conditions of use.

.2 Provide test kits at the rate of three kits per 1000 sq. ft. and one additional test kit for each additional 1000 sq. ft. or portion thereof; and for validation testing, provide one test kit placed beside every sixth test kit.

.3 Digital Alkalinity pH Testing: Testing agency shall conduct pH test at each calcium chloride test.

.4 Vapour emission test readings shall satisfy the manufacturer's published requirements of the finish flooring to be installed. Common acceptable criteria require that vapour emissions not exceed 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in twenty-four (24) hours, although various manufacturers' actual requirements may vary.

.5 Once test results are known, copies shall be given to Consultant, Contractor, and Owner.

.2 If the validation test vapour emission and pH readings exceed the requirements of the finish flooring manufacturer, provide remedial materials and labor, at no additional cost to the Owner, to bring vapour emissions and pH within acceptable limits.

3.8 CLEANING AND PROTECTION

.1 Immediately clean vapour-control flooring treatment from adjoining surfaces and surfaces soiled or damaged by flooring treatment application as work progresses. Correct damage to work of other trades caused by flooring treatment application, as approved by Consultant.

.2 Comply with manufacturer's written cleaning instructions.

.3 Provide finish, clean and ready for the application of finish flooring.

.4 Protect each coat during specified cure periods from traffic, topical water, and contaminants.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes, but is not limited to, the following:

.1 Resilient sheet materials:

.1 Homogeneous sheet vinyl flooring

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards

.4 American Society for Testing and Materials (ASTM):

.1 ASTM F1516-13, Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended)

.2 ASTM F1869-11, Standard Test Method for Measuring Moisture Vapour Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

.3 ASTM F1913-04(2010), Standard Specification for Vinyl Sheet Floor Covering Without Backing

.5 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Close spaces to traffic during flooring installation and until time period after installation recommended in writing by manufacturer; install flooring and accessories after other finishing operations, including painting and ceiling construction have been completed.

.2 Pre-Installation Conference:

.1 Conduct conference at Project site in accordance with requirements of Division 01, to verify project requirements, substrate conditions, patterns and layouts, coordination with other Sections affected by work of this Section, manufacturer's installation instructions and manufacturer's warranty requirements.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals:

.1 Product Data: Submit one copy of product data for each type of product specified.

.2 Shop Drawings: Submit shop drawings indicating:

.1 Location of seams and edges

.2 Location of columns, doorways, enclosing partitions, built-in furniture, cabinets, and cut-out locations.

.3 Samples for Selection: Submit manufacturer's colour charts and samples for initial selection consisting of full range of colours and patterns available for each type of product indicated.

.4 Samples for Verification:

.1 Resilient Flooring: Submit samples of each different specified product for verification of colour and pattern in manufacturer's standard size, but not less than 150mm x 150mm (6” x 6”) in size for tile or sheet material.

.3 Informational Submittals: Provide the following submittals during the course of the work:

.1 Site Quality Control Test Results: Submit results or moisture emission testing of concrete subfloors prior to installation of flooring. Results shall include comparison of manufacturer’s recommended moisture content to actual moisture vapour emission rate.

.4 Maintenance Data and Operating Instructions:

.1 Operation and Maintenance Data: Submit manufacturer’s written instructions for maintenance and cleaning procedures, include list of manufacturers recommended cleaning and maintenance products, and name of original installer and contact information in accordance with Division 01.

.5 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for incorporation into the Operation and Maintenance Manual. Keep one copy of WHMIS safety data sheets on site for reference by workers.

.6 Maintenance Materials:

.1 Provide five percent (5%) of each colour and type of resilient flooring specified, boxed and labelled.

.2 Store maintenance materials on the premises as directed by the Owner.

1.5 QUALITY ASSURANCE

.1 Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Resilient Flooring Installer:

.1 Use an installer who is competent in heat welding and have a minimum of five (5) years documented experience in the installation of resilient flooring and seams in accordance with manufacturer’s training or certification program.

1.6 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with Construction Schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Restrict traffic by other trades during installation.

.5 Provide adequate protection of completed tiled surfaces to prevent damage by other trades until final completion of this project. Minimum protection shall consist of kraftpaper.

1.7 ENVIRONMENTAL CONDITIONS

.1 Temperature of room, floor surface and materials shall not be less than 21 deg C for forty-eight (48) hours before, during and for forty-eight (48) hours after installation. Concrete floors shall be aged for a minimum of twenty-eight (28) days and shall be dry before application of the resilient flooring.

.2 Moisture content of floor shall not exceed a maximum of 3 lbs. of water per 1,000 sq. ft. of concrete slab area over a twenty-four (24) hour period as measured by one (1) of the following methods, as approved by Consultant:

.1 Rubber Manufacturer's Association (RMA) moisture test using anhydrous calcium chloride.

.2 Does not exceed 3% as measured by Calcium Carbide Hygrometer procedure.

.3 Does not exceed 5% as measured by normal Protimeter.

.3 Avoid exposure to high humidity, cold drafts and abrupt temperature changes.

1.8 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions but for an extended period of five (5) years and agree to repair or replace faulty materials or work which become evident during warranty period without cost to the Owner.

.2 Defects shall include, but not limited to, bond failure, and extensive colour fading.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design Manufacturers: Manufacturers named in this Section were approved to provide work specified in this Section. Additional manufacturers offering similar products may be incorporated into the work of this Section provided they meet the performance requirements indicated and provided requests for substitution are provided a minimum of five (5) days in advance of Bid Closing.

.2 Approved manufacturers:

.1 Tarkett

.2 Armstrong Flooring

.3 Interface Flor

.4 Altro Floor

2.2 SHEET FLOORING MATERIALS

.1 Unbacked Sheet Vinyl Flooring (VSF-1 & VSF-2): Conforming to ASTM F1913 and the following:

.1 Colour, Pattern, Model and Manufacturer: As indicated in the Finishes Materials Legend on Drawing A3.3.

.2 Total Thickness: Nominal 2 mm (0.080”)

.3 Width: Minimum nominal 2 m (6’-6”)

.4 Length: Manufacturers standard roll length.

2.3 RESILIENT ACCESSORIES

.1 Trowellable Levelling and Patching Compounds: As indicated in Section 03 35 00.

.2 Heat Welding Bead: Solid strand product recommended by flooring manufacturer for heat welding seams, and as follows:

.1 Colour and Pattern: Match colour and pattern of resilient flooring, as approved by the Consultant.

.3 Fillers and Primers:

.1 Types and brands approved, acceptable to flooring material and resilient base manufacturers for the applicable conditions. Use non-shrinking latex compound.

.4 Resilient Flooring Adhesive:

.1 Waterproof, clear setting type and brands as recommended by the tile manufacturer.

3 Execution

3.1 EXAMINATION

.1 Testing and Inspections: Test moisture emission rate of concrete subfloor prior to installing flooring, using the calcium chloride test method in accordance with ASTM F1869.

.2 Examine substrates, areas, and conditions affecting work are in accordance with manufacturer's requirements, and as follows:

.1 Verify that floor surfaces are smooth and flat to plus or minus 3mm over 3m (1/8” over 10’); notify Consultant in writing where floor tolerances are not within acceptable values.

.2 Verify that concrete slabs exhibit normal alkalinity of between 5 and 9 and that they are free of carbonization or dusting deleterious to flooring installation or adhesive bond.

.3 Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits that could interfere with flooring installation.

3.2 PREPARATION

.1 Comply with resilient flooring manufacturer's written installation instructions for preparing substrates indicated to receive flooring.

.2 Fill cracks, holes, and depressions in substrates using trowellable levelling and patching compounds in accordance with manufacturers written instructions, and as indicated in Section 03 35 00.

.3 Remove coatings from concrete substrates, including curing compounds and other substances that are incompatible with flooring adhesives, and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer; do not use solvents.

.4 Broom and vacuum clean substrates immediately before installing resilient flooring.

3.3 INSTALLATION

.1 Comply with resilient flooring manufacturer's written installation instructions.

.2 Unroll flooring and allow stabilizing before cutting and fitting in accordance with manufacturer’s installation instructions.

.3 Apply primer in strict accordance with manufacturer's printed instructions. Permit primer to dry.

.4 Apply adhesive uniformly with an approved notchtooth spreader at the recommended rate. (Mechanical spreader not approved). Do not spread more adhesive than can be covered before initial set takes place. Use waterproof adhesive throughout. Follow manufacturer's instructions.

.5 Layout sheet flooring as follows:

.1 Maintain uniformity of resilient flooring direction.

.2 Arrange for a minimum number of seams, where seams are necessary place them in inconspicuous and low traffic areas, and not less than 150mm (6") away from parallel joints in flooring substrates.

.3 Match edges of flooring for colour shading and pattern at seams in accordance with manufacturer's written recommendations.

.4 Obtain Consultant’s acceptance in writing before installing materials having cross seams; make adjustments to seaming plan as directed by Consultant to minimize or eliminate cross seams.

.5 Weld seams with welding rod where optional with manufacturer in accordance with written instructions for treatment of flooring adjacent to seams:

.1 Route joints of sheet flooring, leaving recommended joint profile for welding rod and permanently weld seams in accordance with ASTM F1516

.6 Install flooring flush with adjoining floor covering surfaces.

.7 Scribe sheet flooring to walls, columns, cabinets, floor outlets and other appurtenances.

.8 Roll sheet flooring in both directions in accordance with manufacturer’s instructions.

.6 Each type of material used shall be from one manufacturer throughout the work and material in each area shall be of same production run.

.7 Remove and replace loose, damaged and defective tiles where required and as directed by Consultant.

3.4 CLEANING AND PROTECTION

.1 Cleaning, sealing and finishing of resilient flooring in accordance with the manufacturer's instructions and recommendations.

.2 Work shall be handed over to the Owner free of blemishes and in perfect condition.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes, but is not limited to, the following:

.1 Resilient accessories:

.1 Resilient Wall Bases

.2 Resilient Accessories for Transition Strips.

1.2 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards

.4 American Society for Testing and Materials (ASTM):

.1 ASTM F1861, Standard Specification for Resilient Wall Base

.2 ASTM F1869, Standard Test Method for Measuring Moisture Vapour Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

.3 ASTM F2169, Standard Specification for Resilient Stair Treads

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Close spaces to traffic during installation and until time period after installation recommended in writing by manufacturer; install accessories after other finishing operations, including painting and ceiling construction have been completed.

.2 Pre-Installation Conference:

.1 Conduct conference at Project site to verify project requirements, substrate conditions, patterns and layouts, coordination with other Sections affected by work of this Section, manufacturer’s installation instructions and manufacturer’s warranty requirements.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals:

.1 Product Data: Submit one copy of product data for each type of product specified.

.2 Shop Drawings: Submit shop drawings indicating:

.1 Location of seams and edges

.2 Location of columns, doorways, enclosing partitions, built-in furniture, cabinets, and cut-out locations

.3 Type and style of resilient transition strip used between adjacent flooring types

.3 Samples for Selection: Submit manufacturer's colour charts and samples for initial selection consisting of full range of colours and patterns available for each type of product indicated.

.4 Samples for Verification:

.1 Submit samples of each different specified product for verification of colour and pattern in manufacturer's standard size, but not less than 150mm (6”) long for resilient accessories.

.3 Maintenance Data and Operating Instructions:

.1 Operation and Maintenance Data: Submit manufacturer’s written instructions for maintenance and cleaning procedures, include list of manufacturers recommended cleaning and maintenance products, and name of original installer and contact information in accordance with Division 01.

.4 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for incorporation into the Operation and Maintenance Manual. Keep one copy of WHMIS safety data sheets on site for reference by workers.

.5 Maintenance Materials:

.1 Provide 9144mm (30') lineal feet coil stock of each colour of resilient base specified, boxed and labelled.

.2 Store maintenance materials on the premises as directed by the Owner.

1.5 QUALITY ASSURANCE

.1 Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

1.6 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with Construction Schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Restrict traffic by other trades during installation.

1.7 ENVIRONMENTAL CONDITIONS

.1 Temperature of room, floor surface and materials shall not be less than 21 deg C for forty-eight (48) hours before, during and for forty-eight (48) hours after installation. Concrete floors shall be aged for a minimum of twenty-eight (28) days and shall be dry before application of the resilient accessories.

.2 Avoid exposure to high humidity, cold drafts and abrupt temperature changes.

1.8 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions but for an extended period of five (5) years and agree to repair or replace faulty materials or work which become evident during warranty period without cost to the Owner.

.2 Defects shall include, but not limited to, bond failure, and extensive colour fading.

2 Products

2.1 RESILIENT ACCESSORIES

.1 Resilient Wall Base (BASE-1 & BASE-2): Smooth, buffed exposed face and ribbed or grooved bonding surface supplied in maximum practical length, with pre-moulded end stops and external corners to match base, conforming to ASTM F1861 and as follows:

.1 Type: TV – Thermoplastic Vinyl.

.2 Group: 1 – Homogeneous/Solid.

.3 Style: Coved with toe.

.4 Height: 100mm (4”)

.5 Thickness: 3mm (1/8”)

.6 Length: Manufacturers standard maximum length.

.7 Colour, Model and Manufacturer: As indicated in the Finishes Materials Legend on Drawing A3.3.

.2 Resilient Transition and Edge Strips (TS):

.1 Extruded vinyl shapes meeting or exceeding ADA Recommendations for change of level transitions for transition between floors finishes having different levels.

.2 Transition Strip (TS1): Resilient Flooring to Concrete Slab Transition.

.1 Basis of Design Material: Transition Strip Model SSR-XX-B by Tarkett.

.2 Colour: As indicated in the Finishes Materials Legend on Drawing A3.3.

.3 Fillers and Primers:

.1 Types and brands approved, acceptable to flooring material and resilient base manufacturers for the applicable conditions. Use non-shrinking latex compound.

3 Execution

3.1 EXAMINATION

.1 Examine substrates, areas, and conditions affecting work are in accordance with manufacturer's requirements, and as follows:

.1 Verify that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that could interfere with base and accessories installation.

3.2 PREPARATION

.1 Comply with manufacturer's written installation instructions for preparing substrates indicated to receive wall base.

.2 Broom and vacuum clean substrates immediately before installing materials indicated in this Section.

3.3 INSTALLATION

.1 Comply with manufacturer's written installation instructions.

.2 Layout resilient base as follows:

.1 Fit joints tight and vertical.

.2 Joints along one plane shall be at minimum 6096mm (20’) spacing, at inconspicuous locations.

.3 Mitre internal corners, use pre-moulded sections for external corners and exposed ends.

.4 Install base on solid backing. Adhere tightly to wall and floor surfaces.

.5 Scribe and fit to door frames and other obstructions.

.6 Install outside corners prior to installation of straight sections.

.7 Install straight and level to variation of plus or minus 3mm over 3m (1/8" over 10') straight edge.

.8 Do not stretch base during installation.

.9 Shave back of base where necessary to produce snug fit to substrate.

.3 Layout resilient accessories as follows:

.1 Install edge strips at unprotected and exposed edges where flooring terminates.

.4 Each type of material used shall be from one manufacturer throughout the work and material in each area shall be of same production run.

.5 Remove and replace loose, damaged and defective materials where required and as directed by Consultant.

3.4 CLEANING AND PROTECTION

.1 Cleaning and finishing of resilient base shall be performed in accordance with the manufacturer's instructions and recommendations.

.2 Work shall be handed over to the Owner free of blemishes.

END OF SECTION

1 General

1.1 SUMMARY

.1 The Work of this Section includes, but is not limited to the following:

.1 Provide labour, materials, tools and other equipment, services and supervision required to complete new painting work.

.2 Provide surface preparation of substrates as required for acceptance of painting, including cleaning, small crack repair, patching, caulking, to making good surfaces and areas prior to painting.

.3 Provide labour, materials, tools and other equipment, services and supervision required to complete all exterior and interior repainting work to the full extent of the design intent indicated on the Drawings and Specifications.

.1 Work under this Contract shall also include, but not necessarily be limited to:

.1 High pressure washing and abrasive blasting in accordance with the requirements of Section.

.2 Moisture testing of substrates.

.3 Surface preparation of substrates as required for acceptance of paint, including cleaning, small crack repair, patching, caulking, and making good surfaces and areas to the limits defined under MPI Repainting Manual Preparation requirements.

.4 Specific pre-treatments noted herein or specified in the MPI Repainting Manual.

.5 Sealing / priming surfaces for repainting in accordance with MPI Repainting Manual requirements.

1.2 RELATED REQUIREMENTS

.1 Other sections of the specification requiring painting refer to this section. Coordinate requirements of referencing sections.

1.3 REFERENCE STANDARDS

.1 The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

.2 All reference amendments adopted prior to the bid closing date of this Project shall be applicable to this Project.

.3 All materials, installation and workmanship shall comply with all applicable requirements and standards.

.4 Applicable Standards:

.1 Environmental Choice Paints and Surface Coatings, Low VOC Product Listings Program (ECP):

.1 Paints and Surface Coatings, Low VOC Product Listings

.2 The Master Painters Institute (MPI):

.1 New Surfaces: Architectural Painting Specification Manual.

.2 Existing Surfaces: Maintenance Painting Specification Manual.

.3 The Society for Protective Coatings (SSPC):

.1 Coating Materials Guidelines

.2 Surface Preparation Guidelines

.3 Application, Inspection and Quality Control Guidelines

1.4 DEFINITIONS

.1 Gloss Levels: Standard coating terms defined by MPI Manual apply to products of this Section as follows, unless otherwise indicated on the Drawings:

.1 G1: Matte of Flat: Lustreless or matte finish with a gloss range below 10 when measured at 85° to meter and 0 to 5 when measured at 60°.

.2 G2: Velvet: Matte to low sheen finish with a gloss range of 10 to 35 when measured at 85° to meter and 0 to 10 when measured at 60°.

.3 G3: Eggshell: Low sheen finish with a gloss range of 10 to 35 when measured at 85° to meter and 10 to 25 when measured at 60°.

.4 G4: Satin: Low to medium sheen with a gloss range of minimum 35 when measured at 85° to meter and 20 to 35 when measured at 60°.

.5 G5: Semi-Gloss: Medium sheen finish with a gloss range of 35 to 70 when measured at 60° to meter.

.6 G6: Gloss: High sheen finish with a gloss range of 70 to 85 when measured at 60° to meter.

.7 G7: High Gloss: Reflective sheen having a gloss range in excess of 85 when measured at 60° to meter.

.2 Gloss Values: Generally, provide paints and coatings having the following sheens when installed on the following substrates:

.1 Walls: Eggshell (G3).

.2 Trim and Doors: Satin (G4).

.3 Ceilings: Flat (G1).

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by all relevant personal before commencement of work for this Section.

.2 Agenda for meeting will include; but not be limited to, the following:

.1 Sequencing of work and preparation requirements for surfaces scheduled to receive work of this Section.

1.6 SUBMITTALS

.1 Provide required information in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit list of all painting materials used for the Work to the Consultant for review prior to ordering materials for each paint system indicated, including block fillers and primers.

.1 Material List: An inclusive list of required coating materials indicating each material and cross reference specific coating, finish system, and application; identify each material by manufacturer's catalogue number and general classification.

.2 Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

.2 Samples: Provide stepped samples, defining each separate coat, including block fillers and primers using representative colours required for the project; label each sample for location and application, and as follows:

.1 Drawdown Samples: Provide three (3) drawdown sample charts (cards) for each type, texture and colour of finish specified for verification purposes before ordering paint materials.

.3 Informational Submittals: Provide the following submittals when requested by the Consultant:

.1 Certification: Submit certification reports for paint products indicating that they meet or exceed low VOC and coloured base requirements listed in this Section.

1.7 PROJECT CLOSEOUT SUBMISSIONS

.1 Operation and Maintenance Data:

.1 Submit copies of paint manufacturer's written maintenance information for inclusion in the operations manual in accordance with Division 01, including specific warning of any maintenance practice or materials that may damage or disfigure the finished Work.

.2 Maintenance Materials:

.1 Deliver maintenance materials to Owner in quantities indicated and in accordance with Division 01, that match products installed; packaged with protective covering for storage, and identified with labels describing contents and building location and as follows:

.1 Paints and Coatings: Minimum of 4-4L containers of field colours and 4-1 L containers of each accent colour, and all remnants.

1.8 QUALITY ASSURANCE

.1 Conform to the standards contained in the MPI Manual.

.2 Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in service performance, and as follows:

.1 Have a minimum of five (5) years proven satisfactory experience and shall show proof before commencement of work that he will maintain a qualified crew of painters throughout the duration of the work.

.2 When requested provide a list of the last three comparable jobs including, name and location, specifying authority, start and completion dates and cost amount of the painting work.

.3 Apprentices may be employed provided they work under the direct supervision of a qualified journeyman in accordance with trade regulations.

.3 Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats and as follows:

.1 Use only paint manufacturers and products as listed under the Approved Products section of the MPI Manual Architectural Painting Specification Manual.

1.9 DELIVERY, STORAGE, AND HANDLING

.1 Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 7 deg C (45 deg F).

.1 Maintain containers in clean condition, free of foreign materials and residue.

.2 Remove rags and waste from storage areas daily.

1.10 ENVIRONMENTAL REQUIREMENTS

.1 Conform to MPI Manual and manufacturers requirements.

.2 Perform no painting or decorating work when the ambient air and substrate temperatures, relative humidity and dew point and substrate moisture content is below or above requirements for both interior and exterior work.

.3 Apply paint only to dry, clean, properly cured and adequately prepared surfaces in areas where dust is no longer generated by construction activities such that airborne particles will not affect the quality of finished surfaces.

.4 Ensure adequate continuous ventilation and sufficient heating and lighting is in place.

.5 Paint, stain and wood preservative finishes and related materials (thinners, solvents, caulking, empty paint cans, cleaning rags, etc.) shall be regarded as hazardous products. Recycle and dispose of same subject to regulations of applicable authorities having jurisdiction.

.6 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground retain cleaning water and filter out and properly dispose of sediments.

.7 Set aside and protect surplus and uncontaminated finish materials not required by the Owner and deliver or arrange collection for verifiable re-use or re-manufacturing.

1.11 SCHEDULING

.1 Schedule repainting operations to prevent disruption of and by other trades when applicable.

.2 Schedule repainting operations to prevent disruption of Owner's operations or building occupants. Obtain written authorization from Consultant / Owner for changes in work schedule.

1.12 WARRANTY

.1 Provide upon completion of the work, a Warranty Certificate, in the name of the Owner, stating that the work of this section was performed in accordance with these specifications and the MPI manual (latest edition), and is warranted against defects in material or installation, for a period of two (2) years from Date of Substantial Performance.

2 Products

2.1 MANUFACTURERS

.1 Subject to compliance with requirements, manufacturers that have attained the prerequisites for ecologically sustainable labelling mark on their products and may be incorporated into the Work include; but are not limited to, the following:

.1 Dulux Paints (PPG)

.2 Benjamin Moore and Co. Limited

.3 Sherwin-Williams LLC

2.2 PAINT, GENERAL

.1 MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists".

.2 Material Compatibility:

.1 Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

.2 For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

.3 VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

.1 Flat Paints and Coatings: 50 g/L.

.2 Nonflat Paints and Coatings: 50 g/L.

.3 Dry-Fog Coatings: 150 g/L.

.4 Primers, Sealers, and Undercoaters: 100 g/L.

2.3 EPOXY PAINT AND SCHEDULE

.1 Latex Primer:

.1 For use on gypsum board surfaces; interior latex primer.

.2 Topcoat - Pre-Catalyzed Waterborne Epoxy Paint:

.1 Low VOC, durable to allow scrubbing once cured with a high abrasion resistance.

.2 Resists water and common cleaning chemicals, and adheres to existing surfaces including existing paint, drywall, primed masonry and primed metal.

.3 Basis of Design Materials:

.1 Corotech High Performance Pre-Catalyzed Waterborne Epoxy by Benjamin Moore.

.2 Pro Industrial Pre-Catalyzed Waterbased Epoxy by Sherwin Williams.

.3 Pitt-Glaze Wb1 High-Performance Pre-Catalyzed Waterborne Epoxy by Dulux (PPG).

.3 Paint Schedule:

.1 (PT-1) General Wall and Ceiling Colour: As indicated in the Finish Material Legend on Drawing A3.3.

.2 (PT-2) Doors and Trim Paint: As indicated in the Finish Material Legend on Drawing A3.3.

3 Execution

3.1 EXAMINATION

.1 Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

.2 Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

.1 Concrete: 12 percent.

.2 Fiber-Cement Board: 12 percent.

.3 Masonry (Clay and Concrete Masonry Units): 12 percent.

.4 Wood: 15 percent.

.5 Portland Cement Plaster: 12 percent.

.6 Gypsum Board: 12 percent.

.3 Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

.4 Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

.5 Proceed with coating application only after unsatisfactory conditions have been corrected.

.1 Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Comply with manufacturer's written instructions and recommendations in "MPI Painting Specification Manual" applicable to substrates and paint systems indicated.

.2 Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

.1 After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

.3 Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

.1 Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

.4 Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

.1 Use abrasive blast-cleaning methods if recommended by paint manufacturer.

.5 CMU / Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

.6 Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:

.1 Hand tool cleaning (SSPC-SP 2) or power tool cleaning (SSPC-SP 3).

.7 Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

.8 Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

.9 Gypsum Wallboard: Repair all surfaces in gypsum wallboard with wallboard joint finishing compound or spackling compound, filled out flush and sanded smooth. Clean all surfaces and taped joints of dust, dirt and other contaminants and be sure they are thoroughly dry before applying paint.

.10 Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

.11 Mix and prepare paint materials according to manufacturer's written instructions.

.1 Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

.2 Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

.3 Use only thinners approved by paint manufacturer and only within recommended limits.

3.3 APPLICATION

.1 Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

.1 Use applicators and techniques suited for paint and substrate indicated.

.2 Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.

.3 Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

.4 Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

.5 Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

.2 Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match colour of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

.3 Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

.1 The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

.1 Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

.2 Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

.3 If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

.2 Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

.4 Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

.1 Spray Equipment (Preferred Method): Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

.1 Tip range between .015 and .019. Total fluid output pressure at tip should not be less than 2400 psi.

.2 Recommended Tip: Fluid Tip E.

.2 Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.

.3 Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.

.5 Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and colour breaks.

.6 Apply block fillers to CMU at a rate to ensure complete coverage with pores filled.

.7 Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

.1 Paint the following work where exposed in equipment rooms and where exposed in occupied spaces:

.1 Equipment, including panelboards.

.2 Uninsulated metal piping.

.3 Uninsulated plastic piping.

.4 Pipe hangers and supports.

.5 Metal conduit.

.6 Plastic conduit.

.7 Tanks that do not have factory-applied final finishes.

.8 Other items as directed by Consultant.

.8 Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

.1 Colour: Flat (gloss level 1), nonspecular, black.

3.4 FIELD QUALITY CONTROL

.1 Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

.1 Contractor shall touch up and restore painted surfaces damaged by testing.

.2 If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

.1 At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

.2 After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

.3 Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Consultant, and leave in an undamaged condition.

.4 At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply and installation of solid surface countertops on top of millwork, ready to accept under mount sinks indicated on Drawings.

1.2 DEFINITION

.1 Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.3 SUBMITTALS

.1 Provide product information in accordance with Division 01.

.2 Action Submittals: Provide the following samples before starting any work:

.1 Product Data: Indicate product description, fabrication information, and compliance with specified performance requirements.

.2 Shop Drawings: Submit shop drawings indicating dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.

.3 Samples for Initial Selection: Submit minimum 100 mm x 100 mm samples. Indicate full colour and pattern variation.

.4 Samples for Verification: Submit minimum 305 mm x 305 mm sample for each type, texture, pattern and colour of solid polymer.

.5 Maintenance Data: Submit manufacturer’s care and maintenance data, including care, repair and cleaning instructions. Include in Project closeout documents.

.3 Informational Submittals: Provide the following submittals during the course of the work:

.1 Coordination Drawings: Submit coordination drawings indicating layout of plumbing and electrical work, steel reinforcing, recessed and built-in items and wall blocking information.

.2 Fire-Test-Response Characteristics: Provide original fire test reports to ensure compliance with the following requirements:

.1 Rate of Burning: ASTM D635Class: CC1 for a nominal thickness of 1.5 mm (0.060 in.)

.2 Self-Ignition Temperature: ASTM D1929: greater than 650 deg F

.3 Density of Smoke: ASTM D2843: Less than 75%

.3 Impact Resistance: Provide Solid Polymer Fabrications that comply with the following requirements:

.1 Impact Strength, Un-notched (23°), ASTM D4812: No breakage.

.2 Impact Strength, Notched (23°), ASTM D526: 88J/m (1/16)

.4 Allowable Tolerances: Maximum deflection: 2 mm over 305 mm.

.4 Project Closeout Submissions:

.1 Operation and Maintenance Data: Submit manufacturer’s care and maintenance data, including repair and cleaning instructions in accordance with Division 01.

1.4 QUALITY ASSURANCE

.1 Qualifications: Provide proof of qualifications when requested by Consultant:

.1 Fabricator: Use a fabricator having a minimum of three (3) years experience in fabrication and installation of solid surface materials and have training and certification from the manufacturer for work of similar scope and complexity as that required for the project.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.1 Deliver components to project when areas are ready for installation.

.2 Storage and Handling Requirements:

.1 Store components indoors in heated conditions similar to the area of installation until ready for installation; handle materials to prevent damage to finished surfaces; provide protective coverings to prevent physical damage or staining following installation until just prior to Substantial Performance for the Project.

1.6 SITE CONDITIONS

.1 Environmental Limitations:

.1 Do not install Solid Polymer Fabrications until spaces are enclosed and weatherproof, and ambient temperatures and humidity conditions are maintained at the levels recommended by manufacturer.

1.7 WARRANTY

.1 Manufacturer Warranty:

.1 Provide manufacturer's standard 10 year warranty against defects in materials and workmanship; including material and labour to repair or replace defective materials.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design products are named in this Section; additional manufacturers offering similar setting systems may be incorporated into the work provided they meet the performance and aesthetic requirements established by the named products.

.2 Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

.1 Dupont

.2 Formica

.3 Hanex

2.2 MATERIALS

.1 Solid Surfacing Sheet (SURF-1): Cast, nonporous, filled polymer, with through body colour meeting requirements of NEMA LD 3, and having the following nominal properties:

.1 Thickness: ½” (13 mm), unless otherwise indicated on the Drawings.

.2 Surface Burning Characteristics: in accordance with CAN/ULC S102 and as follows:

.1 Flame Spread: Maximum 25

.2 Smoke Developed: Maximum 450

.3 Pattern and Colour: As selected by the Consultant from the manufacturer's standard product line.

2.3 ACCESSORIES

.1 Joint Adhesive:

.1 Manufacturers recommended adhesive designed to create chemically bonded, inconspicuous, nonporous joints.

.2 Sealant:

.1 Mildew resistant, silicone sealant, as specified in Section 07 92 00.

.2 Colour: As selected by the Consultant from the manufacturer's standard product line.

.3 Sink Mounting Hardware:

.1 Manufacturers recommended clips, inserts and fasteners for attachment of under mount sinks.

2.4 FABRICATION

.1 Fabricate units to maximum size capable of being safely transported and handled to place of final installation in accordance with shop drawing and manufacturers written instructions using a fabricator certified by the manufacturer.

.2 Fabricate and machine shapes to profiles indicated on Drawings; obtain all dimensions affecting fabrication and installation from job site before starting fabrication.

.3 Cut, drill and shape fabrications as required to receive plumbing fittings and services, and built-in accessories, provide edge treatments, back splashes, and other details as indicated on Drawings.

.4 Finish edges and surfaces true, level and even with inconspicuous joints between having no voids formed using manufacture's standard joint adhesive and reinforcing strips.

.5 Make cut outs with 3 mm radius corners to prevent stress cracking.

.6 Fabrication assemblies with tolerances as follows:

.1 Variation in component size: $\pm$ 3 mm.

.2 Location of openings: $\pm$ 3 mm from indicated location.

.7 Match numbered components assembled on site; number items to show proper location on site; number on back using material that will not show or telegraph through finished assemblies.

.8 Provide anchorage to receive Work of other Sections scheduled and detailed to be installed.

2.5 MISCELLANEOUS MATERIALS

.1 Cleaner:

.1 Type recommended by manufacturer.

.2 Fasteners:

.1 Use stainless steel fasteners designed specifically for plastics.

.2 Self-threading screws are acceptable for permanent installations.

.3 Provide threaded metal inserts for applications requiring frequent disassembly such as light fixtures.

.4 Use threaded rods and bolts to suit application.

3 Execution

3.1 EXAMINATION

.1 Examine substrates, areas, and conditions where installations of solid surface materials occur, with Installer present, for compliance with manufacturer’s requirements.

.2 Verify that substrates and conditions are satisfactory for installation and comply with requirements specified.

3.2 INSTALLATION

.1 Install components plumb and level, in accordance with shop drawings and manufacturers written installation requirements.

.2 Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.

.3 Adhere under mount sinks to countertops using manufacturer's recommended adhesive and mounting hardware.

.4 Install backsplashes and end splashes as indicated on Drawings; adhere to countertops using manufacturer's standard colour matched silicone sealant.

.5 Coordinate plumbing connections and electrical requirements with affected Sections of work.

3.3 CLEANING AND PROTECTION

.1 Keep components and hands clean during installation; remove adhesives, sealants and other stains as work progresses; keep components clean until Substantial Performance for the Project.

.2 Repair or replace damaged work that cannot be repaired to match installed work at no additional cost to the Owner.

END OF SECTION

1 General

1.1 SUMMARY

.1 Provide all labour, materials, equipment and services to supply and install the dual telescopic hydraulic elevator required and/or indicated on the drawings and as specified herein.

.1 Where works, devices or part of the equipment in the contract documents occur in the singular number, they shall be taken as plural where applicable in accordance with the quantities required to satisfy the requirements of the contract.

.2 Before commencing work the elevator contractor shall prepare all necessary drawings to show general arrangement of the elevator equipment. These drawings must be approved before installation of the elevator.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1 A properly framed and enclosed legal hoistway, including venting as required by the governing code or authority.

.2 Suitable machine room with legal access and ventilation, with concrete floor. Temperature in machine room to be maintained between 12 deg C and 32 deg C (55 deg F and 90 deg F). Ventilation to suit elevator heat release requirements.

.3 Adequate rail bracket supports, bracket spacing as required by governing code. Separator beams where required.

.4 Dry pit reinforced to sustain normal vertical forces from rails and impact loads from buffer and cylinder. Pit floor to be level and free of debris.

.5 Adequate support for sill angle across full width of hoistway at each landing. Vertical surfaces of entrance sill supports to be plumb, one above the other, and square with the hoistway. Finish floor and grout, if required, between door frames to sill line.

.6 Hoist beam to be provided.

.7 Hoistway walls are to be designed and constructed in accordance with the required fire rating including where penetrated by elevator fixture boxes and to include adequate fastening to hoistway entrance assemblies.

.8 Entrance walls and finished floors are not to be constructed until after door frames and sills are in place. If front walls are poured concrete bearing walls, rough openings are to be provided to accept entrance frames and filled in after frames are set. Consult elevator contractor for rough opening size. When drywall construction is used, the General Contractor shall supply the drywall framing so that the wall fire resistance rating is maintained.

.9 Any cutting, including cut-outs to accommodate hall signal fixtures, patching, and painting of walls, floors, or partitions together with finish painting of entrance doors and frames.

.10 A fused disconnect switch or circuit breaker for elevator per the Canadian Electrical Code with feeder or branch wiring to controller. Size to suit elevator requirements, and fused disconnect for auto safe.

.11 A 120 volt, A.C., 20 amp, single phase power supply with fused SPST disconnect switch for elevator, with feeder wiring to each controller for car lights and fans, including main line switch.

.12 Clear access above ceiling, for oil line and wiring duct from machine room, if machine room is remote from elevator hoistway.

.13 Suitable light and convenience outlets in machine room with light switches located within 18" of lock jamb side of machine room door. Machine room receptacles shall be GFI type.

.14 Convenience outlet and light fixture in pit with switch located adjacent to the access door. Pit receptacles shall be GFI type.

.15 Others to provide telephone line into elevator machine room for hook-up by this Section to hands-free telephone unit provided by this Section and mounted in car operating panel.

.16 Guarding and protecting the hoistway during construction. The protection of the hoistway shall include solid panels surrounding each hoistway opening at each floor, a minimum of 4'-0" high. Hoistway guards to be erected, maintained and removed by others.

.17 All electric power for light, tools, hoists, during erection as well as electric current for starting, testing and adjusting the elevator.

.18 Cutout through machine room wall, 8” x 16”, for oil line and wiring duct. Coordinate with elevator contractor at the building site.

.19 All conduit and wire runs remote from either the machine room or the hoistways.

.20 Steel pit ladder – Refer to Architectural Drawings for details.

.21 Cementitious waterproofing in pits.

.22 Heat, smoke or products of combustion sensing devices connected to elevator machine room terminals when such devices are required. Make contacts on the sensors should be sided for 120 volt D.C.

.23 Finish flooring of elevator car enclosure - – Refer to Architectural Drawings for details.

.24 Where drywall construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.

.25 Door frames are to be anchored to walls and properly grouted in place to maintain legal fire rating (masonry construction).

.26 The interface of the elevator wall with hoistway entrance assembly shall be in strict compliance with the elevator contractor's requirements.

.27 Filling and grouting around entrances by General Contractor, as required.

.28 When fixtures are mounted in drywall, wall thickness may increase. The General Contractor must coordinate requirements with the elevator contractor.

1.3 PERMITS AND INSPECTIONS

.1 Obtain and pay for necessary municipal or provincial inspections and permits and make such tests as are called for by the regulations of such and any other authorities.

.2 Owner shall pay for all associated licensing fees for the elevators as required.

1.4 CODES AND STANDARDS

.1 This work shall be done in accordance with the requirements of the Canadian Electrical Code latest edition, CAN/CSA-B44, Safety Code For Elevators, latest edition, and any local codes which may govern the requirements of the installation as now in force or understood.

1.5 SUBMITTALS

.1 Shop Drawings:

.1 Submit shop drawings showing the layout of the elevator machine rooms, pits and hoistways including all significant dimensions, the locations and magnitude of all loads imposed on the structure, electrical requirements, all finishes and the finished appearance of the elevator car, hall buttons, lanterns, car position indicators and the hoistway doors and frames and all construction details.

.2 Submit descriptive brochures or detail drawings of landing buttons, main lobby panel, hall fixtures, car position indicators, car operator panels and cab interior design to the Consultant for approval.

.3 Submit shop drawings in ample time so as not to delay preparation of walls, pits, and installation of inserts and anchors required.

.4 Submit shop drawings for approval by municipal or provincial authorities having jurisdiction.

.2 Samples:

.1 Submit samples of finishes as requested by Consultant.

.3 Maintenance Data:

.1 Upon completion of work of this Section, provide the Owner with 2 copies of wiring diagrams for elevator and maintenance and operating manuals, for incorporation into the Operation and Maintenance Manual, and Renewal Parts Catalogues.

1.6 WARRANTY

.1 Warrant that the materials and workmanship of the apparatus installed under these specifications are first-class in every respect. Make good any defects, not due to improper use or care, which may develop within two (2) years from date of Substantial Completion of the Work.

1.7 MAINTENANCE – TWO YEARS

.1 Provide full maintenance and call-back service on the entire elevator equipment described herein for a period of two years from the date of Substantial Completion of the Work. This maintenance shall include systematic examination, adjustment and lubrication of elevator equipment. Repair or replace electrical and mechanical parts of the equipment whenever this is required. (USE ONLY GENUINE STANDARD PARTS SUPPLIED BY THE MANUFACTURER OF THE EQUIPMENT) concerned. Renewals or repairs necessitated by reason of negligence of misuse of the equipment shall not be the responsibility of the elevator sub-contractor.

.2 All work under this maintenance provision shall be performed by competent personnel under the supervision and in the direct employ of the elevator sub-contractor.

.3 All work, including emergency call back service, shall be done 7 days a week, 24 hours daily. Call-backs during normal working hours shall be included as part of the maintenance service, except for calls resulting from vandalism, abuse or other reasons beyond the normal control of the maintenance provider. Call-backs outside of normal hours involving the release of trapped passengers shall be included as part of the maintenance service, without additional premiums to the Owner.

.4 Employ competent personnel to handle this service, maintain locally an adequate stock of parts for replacement or emergency purposes and have qualified men available at such places to insure the fulfilment of this service without unreasonable loss of time in reaching the job site.

.5 This maintenance service shall be performed solely by the elevator subcontractor and shall not be assigned or transferred to any agent or subcontractor.

.6 The Owner will provide ongoing maintenance with an approved vendor through separate Contract, following the conclusion of the two (2) year maintenance period included in this Contract.

.7 The maintenance Contract, included in this Contract, shall include the following clauses in addition to the regular maintenance clauses:

.1 If unsafe conditions persist (as judged by an inspector from the Ministry of Consumer and Commercial Relations, Elevating Devices Branch) after adequate notice has been given to the Owner to correct the problem and sufficient time has been allowed for the problem to be solved and if the submitted invoices are not paid with a 60-day period after submission, the Elevator Contractor shall make good all deficiencies as per the Contract Agreement.

.2 In addition, the Owner may cancel the contract at any time with 90 days written notice to the elevator contractor, if, and only if, a professionally qualified 3rd party, satisfactory to both parties, judges the maintenance performed on any unit as unsatisfactory and adequate written notice is given to the elevator contractor to correct the problem, and if the elevator contractor fails to satisfy the minimum service coverage required by the contract as judged by a qualified 3rd party satisfactory to both parties.

.3 Safety devices and governors shall be periodically examined.

.4 The elevator sub-contractor shall be responsible for the changes of cables, as found necessary; based on inspection standards of CEMA.

.5 Relays, resistors, solid state cards, condensers, transformer, contacts, leads, dashpots on controllers, and selectors shall be kept in good operating condition.

.6 Machine room equipment shall be kept clean and well painted. The pit, hoistway, tops and bottoms of cabs shall be kept in a clean condition.

.7 Should it become necessary to work on elevators with hall doors open, proper safety barricades shall be erected by the Elevator Contractor to protect people from all hazards.

.8 If for any reason (such as a strike), it is mutually agreed to reduce the level of maintenance, the monthly amount of the contract shall be reduced to reflect the reduction in maintenance service.

.9 Should the Owner request that the elevator contractor perform any work on the equipment of this contract, but not included in the terms of this contract, then such work shall be based on the rates included in the contract for time and material as modified by the defined price index contained in the contract.

.10 All work on the elevators shall be registered in the owner's log book and shall include the time of arrival, nature of work or problem, and the action taken.

.11 A scheduled preventative maintenance program shall be set up and followed by the maintenance contractor. The program shall be designed to minimize elevator shut-downs.

2 Products

2.1 APPROVED SYSTEMS AND MANUFACTURERS

.1 Basis of Design Materials: Hydraulic – Dual Telescopic Elevator by Delta Elevator Co Ltd.

2.2 DESCRIPTION OF SYSTEM

.1 Furnish and install one hydraulic, dual telescopic passenger elevator as indicated on drawings and as specified herein:

.1 Common Features:

.1 Class of Loading: A

.2 Drive Configuration: Dual Telescopic.

.3 Drive Type: Hydraulic.

.4 Elevator Type: Passenger.

.5 Front Entrances: 2

.6 Rear Entrances: 0

.7 Total Entrances: 2

.8 Group Operation: Simplex.

.9 Rated Capacity: 1365 kg

.10 Up Speed: 0.63 m/s

.2 Cab Features

.1 Cab Height: 2438 mm

.2 Cab Height: Clear Inside 2286 mm

.3 Car Lighting: LED Pot Lights for Stainless.

.4 Inside Depth: 1406 mm

.5 Inside Width: 2032 mm

.6 Bumper Rail: None

.7 Button Type: US91

.8 Cab Flooring: As indicated on the Drawings.

.9 Cab Pads: Yes.

.10 Car Front Door Finish: Stainless Steel.

.11 Ceiling Finish: Stainless Steel Panel.

.12 Front and Rear Finish: Stainless Steel.

.13 Handrail Style: Flat 2-1/2" x 1/4"

.14 Reveals: Stainless Steel.

.15 Wall Finish: Raised Plastic Laminate Panel.

.16 Button Colour: Blue.

.3 Control System Features:

.1 Battery Lowering: Yes

.2 Emergency Power: No

.3 Operation: No

.4 Onboard Diagnostics: Yes

.4 Entrances Features:

.1 Entrance Height: 2134 mm

.2 Entrance Width: 1067 mm

.3 Front Wall Thickness: 440mm – Refer to Drawings.

.4 Door Type: Single Speed Side Opening.

.5 Fixtures Features:

.1 Bilingual Markings: No

.2 Camera Provision: Yes

.3 Car Position Indicator: 2

.4 Car Station Quantity: 1

.5 Hall Position Indicator: 1

.6 Hoistway Features (Based on Non-Seismic Requirements):

.1 Hoistway Construction: Concrete Block.

.2 Hoistway Depth: 2142 mm

.3 Hoistway Width: 2640 mm

.4 Pit Depth: 1829 mm

.5 Travel: Refer to Drawings.

.6 Total number of Floors: 2

.7 Machine Room Features:

.1 Motor Voltage: 208 VAC

.2 Building Supply Voltage: 208 VAC

.3 Machine Room: Remote.

2.3 INDEPENDENT SERVICE

.1 Provide independent service by means of key operated switch in car operating panel to allow removal of the car from service and to operate independently in response to car calls only and as follows;

.1 Open doors automatically upon arrival.

.2 Render door protective devices inoperative.

.3 Render hall signals inoperative.

2.4 GENERAL

.1 In all cases where a device or part of equipment is referred to in singular number, it is intended that such reference shall apply to as many devices or parts as are required to complete the installation.

2.5 CYLINDER AND PLUNGER (JACK UNIT)

.1 A holeless dual jack system that utilizes two (2) mechanically synchronized jacks shall be provided. The jacks are located at each side of the car and connected to the elevator structure.

.2 Cylinder shall be constructed of steel pipe of sufficient thickness suitable for a working pressure of 2758 KPa. Cylinders of multiple section construction shall be thoroughly and substantially connected by means of external couplings.

.3 Bottom of the cylinder shall have a safety bulkhead and a dished seamless head, concave to pressure. Safety bulkhead shall contain a small orifice to limit the flow of hydraulic fluid in case of failure of the dished head. Top of the cylinder shall be equipped with a cylinder head with drip ring to collect any oil seepage as well as an internal guide ring and self-adjusting packing.

.4 Plunger shall be constructed of selected steel tubing of proper diameter machined true and smooth with a fine polished finish. Plunger shall be provided with a stop electrically welded to the bottom to prevent the plunger from leaving the cylinder. Plunger will be secured to the car frame by means of a suitable platen connection.

.5 Plunger and cylinder shall be installed plumb and must operate freely with minimum friction.

2.6 LEVELLING DEVICE

.1 Elevators shall be provided with an automatic levelling device which will bring the car to a stop within 1/4" of the landing level regardless of load or direction of travel. Landing level will be maintained within the levelling zone irrespective of the hoistway doors being open or closed.

2.7 CAR STALL PROTECTIVE CIRCUIT

.1 A protective circuit shall be provided which will stop the motor and the pump and return the car to its lowest landing in the event the car does not reach its designated landing within a predetermined time interval. This circuit will permit a normal exit from the car but prevent further operation of the elevator until the trouble has been corrected.

2.8 CYLINDER PROTECTION

.1 Inside of the cylinder shall be treated with rust preventative prior to shipment.

2.9 PUMPING UNIT

.1 Pumping unit shall be of integral design and shall include an electric motor connected to a pump, a hydraulic control system, storage tank, necessary piping connections, and a controller, all compactly designed as a self-contained unit.

2.10 PUMP

.1 Pump shall be a positive displacement screw type to give smooth operation and shall be especially designed and manufactured for elevator service.

2.11 MOTOR

.1 Motor shall be of the alternating current, polyphase, submersible cage induction type and shall be of a design especially adapted to electro-hydraulic requirements.

2.12 HYDRAULIC CONTROL SYSTEM

.1 Hydraulic control system shall be of compact design suitable for operation under the required pressures and it shall be mounted in the storage tank. Control valve will be manifold type with up, down and check valve sections. A control section including solenoid valves will direct the main valved and control up and down starting, transition from full speed to levelling speed, up and down stops, pressure relief and manual lowering.

.2 Down speed and up and down levelling shall be controlled at the main valve sections. All of these functions shall be fully adjustable for maximum smoothness and to meet contract conditions. All control systems shall be pre-adjusted at the factory.

.3 Manual lowering feature shall permit lowering the elevator at slow speed in the event of power failure or for adjusting purposes.

2.13 STORAGE TANK

.1 Storage tank or oil reservoir shall be constructed of welded steel sheets, and shall be provided with a cover, a protected vent opening, an oil level gauge, a filtering screen mounted over the suction inlet and a drain connection. An initial supply of oil sufficient for proper operation of the elevator shall be provided. Tank shall have a capacity equal to the volume of oil required to lift elevator to top terminal plus a reserve of not less than 10 gallons.

2.14 MUFFLER

.1 A blow-out proof muffler, designed to minimize the transmission of fluid pulsations, shall be furnished and installed in the pipeline between the pumping unit and the cylinder head.

2.15 PIPING

.1 Piping shall be furnished and installed between the pumping unit and the cylinder head complete with necessary fittings. A gate valve shall be provided in the line to facilitate maintaining and adjusting the elevators.

2.16 CONTROLLER

.1 Microprocessor controllers shall be provided including necessary starting switches of adequate size together with all relays and switches required to accomplish the operation specified.

2.17 REDUCED VOLTAGE STARTING

.1 To reduce starting currents, "Solid State" starting shall be provided for the pump motor.

2.18 WIRING

.1 All wiring and electrical interconnections shall comply with the governing codes. Insulated wiring shall have flame retardant and moisture proof outer covering, and shall be run in conduit, tubing or electrical wireways. Travelling cables shall be flexible and suitably suspended to relieve strain on individual conductors.

2.19 HOISTWAY OPERATING DEVICES

.1 Normal terminal stopping devices shall be provided. When an emergency terminal stopping device is also required, it shall be furnished and the controller switches and circuitry arranged accordingly.

2.20 PIT SWITCH

.1 An emergency stop switch shall be located in the elevator pit.

2.21 PLATFORM

.1 Car platform shall be of all steel construction. It shall be equipped with an aluminum threshold.

2.22 CAR FRAME

.1 A suitable car frame fabricated from formed or structural steel members shall be provided with adequate bracing to support the platform and car enclosure. Car frame shall be isolated from the platen plate by means of rubber isolation mounts. Buffer striking plate on the underside of the car frame plank members must fully compress the spring buffers mounted in the pit before the plunger reaches its down limit of travel.

.2 Rubber tired roller, or slipper, guides shall be mounted on top and bottom of the car frame to engage the guide rails.

2.23 GUIDES

.1 Steel elevator guide rails shall be furnished to guide the car, erected plumb and securely fastened to the building structure.

2.24 DOOR OPERATION

.1 Doors on the car and at that hoistway entrances shall be power operated by means of a quality operator mounted on top of the car. The motor shall have positive control over door movement for smooth operation.

.2 Door operation shall be automatic at each landing with door opening being initiated as the car arrives at the landing and closing taking place after expiration of a time interval. A car door electric contact shall prevent starting the elevator away from the landing unless the car door is in its closed position.

.3 Door closing at elevator shall be arranged to start within a time consistent with handicapped requirements, from notification that a car is answering a hall call. Door shall be arranged to remain open for a time period sufficient to meet handicapped requirements.

.4 Time interval for which the elevator doors remain open when a car stops at a landing shall be independently adjustable for response to car calls and response to hall calls.

.5 An approved positive interlock shall be provided for each hoistway entrance which shall prevent operation of the hydraulic unit unless all doors for that elevator are closed and shall maintain the doors in their closed position while the elevator is away from the landing. Emergency access to the hoistway as required by governing codes shall be provided.

.6 Doors shall be vandalproof to prevent unauthorized access to elevator shaft.

2.25 CAR DOOR SAFETY DEVICE

.1 Provide multi-beam infrared detector for car door protection. Adjust detector unit to automatically time out after 20 seconds as required by Code.

2.26 DOOR HANGERS AND TRACKS

.1 Furnish and install for each car door sheave type two point suspension hangers and tracks complete.

.2 Sheaves shall be steel with flanged groove and include resilient sound absorbing tires of approved material.

.3 Sheaves shall include ball bearings sealed to retain grease lubrication and shall be mounted on steel housing arranged for attaching to the doors.

.4 Hangers shall be provided with ball bearing adjustable rollers to take the up-thrust of the doors.

.5 Tracks shall be cold drawn steel with surfaces shaped to conform to the tread of the hanger sheaves and rollers.

2.27 ELEVATOR ENTRANCE

.1 Sliding Type:

.1 Furnish at all floors, as indicated complete elevator entrances of quality as shown on the plans and specified herein. Assume complete and undivided responsibility for the entire installation including doors, frames, structural supporting angles, headers, hanger covers, fascias or toe guards, hangers and sills.

.2 Flush Type Door:

.1 Door of the flush type with sound-deadening material. Doors shall be constructed of not less than 1/16" thick high quality patent level stainless steel sheets rigidly reinforced by cold rolled shapes full height of door.

.2 Top and bottom of the doors shall be provided with cold rolled shapes full width of door and securely welded in place. Doors to be 1-1/4" in thickness and equipped with approved guides to operate in accurately grooved sills.

.3 Door finish shall be stainless steel in brushed finish. Refinish exposed edges after fabrication.

.3 Reinforcement of Door:

.1 Door shall be suitably reinforced to receive standard equipment, mortised where required and drilled and tapped to receive hangers, operators and interlocks.

.2 Door shall be suitably reinforced to receive operating mechanism and to withstand all strains of power operation.

.4 Unit Frame with Integral Trim:

.1 Frames shall be welded or bolted for a one piece assembly and shall be constructed from not less than 1/16" thick stainless steel to detail shown combining rough buck, jamb, casing and glazed transom, all in one piece construction. Frames shall be securely bolted to the sill, or sill extension, at the bottom and secured to the header at the top.

.2 Frame finish shall be stainless steel in brushed finish. Refinish exposed edges after fabrication.

.5 Structural Supporting Angles:

.1 Vertical structural members shall consist of two 3" x 3" x 1/4" steel strut angles.

.6 Headers:

.1 Headers or hanger housings shall be formed of 1/8" thick stainless steel sheet suitably reinforced to provide proper support for hangers and shall be bolted to support angles.

.2 Header finish shall be stainless steel in brushed finish. Refinish exposed edges after fabrication.

.7 Sills:

.1 Sills shall be extruded aluminum with approved anti-slip wearing surface. Grooves for the door guides shall have minimum clearance for the guides.

.8 Sill Supports:

.1 Sills shall be set with properly located sill support angles and shall be fastened to a vertical surface immediately below the finished floor level and flush with the hoistway face of the corridor wall suitable for secure fastening.

.9 Fascias or Toe Guards:

.1 Fascias shall be made of not less than 1/16" thick stainless steel sheet substantially reinforced where necessary and securely fastened in place. They shall extend 12" up from header and be full width of opening plus width of frame flanges.

.2 On lower terminal floors, toe guards of the same construction shall be furnished securely fastened to the sill and wall construction.

.3 Fascias or toe guards finish shall be galvanized steel.

2.28 INSPECTION OPERATION STATION

.1 A key switch shall be provided in the car to permit operation of the elevator from on top of the car, for inspection purposes, with car and hall buttons inoperative.

.2 An operating fixture shall be provided on top of the car containing continuous pressure "UP" and "DOWN" buttons for operating the elevator, an emergency stop button and a toggle switch which makes the top of the car inspection devices operative, and a telephone jack.

2.29 LANDING IDENTIFICATION

.1 Provide 2" high numerals in #4 brushed stainless steel finish on outside frame to identify floor level.

2.30 EMERGENCY CAR LIGHTING

.1 An emergency power unit employing a 12 volt sealed rechargeable battery and totally static circuits shall be provided that will adequately illuminate the elevator car and provide current to the alarm bell in the event of a power failure.

2.31 CAR OPERATING STATION

.1 Provide car operating panel of design selected by the Consultant from manufacturer's standard designs. Finish to be #4 brushed stainless steel finish. Panel shall contain buttons and required switches, all suitably identified complete with braille designations.

.2 Operating button heights and mounting arrangement to comply with B44 requirements.

2.32 HANDS-FREE TELEPHONE

.1 A hands-free communication device shall be mounted behind perforated grille in the car operating panel, and unit shall be controlled using ALARM or HELP button. Necessary wires shall be included in the travelling cable. Communications equipment and connections to the building service system shall be furnished and installed by this Section.

2.33 CAMERA

.1 Include the camera monitoring/call system within the two (2) year maintenance period as per WRDSB requirements.

.2 Camera Monitoring shall be via emercon system, as agreed upon with WRDSB.

2.34 CAR POSITION INDICATOR

.1 A digital car position indicator with stainless steel faceplate shall be installed in car operating panel.

.2 When stopping at a landing, the position of the car in the hoistway shall be shown by the illumination of the indication corresponding to the landing at which the car is stopped or passing.

.3 Provide lens for LED readout with 2" high characters.

2.35 HALL BUTTONS

.1 At each landing of elevator provide a push button station with #4 brushed stainless steel finish. When a call is registered by momentary pressure on a landing button, that button shall become illuminated and remain illuminated until the call is answered.

2.36 AUTO SAFE

.1 Equip the car with an auto safe which, in event of power failure, will return the car to the entrance landing and open the doors. Coordinate with Electrical Drawings.

2.37 FINISHES

.1 Stainless Steel:

.1 All stainless steel exposed in the finished work shall have stainless steel with brushed finish. Refinish exposed edges after fabrication.

.2 Grain direction of stainless steel shall be vertical, unless indicated otherwise.

.3 Protect finish with strippable protective film.

.2 Clear Anodizing (Class II):

.1 All aluminum surfaces exposed in the finished work shall have integral clear anodic coating, minimum 0.4 mils thickness, and conforms to Aluminum Finish Designation AA-M12C22A31, Architectural Class II.

.2 Pre-treat aluminum with caustic etch treatment prior to applying integral clear anodic coating.

.3 Protect finish with strippable protective film.

.3 Air Drying Baking Enamel:

.1 All surfaces inside cab enclosure top forming the reflector shall have highly reflective, air drying, baking type, alkyd gloss enamel conforming to CAN/CGSB-1.88, Type 1.

.2 Colour: "White".

.3 Pre-treat aluminum/steel surfaces after fabrication and apply primer and finish coats in strict accordance with manufacturer's written instructions.

.4 Protect finish with strippable protective film.

.4 Steel (Concealed):

.1 Hot-dip galvanized, or zinc rich paint.

.5 Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact. Use bituminous paint, butyl tape or other approved divorcing material.

3 Execution

3.1 EXAMINATION

.1 Examine the work by other trades and ensure that the hatchway is accurately plumbed and dimensioned within required tolerances and that all necessary inserts have been accurately installed and rigidly anchored.

.2 Report any defects. Do not start elevator work until satisfactory arrangements have been made for their correction.

3.2 INSTALLATION

.1 Follow the manufacturer's recommendations.

.2 Work shall be performed by manufacturer's forces, and only by mechanics skilled in installation of elevators.

.3 Install elevator machinery, car, guides, control and entrances by mechanics skilled in elevator work to provide a quiet, smoothly operating installation free from site sway vibration.

.4 Install guide rails continuously with no gaps at joints. Provide support brackets at required spacing.

.5 Set entrances in perfect alignment with car openings and true with plumb hatch lines.

.6 Erect sills, headers and frames prior to erection of rough walls. Install doors, fascias and toe guards after walls are finished.

.7 Except where submersible pump is provided, mount pump unit minimum 3'-4" above finish floor, also raise level of tank if required by higher pump location.

.8 Perform and meet test requirements of CAN/CSA-B44.

.9 Furnish test and approval certificates issued by the authorities having jurisdiction.

.10 Prior to final acceptance, remove protection from exposed surfaces, clean and polish surfaces, with due regard to type of material.

.11 Touch-up and restore to new condition, damaged or defaced factory finished surfaces.

.12 Upon completion run elevator in the presence of the Consultant. Demonstrate that all adjustments have been properly made and that each elevator meets the specified operation requirements.

.13 Provide electrical troughing and hydraulic oil line sections running between remote elevator machine room and elevator hoistway. Route these connections through the Upper Level floor slab, and affix to the underside of the Upper Level floor slab. Set oil line and duct elevations to height and right of way requirements as defined by Construction Manager. Provide all required fasteners and mountings to support oil line and duct sections. Oil line supports shall have isolation between pipe clamp and oil line.

3.3 EQUIPMENT PERFORMANCE AND ADJUSTMENT SETTINGS

.1 Arrange equipment to operate at maximum speed variation between -5% and +10%, to compensate for changing car loads and direction of travel.

.2 Adjust and set up car door operator to achieve full open cycle in 3.0 to 3.5 seconds. Full open cycle shall be measured from the time the door initially starts to open until it reaches its fully open position.

.3 Adjust and set up car door operator to achieve full close cycle in 3.5 to 4.0 seconds. Full close cycle shall be measured for the time the door initially starts to close until it reaches its fully closed position.

.4 Set up car and hall landing dwell timers to achieve a dwell interval of 3.0 to 4.0 seconds. Dwell time settings shall be capable of being individually reset and adjusted between 0 and 20 seconds.

.5 Set up nudging timer to initiate nudging operation should the door detector be activated for a period equal to the dwell interval plus 20 seconds. Under nudging operation, car doors shall close at a reduced speed. Closing times shall be approximately 1.75 times the time as noted above for normal closing operation under paragraph 3.3.3.

.6 Door re-cycle timer shall operate after 8 to 10 seconds.

.7 Lowest landing return feature shall initially be set for 15 to 20 minutes. During periods of inactivity, car shall also be programmed to return to its bottom landing after sitting idle for specified length of time.

.8 Lighting levels inside the elevator cab shall be not less than 20 foot candles (under normal power), measured inside the cab at the platform level.

.9 Car levelling accuracy shall be maintained at ∀1/4" under all car loading conditions (up to full rated load) and direction of travel.

.10 Valve unit shall be set up and adjusted to achieve imperceptible car acceleration and deceleration rates, with no sudden jerks during speed transitions.

END OF SECTION

Division 20 Common Requirements for Mechanical

Division 22 Plumbing

Division 23 Heating, Ventilating, and Air Conditioning (HVAC)

Division 25 Integrated Automation

Common Work Results for Integrated Automation

Control Systems

END OF SECTION

Part 1 General

1.1 GENERAL

.1 The following Mechanical Identified Prices Form must be submitted to the architect and consultant at the time of tender closing. Mechanical contractors must complete all information requested or tenders may be considered null and void. Should any uncertainty arise as to the proper manner of submitting tenders, the requisite information will be given at the office of the Consultant. Contractor shall sign and date this page and initial and date each page thereafter.

1.2 CONTRACTOR

I/We certify that I/We have the authority to bind the company.

COMPANY NAME	AUTHORIZED SIGNATURE
ADDRESS	PRINTED SIGNATURE
CITY	TITLE
TELEPHONE NUMBER	DATE
FAX	

1.3 RELATED SECTIONS

.1 This section must be read in association with the following: Division 1, Mechanical and Electrical Divisions.

1.4 ITEMIZED PRICES (EXCLUDING HST)

.1 Itemized prices are for work which is included in the bid price listed on the bid form. Each price may be retained, or deleted from the bid price in the amount indicated, at the discretion of the Owner, and may be used to determine the low bidder.

.1 For the supply and installation of new DDC controls and the removal of existing pneumatic controls as indicated.

_____

_____*Dollars ($_____)*

(Dollar amount in writing)

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Products

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 GENERAL INSTRUCTIONS

.1 Comply with the General Conditions, Supplementary Conditions, and all of Division 1, General Requirements of Mechanical and Electrical Divisions.

1.2 CASH ALLOWANCES (HST EXCLUDED)

.1 Refer to CCDC 2 – 2020, GC 4.1 - CASH ALLOWANCES.

.2 The Contract Price includes the allowances stated below, which allowances shall be expended as the Owner directs through the Consultant. The Consultant may direct the Contractor to bid work for which payment is made from an allowance.

.3 The Contract Price, and not the cash allowances, includes the Contractor's overhead and profit in connection with such cash allowances.

.4 Where the actual cost of the *Work* under any cash allowance is less that the amount of the allowance, the *Owner* shall be credited for the unexpended portion of the cash allowance, but not for the *Contractor's* overhead and profit on such amount.

.5 The value of the work performed under a cash allowance is eligible to be included in progress payments.

.6 HST (Harmonized Sales Tax) is not included in cash allowance(s).

.7 Handling, Storage, and Delivery Cash Allowance (HST Excluded)

.1 This cash allowance covers the net cost to the Contractor of services, products, construction machinery and equipment, freight, unloading, handling, storage, Provincial Sales Tax, and other authorized expenses incurred in performing the work stipulated under this allowance.

.2 Storage and installation shall be in accordance with the manufacturer's instructions.

.3 Provide a cash allowance of $25,000.00 in the tender price for the following:

.1 Storage of air handling unit sections from December 2025 through July 2026, for loading/unloading, delivery to/from storage facility, insurance, etc.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

.1 This section covers items common to all sections of Mechanical 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.

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 mechanical 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 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.

.2 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 fittments.

.3 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.

.4 Install piping and ductwork to clear structural members and any fireproofing. Locate mechanical 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.

.5 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.

.6 Locate all mechanical and electrical equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.

.7 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.

.8 Relocate equipment and/or material installed but not coordinated with work of other Sections and/or installed incorrectly as directed, without extra charge.

.9 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 coordination 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, 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 mechanical 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 Division 15 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 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 mechanical 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 Mechanical 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 Mechanical 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 Mechanical 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.

Mobilization and shop drawings (max. $2000.00)
Demolition
Inside buried plumbing and drainage
Above grade rough-in plumbing and drainage
Plumbing Fixtures
Sprinkler system and heads
Heating piping
Piping Insulation
Ductwork
Duct Insulation
Grilles & Diffusers
Fire Stopping
Fans & Equipment
Building Automation Systems
Testing Adjusting and Balancing
HVAC system commissioning
VRF/Heat Pump Equipment
Refrigeration Piping
Mechanical 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" x 11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11" x 17".

.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 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 so directed by Consultant. Submission can be done electronically in pdf format or as a hardcopy.

.1 Electronic submission/pdf file is required to be bookmarked. Any submission received without bookmarking will be immediately returned as unacceptable.

.2 Hardcopy 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 maintenance manuals, as well as a PDF file of the entire approved manual on a USB stick. Only one 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 mechanical 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 mechanical 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:

.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 MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).

.3 TAB to be performed using as-built drawings.

.1 Submit hard copy to Consultant for approval. When returned, make corrections as directed.

.2 Once approved, submit completed reproducible paper as-built drawings as well as a scanned pdf file copy on USB stick with Operating and Maintenance Manuals.

1.16 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 & 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, and for two (2) years.

1.17 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)

.2 Mandatory TSSA Gas Pressure Test (CSA B149.1)

.3 Backflow Test Certificate (for all testable devices)

.4 TSSA Certificate of Authorization for split air conditioning systems ***exceed 5 tons

.5 Contractor letter verifying all refrigeration leak detection systems and their interlocks to downstream devices have been installed and tested.

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 mechanical injury but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in dry, heated space.

1.21 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.

1.22 PHASING OF WORK

.1 This work for this project shall be constructed in phases. Refer to the architectural drawings for phasing information and details. Misinterpretation of the drawings with respect to the extent of the phasing of the work shall not relieve the contractor of the work required to complete the entire contract.

.2 Provide all necessary services or temporary services to suit phasing of construction with respect to all mechanical services and fire protection.

.3 Life safety systems in the building are to remain fully operational in occupied areas for building staff and occupants during renovations.

.4 Provide all necessary tests and certificates at completion of each phase to suit requirements of local authorities and consultants for occupancy of completed areas.

1.23 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.

1.24 CONFINED SPACES

.1 Certain areas of the building may be defined as a “Confined Space”. Any personnel working in these areas must have confined space training, appropriate equipment and undertake all work in conformance with appropriate codes and standards.

.2 Refer to building documentation for any spaces deemed “Confined Space”.

1.25 ENERGY EFFICIENCY

.1 The mechanical 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 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.

.4 Test drainage, waste and vent piping to Ontario Building Code and authorities having jurisdiction.

.5 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 Test fire systems in accordance with authorities having jurisdiction 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.

1.2 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 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 Mechanical 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 Mechanical 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.

1.4 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 Domestic water

.4 Plumbing and drainage.

1.5 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.

1.6 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.

1.7 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 mechanical equipment at following heights unless indicated otherwise.

.1	Fire extinguisher	1350 (4'– 0") to hanger
.2	Backflow preventors	900 – 1200 (3'– 4') to centerline of unit
.3	Thermostats: Barrier Free (operable)	1200 mm (47.25")
	Non Barrier Free	1500 mm (59")

Also follow direction of architectural drawings and where discrepancies occur clarify prior to rough-in.

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 mechanical responsibility is indicated in Equipment Schedule on 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 specified in Mechanical 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 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, mechanical wiring and installations shall comply with local and national electrical and mechanical 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 mechanical or 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 MOTORS

.1 Provide high efficiency motors for mechanical 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.

1.13 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.

1.14 GUARDS

.1 Provide guards for unprotected devices.

.2 Guards for belt drives:

.1 Expanded metal screen welded to steel frame.

.2 Minimum 1.2 mm (18 gauge) thick sheet metal tops and bottoms.

.3 40 mm (1 1/2") diameter holes on both shaft centres for insertion of tachometer.

.4 Removable for servicing.

.3 Provide means to permit lubrication and use of test instruments with guards in place.

.4 Install belt guards to allow movement of motors for adjusting belt tension.

.5 Guard for flexible coupling:

.1 "U" shaped, minimum 1.6 mm (16 gauge) thick galvanized mild steel.

.2 Securely fasten in place.

.3 Removable for servicing.

.6 Unprotected fan inlets or outlets:

.1 Wire or expanded metal screen, galvanized, 20 mm (3/4") mesh.

.2 Net free area of guard: not less than 80% of fan openings.

.3 Securely fasten in place.

.4 Removable for servicing.

.7 Duct Openings in Floor

.1 Provide reinforced expanded mesh grating, style 3 (3 lbs/sq.ft.) cover on accessible unprotected duct openings over 300 mm (12") wide and as indicated. This includes all ductwork terminating in air handling units and plenums.

.2 Securely Fasten in place.

.3 Removable for servicing.

1.15 PIPING AND EQUIPMENT SUPPORTS

.1 Equipment supports supplied by equipment manufacturer: specified elsewhere in Mechanical Division.

.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.

.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. Concrete specified elsewhere.

.4 Where housekeeping pads incorporate existing pads provide 10 mm dowels into existing pads. New pad height shall match existing.

1.16 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.

1.17 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 cementious or rigid seals around penetrations for pipe, ductwork, or other mechanical items.

.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.

1.18 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.

1.19 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, base colour as specified in Mechanical 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.

1.20 SPARE PARTS

.1 Furnish spare parts in accordance with general requirements and as follows:

.1 One (1) set of packing/mechanical seals for each pump.

.2 One (1) casing joint gasket for each size pump.

.3 One (1) head gasket set for each heat exchanger.

.4 One (1) glass for each gauge glass.

.5 One (1) set of belts for each type or each size of machinery.

.6 One (1) 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.

1.21 SPECIAL TOOLS

.1 Provide one (1) set of special tools required to service equipment as recommended by manufacturers and in accordance with Maintenance Materials Special Tools and Spare Parts.

1.22 ACCESS DOORS

.1 Provide access doors to concealed mechanical 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 materials:

.1 Le Hage

.2 Zurn

.3 Acudor

.4 Nailor Industries Inc.

1.23 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.

1.24 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.

1.25 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.

1.26 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.

1.27 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.

1.28 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.

1.29 OWNER SUPPLIED EQUIPMENT

.1 Connect to equipment supplied by the owner and make operable.

1.30 LOCATION OF EXISTING UNDERGROUND SERVICES

.1 This contractor shall locate existing services prior to starting any work in the affected area.

.2 This contractor shall use a video camera for the existing storm and/or sanitary drainage at the indicated connection point to confirm location, size and invert of the existing piping.

1.31 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 wall 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.

1.32 EXCAVATING AND BACKFILLING

.1 Provide all excavating and backfilling inside and outside the building for plumbing pipes, drains and equipment. All backfilling shall be new clean granular ‘A’ fill brought in specifically for the purpose of backfilling to the underside of floor slab. All backfilling shall be compacted at intervals not more than 150 mm (6") layer to the satisfaction of the Consultant.

.2 Provide excavating and backfilling outside the building with granular A brought in specifically for backfilling to a minimum of 450 mm (18") over the pipe. Backfilling outside building over and above the 450 mm (18") backfill as previously specified herein shall be by the Mechanical Contractor as specified under Division 2. Where backfilling outside the building is not specified under Division 2 the mechanical contractor shall provide new clean granular ‘A’ fill to grade level.

.3 Bottoms of trenches shall be excavated so that the pipe will be supported on a 150 mm (6") compacted bed of clean granular ‘A’ fill. Provide all necessary pumping to maintain excavation free of water.

.4 Should water be encountered during excavation, the mechanical contractor shall provide all labour and material, including all equipment required for dewatering the excavation. After the water has been removed, this Contractor shall install a 300 mm (12") base of compacted 50 mm (2") clear stone covered with filter cloth before installing backfill as detailed and/or as specified.

.5 Be responsible for all weather protection required to install piping and/or equipment to the satisfaction of the Consultant.

.6 Be responsible for providing all clear stone or granular 'A' material suitable for application to replace existing soil not suitable for backfilling above the 450 mm (18") bedding material.

1.33 CONFINED SPACES

.1 Certain areas of the building may be defined as a "Confined Space". Any personnel working in these areas must have confined space training, appropriate equipment and undertake all work in conformance with appropriate codes and standards.

.2 Refer to building documentation for any spaces deemed "Confined Space".

1.34 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.

1.35 INTEGRATED LIFE SAFETY SYSTEMS TESTING

.1 Mechanical systems in this building, including but not limited to smoke control dampers, smoke control fans, high speed low velocity ceiling fans, makeup air units, heat tracing for fire protection systems and fire protection system components may be subject to Integrated Life Safety Systems testing.

.2 The Mechanical Contractor shall co-ordinate with the Integrated Life Safety Systems Testing Agent as follows:

.1 Confirm which mechanical systems are to be included as part of the testing process.

.2 Verify in writing to the Integrated Life Safety Systems Testing Agent that mechanical 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.

1.36 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.

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 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 mechanical systems which are not being reused are to be patched with the same material surrounding surfaces.

.5 All new holes and openings to facilitate mechanical 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 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 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.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 American Society for Testing and Materials

.1 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A105/A105M, Specification for Carbon Steel Forgings for Piping Applications.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate for each item as applicable:

.1 Manufacturer, model number, line contents, pressure and temperature rating.

.2 Movement handled; axial, lateral, angular and the amounts of each.

.3 Nominal size and dimensions including details of construction and assembly.

1.3 CLOSEOUT SUBMITTALS

.1 Submit maintenance data in accordance with general requirements.

.2 Data to include:

.1 Servicing requirements, including any special requirements, stuffing box packing, lubrication and recommended procedures.

Part 2 Products

2.1 SLIP TYPE EXPANSION JOINTS

.1 Application: for axial pipe movement, as indicated.

.2 Repacking: under full line pressure.

.3 Body and packing housings: Class 150, 1Mpa carbon steel pipe to ASTM A53/A53M, Grade B. Wall thickness to match pipe and with raised face slip-on flanges to match pipe.

.4 Slip or traverse sleeves: carbon steel pipe to ASTM A53/A53M, Grade B, hard chrome plated.

.5 Anchor base: construction steel, welded to body.

.6 Guides (internal and external): embody into packing housing with concentric alignment of slip or traverse sleeve with packing housing.

.7 Extension limit stop: stainless steel, to prevent over-extension with accessible and removable pins.

.8 Packing rings: 6 minimum, P7FE (teflon) or graphite impregnated non-asbestos fiber.

.9 Thermal plastic packing: P7FE (teflon) or graphite impregnated non-asbestos fiber slug supplied loose.

.10 Lubricating fittings: pet cocks with grease nipple.

.11 Plunger body and plunger:

.1 Plunger body: heavy wall carbon steel welded to body.

.2 Plunger: carbon steel with hex head for use with socket wrench.

.12 Lubricant: to manufacturer's recommendations.

.13 Lubricant gun: complete with hose assembly.

.14 Drip connection: 20 MPa (2900 psi) forged steel to ASTM A105. Include half coupling with drain plug.

.15 Lubricant fittings, plunger, gun not required for low friction self lubricating packing.

2.2 FLEXIBLE CONNECTION

.1 Application: to suit motion.

.2 Minimum length in accordance with manufacturer's recommendations to suit offset.

.3 Inner hose: stainless steel corrugated.

.4 Braided wire mesh stainless steel outer jacket.

.5 Diameter and type of end connection: as indicated.

.6 Operating conditions:

.1 Working pressure: 1034 kPa (150 psi).

.2 Working temperature: 250°C (482°F).

.3 To match system requirements.

2.3 ANCHORS AND GUIDES

.1 Anchors:

.1 Provide as indicated.

.2 Alignment guides:

.1 Provide as indicated.

.2 To accommodate specified thickness of insulation.

.3 Vapour barriers, jackets to remain uninterrupted.

2.4 VRF EXPANSION LOOPS

.1 Flexible hose expansion loop as required by VRF manufacturer.

.2 Operating pressure: 700 psi.

.3 Operating temperature: 300° Fahrenheit.

.4 Corrugated Type 321 stainless steel with braid of double layer Type 304 stainless steel.

.5 Schedule 40 Type 304 stainless steel fittings complete with stainless to copper conversion fittings where required.

.6 Complete with hanger/support lug at bottom of 180° return.

.7 Acceptable materials:

.1 Metraflex Metraloop

.2 Senior Flexonics

Part 3 Execution

3.1 INSTALLATION

.1 Install expansion joints with cold setting, as indicated as instructed by Consultant. Make record of cold settings.

.2 Install expansion joints and flexible connections in accordance with manufacturer's instructions.

.3 Install pipe anchors and guides as indicated. Anchors to withstand 150% of axial thrust.

3.2 APPLICATION

.1 Provide on all vibration isolated equipment.

.2 Provide where requested by equipment manufacturers installation manuals.

.3 Install in accordance with manufacturer’s recommendations.

3.3 THERMAL EXPANSION

.1 Provide in long runs of heating mains exceeding 100 ft. in length.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ANSI/ASME B40.100, Pressure Gauges and Gauge Attachments.

.3 CAN/CGSB-14.4, Thermometers, Liquid-in-Glass, Self Indicating, Commercial/Industrial Type.

.4 CAN/CGSB-14.5, Thermometers, Bimetallic, Self-Indicating, Commercial/Industrial Type.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements.

.2 Submit manufacturer's product data for following items:

.1 Thermometers.

.2 Pressure gauges.

.3 Stop cocks.

.4 Syphons.

.5 Wells.

Part 2 Products

2.1 GENERAL

.1 Design point to be at mid point of scale or range.

.2 Ranges: suitable for application.

2.2 DIRECT READING THERMOMETERS

.1 Industrial, variable angle type, liquid filled, 225 mm (9") scale length: to CAN/CGSB 14.4.

.1 Acceptable materials:

.1 Trerice

.2 Winters 91T

.3 Wiess

2.3 THERMOMETER WELLS

.1 Copper pipe: copper or bronze.

.2 Steel pipe: brass or stainless steel.

2.4 PRESSURE GAUGES

.1 115 mm (4 1/2"), dial type: to ANSI/ASME B40.100, Grade 2A, stainless steel phosphor bronze bourdon tube having 0.5% accuracy full scale unless otherwise specified.

.1 Acceptable materials:

.1 Winters

.2 Trerice

.3 Wiess

.2 Provide:

.1 Siphon for steam service.

.2 Snubber for pulsating operation.

.3 Diaphragm assembly for corrosive service.

.4 Gasketted pressure relief back with solid front.

.5 Bronze stop cock.

Part 3 Execution

3.1 GENERAL

.1 Install so they can be easily read from floor or platform. If this cannot be accomplished, install remote reading units.

.2 Install between equipment and first fitting or valve.

3.2 THERMOMETERS

.1 Install in wells on all piping. Provide heat conductive material inside well.

.2 Install in locations as indicated and on inlet and outlet of:

.1 Water heating and cooling coils.

.2 Boiler Room HWS and HWR.

.3 In other locations indicated.

.3 Install wells as indicated only for balancing purposes.

.4 Use extensions where thermometers are installed through insulation.

3.3 PRESSURE GAUGES

.1 Install in following locations:

.1 Upstream and downstream of control valves.

.2 Inlet and outlet of coils.

.3 Inlet and outlet of backflow prevention.

.4 In other locations as indicated.

.2 Install gauge cocks for balancing purposes, elsewhere as indicated.

.3 Use extensions where pressure gauges are installed through insulation.

3.4 NAMEPLATES

.1 Install engraved lamacoid nameplates as specified elsewhere identifying medium.

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 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.

2.6 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

.1 Provide templates to ensure accurate location of anchor bolts.

2.7 HOUSE-KEEPING PADS

.1 For base-mounted equipment: Reinforced concrete, at least 100 mm (4") high, 150 mm (6") larger all around than equipment, and with chamfered edges as indicated.

.2 Size of housekeeping pads shall be determined from approved shop drawings.

.3 Concrete: 30 Mpa concrete with reinforced wire mesh.

.4 Install all housekeeping pads not indicated on architectural drawings.

2.8 OTHER EQUIPMENT SUPPORTS

.1 From structural grade steel meeting requirements of structural steel section specified herein.

.2 Submit structural calculations with shop drawings.

2.9 MANUFACTURER

.1 Acceptable materials:

.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 Flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.

.6 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')	

.7 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 4 mm (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" (51mm) 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 0.D pipe.

.2 Double Plain Pipe: Type 304 stainless steel pipe roller assemblies sized to suit actual 0.D pipe.

.3 Single Insulated Pipe: Type 304 stainless steel pipe cradle assembly sized to suit actual 0.D of insulated pipe.

.4 Double insulated Pipe: Type 304 stainless steel pipe cradle assemblies sized to suit actual 0.D of insulated pipe.

.5 Basis of design/Acceptable Manufacturer

.1 Thaler MERS 600 series.

.2 Acceptable equals if submitted during tender period.

2.2 DUCT SUPPORT

.1 Duct support:

.1 Adjustable height 6061-T6, hollow aluminum with mill finish, urethane insulated supports, 2" (51mm) 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 Basis of design/Acceptable Manufacturer

.1 Thaler MERS-800 series.

.2 Acceptable equals if submitted 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 materials:

.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 material:

.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 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 material:

.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 mechanical 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 Plumbing piping: most stringent requirements of Canadian Plumbing Code, Provincial Code, or authority having jurisdiction.

.2 Gas and fuel oil piping: every 1.8 m (6').

.3 Copper piping: up to NPS 15 mm (1/2"): every 1.5 m (5').

.4 Flexible joint roll groove pipe: in accordance with table below, but not less than one support at joints.

.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 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 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.

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 Korfund

.2 Vibro-Acoustics

.3 Vibron

2.2 ELASTOMERIC PADS

.1 Type EP1 - neoprene waffle or ribbed; 10 mm (3/8") minimum thick; 50 durometer; maximum loading 350 kPa (50.8 psi).

.2 Type EP2 - rubber waffle or ribbed; 10 mm (3/8") minimum thick; 30 durometer natural rubber; maximum loading 415 kPa (60.2 psi).

.3 Type EP3 - neoprene-steel-neoprene; 10 mm (3/8") minimum thick neoprene bonded to 1.5 mm (16 gauge) steel plate; 50 durometer neoprene, waffle or ribbed; holes sleeved with isolation washers; maximum loading 350 kPa (50.8 psi).

.4 Type EP4 - rubber-steel-rubber; 10 mm (3/8") minimum thick rubber bonded to 1.5 mm (16 gauge) steel plate; 30 durometer natural rubber, waffle or ribbed; holes sleeved with isolation washers; maximum loading 415 kPa (60.2 psi).

.5 Acceptable materials:

.1 Korfund

.2 IAC Acoustics

.3 Vibro-Acoustics

.4 Vibron

2.3 ELASTOMERIC MOUNTS

.1 Type M1 - colour coded; neoprene in shear; maximum durometer of [60]; threaded insert and two (2) bolt-down holes; ribbed top and bottom surfaces.

.2 Acceptable materials:

.1 Vibro-Acoustics

.2 Korfund

.3 IAC Acoustics

.4 Vibron

2.4 SPRINGS

.1 Design stable springs so that ratio of lateral to axial stiffness is equal to or greater than 1.2 times the ratio of static deflection to working height. Select for 50% travel beyond rated load. Units to be complete with levelling devices.

.2 Ratio of height when loaded to diameter of spring to be between 0.8 to 1.0.

.3 Cadmium plate for all installations.

.4 Colour code springs.

2.5 SPRING MOUNT

.1 Zinc or cadmium plated hardware; housings coated with rust resistant paint.

.2 Type M2 - stable open spring: support on bonded 6 mm (1/4") minimum thick ribbed neoprene or rubber friction and acoustic pad.

.3 Type M3 - stable open spring: 6 mm (1/4") minimum thick ribbed neoprene or rubber friction and acoustic pad, bonded under isolator and on isolator top plate; leveling bolt for rigidly mounting to equipment.

.4 Type M4 - restrained stable open spring: supported on bonded 6 mm (1/4") minimum thick ribbed neoprene or rubber friction and acoustic pad; built-in resilient limit stops, removable spacer plates.

.5 Type M5 - enclosed spring mounts with snubbers for isolation up to 950 kg (2100 lbs) maximum.

.6 Performance: as indicated.

.7 Acceptable materials:

.1 Korfund

.2 IAC Acoustics

.3 Vibron

.4 Vibro-Acoustics

2.6 HANGERS

.1 Colour coded springs, rust resistant, painted box type hangers. Arrange to permit hanger box or rod to move through a 30° arc without metal to metal contact.

.2 Type H1 - neoprene - in-shear, molded with rod isolation bushing, which passes through hanger box.

.3 Type H2 - stable spring, elastomeric washer, cup with molded isolation bushing which passes through hanger box.

.4 Type H3 - stable spring, elastomeric element with pre-compression washer and nut [with deflection indicator].

.5 Performance as indicated.

.6 Acceptable materials:

.1 Vibron

.2 IAC Acoustics

.3 Korfund

.4 Vibro-Acoustics

Part 3 Execution

3.1 INSTALLATION

.1 Install vibration isolation equipment in accordance with manufacturers instructions and adjust mountings to level equipment.

.2 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.

.3 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").

.4 Where isolation is bolted to floor use vibration isolation rubber washers.

.5 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.

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 Background colour marking and legends for piping systems:

CONTENTS	BACKGROUND COLOUR MARKING	LEGEND
Hot water heating supply	Yellow	HEATING SUPPLY
Hot water heating return	Yellow	HEATING RETURN
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
Waste water	Green	WASTE WATER
Contaminated lab waste	Yellow	CONT. LAB WASTE
Acid waste	Yellow	ACID WASTE (add source)
Storm water	Green	STORM
Sanitary	Green	SAN
Plumbing vent	Green	SAN. VENT
Condensate	Green	CONDENSATE
Refrigeration suction	Yellow	REF. SUCTION
Refrigeration liquid	Yellow	REF. LIQUID
Refrigeration hot gas	Yellow	REF. HOT GAS
Natural gas	Yellow	NATURAL GAS
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 (1) copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Consultant. Provide one (1) 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:

.1 Air Audit Inc.
110 Turnbull Court, Unit 11
Cambridge, Ontario
N1T 1K6
(519) 740-0871

.2 Air Velocities Control Ltd.
100 Premium Way
Mississauga, Ontario
L5B 1A2
(905) 279-4433

.3 Flowset Balancing Ltd.
431 Willis Dr.
Oakville, Ontario
L6L 4V6
(416) 410-9793

.4 Clark Balancing Ltd.
8094 Esquesing Line
Milton, Ontario
L9T 2X9
(905) 693-1518

.5 Airwaso Canada Inc.
3365 Paulpeel Avenue
London, Ontario
N6L 0A4
(519) 652-4040

.6 Dynamic Flow Balancing Ltd.

1200 Speers Road, Unit 36
Oakville, Ontario
L6L 2X4
(905) 338-0808

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. Coordinate 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, coordinate 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 three (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 three (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 SYSTEMS

.1 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 Zone pressure differences:

.1 Adjust HVAC systems, equipment, controls to establish air pressure differentials, with all systems in all possible combinations of normal operating modes.

.4 Smoke management systems:

.1 Test for proper operation of all smoke and fire dampers installed as component parts of air systems specified.

.5 Provide duct testing as specified.

.6 Provide AHU testing as specified.

.7 Provide plenum testing as specified.

.8 Changing of air handling equipment sheave and belts as required for specified air flow sheaves and belts supplied by unit manufacturer. Retest equipment after sheave change.

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.

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 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.

3.5 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.

3.6 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.

3.7 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.

3.8 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.

3.9 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:
- Air Handling Units
- 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.

3.10 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

3.11 OPERATION AND MAINTENANCE MANUAL

.1 Conform to General Requirements section for the Operating and Maintenance Manual requirements.

3.12 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:

System	Minimum Training Times
Air Handling Units	2 hours
Water Treatment Systems	2 hours
The Mechanical System	8 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.

3.13 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.

3.14 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.

3.15 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.

3.16 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 Proprieties by Means of the Guarded Hot-Plate Apparatus.

.4 ASTM C518, Standard Test Method for Steady-State Thermal Transmission Proprieties 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 Type A-2: Mineral fibre faced with factory applied vapour retarder jacket.

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52 Ma.

.3 Maximum "k" factor: to ASTM C553.

.5 Materials:

.1 All materials must be supplied by the same manufacturer.

.2 Acceptable Materials:

.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 25 (1")	32 (1¼") 40 (1½")	50 (2") 80 (3")	105 (4") 150 (6")	200 (8") & over
Domestic Water Piping	A-1	25 (1")	25 (1")	40 (1½")	40 (1½")	40 (1½")
Storm Piping	A-1	25 (1")	25 (1")	25 (1")	25 (1")	25 (1")
Roof Drain sumps	A-2	25 (1")	25 (1")	25 (1")	25 (1")	25 (1")
Horizontal Cast Iron Sanitary Piping	A-1	N/A	N/A	25 (1")	25 (1")	25 (1")
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
Exposed in mech. rooms	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 materials:

.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.

2.6 GATE VALVES

.1 NPS 50 mm (2") and under, soldered:

.1 Rising stem: to MSS SP-80, Class 125, 860 kPa (125 psi), bronze body, screw-in bonnet, solid wedge disc.

.2 NPS 50 mm (2") and under, screwed:

.1 Rising stem: to MSS SP-80, Class 125, 860 kPa (125 psi), bronze body, screw-in bonnet, solid wedge disc.

.3 NPS 65 mm (2-1/2") and over, in mechanical rooms, flanged:

.1 Rising stem: to MSS SP-70, Class 125, 860 kPa (125 psi), flat flange faces, cast-iron body, OS&Y bronze trim.

.4 NPS 65 mm (2-1/2") and over, other than mechanical rooms, flanged:

.1 Non-rising stem: to MSS SP-70, Class 125, 860 kPa (125 psi), flat flange faces, cast-iron body, bronze trim, bolted bonnet.

2.7 GLOBE VALVES

.1 NPS 50 mm (2") and under, soldered:

.1 To MSS SP-80, Class 125, 860 kPa (125 psi), bronze body, renewable composition disc, screwed over bonnet.

.2 Lockshield handles: as indicated.

.2 NPS 50 mm (2") and under, screwed:

.1 To MSS SP-80, Class 150, 1.03 MPa (150 psi), bronze body, screwed over bonnet, renewable composition disc.

.2 Lockshield handles: as indicated.

2.8 SWING CHECK VALVES

.1 NPS 50 mm (2") and under, soldered:

.1 To MSS SP-80, Class 125, 860 kPa (125 psi), bronze body, bronze swing disc, screw in cap, regrindable seat.

.2 NPS 50 mm (2") and under, screwed:

.1 To MSS SP-80, Class 125, 860 kPa (125 psi), bronze body, bronze swing disc, screw in cap, regrindable seat.

.3 NPS 65 mm (2 1/2") and over, flanged:

.1 To MSS SP-71, Class 125, 860 kPa (125 psi), cast iron body, flat flange faces, [regrind] [renewable] seat, bronze disc, bolted cap.

2.9 BALANCING VALVES

.1 Provide brass balancing valves suitable for potable water.

.2 Brass body, EDPM O-Ring, Polytetrafluoroethylene slip washer and stainless steel spring.

.3 Connect with dielectric connections.

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 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 BACK FLOW PREVENTORS

.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.

.4 Double check valve assembly (DCVA):
The double check type backflow preventer shall be ASSE 1015 approved, and supplied with full port ball valves. The main body and access covers shall be bronze (ASTM B584), the seat rings and all internal polymers shall be NSF® Listed Noryl™ and the seat disc elastomers shall be silicone. The first and second checks shall be accessible for maintenance without removing the device from the line.

.1 Acceptable materials:

.1 Watts 007 ½"- 2"

.2 Wilkins 950XL ¾ "- 2"

.3 Conbraco 40-100 Series

.5 Back flow preventor with intermediate atmospheric vent:

.1 Acceptable material:

.1 Watts Series 9D

.2 Wilkins 750

.3 Conbraco 40-4A Series

2.2 VACUUM BREAKERS

.1 To CAN/CSA-B64 Series.

.2 Atmospheric vacuum breaker (A-VB):

.1 Acceptable materials:

.1 Watts 288A

.2 Conbraco 38-103 Series

.3 Wilkins 35

.3 Hose connection vacuum breaker (HCVB):

.1 Acceptable materials:

.1 Watts Series 8

.2 Conbraco 38-304-AS

.3 Wilkins BFP-8

.4 Laboratory faucet intermediate vacuum breaker (LFVB):

.1 Acceptable materials:

.1 Watts N-LF9

.2 Conbraco 38-502-01

2.3 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 materials:

.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 materials:

.1 Watts 77F-D (77F-D-FDA for water service)

.2 Crane/Powers

.3 Colton 125 YTB

.4 Wilkins FS Series

2.4 MECHANICAL FLOAT VALVE

.1 Heavy duty mechanical float valve all bronze construction, serrated arm for easy adjustment, lever action, replaceable seals.

.2 Heavy duty, corrosion resistant, plastic float suitable for up to 140°F.

.3 Provide all necessary accessories for complete installation.

.4 Acceptable manufacturers:

.1 Watts Series 500 (1/2"), 750 (3/4") and PX float.

.2 Wilkins

.3 Conbraco

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 STRAINERS

.1 Install with sufficient room to remove basket.

.2 Strainer size to match pipe size.

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 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.
- .2 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.

3.5 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 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 material:

.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 unfinished concrete floors: nickel bronze round, gasket, vandal-proof screws.

.1 Acceptable material:

.1 Zurn ZN-1400 – HD or Zurn ZXN-1612

.2 Mifab C1100-XR-6

.3 Watts CO-200-RX-1-6

.4 Jay R. Smith SQ-4-1753-XNBCO-SP-U

.2 Cover for terrazzo finish: round polished nickel bronze with recessed cover for filling with terrazzo, vandal-proof locking screws.

.1 Acceptable materials:

.1 Zurn ZN-1400-Z

.2 Mifab C1100-UR-6

.3 Watts CO-200-U-1-6

.4 Jay R. Smith SQ-4-1753-NBRT-SP-U

.3 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 materials:

.1 Zurn ZN-1400-T – HD

.2 Mifab C1100-TS-6

.3 Watts CO-200-TS-1-6

.4 Jay R. Smith 4200-U

.4 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 material:

.1 Zurn ZN-1400 – T-HD or Zurn ZXN-1612

.2 Mifab C1100-S-6

.3 Watts CO-200-S-1-6

.4 Jay R. Smith SQ-4-1753-NBCO-SP-U-Y

.5 Cover for carpeted floors: round polished nickel bronze with flush cover, complete with stainless steel carpet marker, vandal-proof locking screws.

.1 Acceptable materials:

.1 Zurn ZN-1400-HD-CM or ZN-1612-CM

.2 Mifab C1100C-S-1-6

.3 Ancon CO-200-RC-1-6

.4 Smith

.5 Contour C3000RMNB

2.3 FLAPPER TYPE BACKWATER VALVES

.1 Coated extra heavy cast iron body with bronze seat, revolving bronze flapper and threaded cover.

.1 Acceptable materials:

.1 Zurn Z-1090

.2 Mifab BV1200-R

.3 Watts BV200

.4 Jay R. Smith 7012

.2 Access: Surface access.
Access pipe with cover: maximum 300 mm (12") depth.
Steel housing with gasketted steel cover.
Concrete access pit with cover, as indicated.

.1 Acceptable material:

.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 TRAP SEAL PRIMERS

.1 Install for all floor, hub and trench drains and elsewhere, as indicated.

.2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space, to approval of Consultant.

.3 Install soft copper tubing to floor drains above grade and polyethylene piping to floor drains below grade.

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 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 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

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 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.

2.4 FORCED MAINS

.1 Above and below ground sewage pump discharge, size as indicated, type ‘L’ copper to ASTMB88M.

.2 Cast copper, solder fitting to ANSI B16.18.

.3 Cast bronze threaded fittings, class 125 to ANSI/ASME B16.15.

Part 3 Execution

3.1 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/m^2 (5 lb/ft^2) 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 ft) 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 ft) 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 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.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Indicate:

.1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled.

.2 Wiring and schematic diagrams.

.3 Dimensions and recommended installation.

.4 Pump performance and efficiency curves.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance and engineering data for incorporation into manual specified in general requirements

.2 Data to include:

.1 Manufacturer's name, type, model year, capacity, and serial number.

.2 Details of operation, servicing, and maintenance.

.3 Recommended spare parts list with names and addresses.

Part 2 Products

2.1 ELEVATOR SUMP AND SIMPLEX PUMP

.1 Pump shall be of the centrifugal type and submersible type motor. The unit shall be capable of 2" solid capacity for normal grey water and 2" discharge pipe.

.2 Pump shall have a capacity of 50 GPM at a total head of 27 feet.

.3 Pump Motor:

.1 Pump motor shall be of the submersible type rated 0.5 horsepower at 3450 RPM. Motor shall be for 60 Hz., three phase, 208 volts (208/3/60). Motor shall be capacitor start, capacitor run type for high starting torque. Motors rated for VFD/continuous duty operation.

.2 Starter winding shall be of the open type with Class F insulation, good for 155°C (311°F) maximum operating temperature. Winding housing shall be filled with a clean, high dielectric oil that lubricates bearings and seals and transfers heat from windings and rotor to outer shell. Air-filled motors which do not have the superior heat dissipating capabilities of oil-filled motors shall not be considered equal.

.3 Motor shall have two heavy-duty ball bearings to support pump shaft and take radial and thrust loads. Ball bearings shall be designed for 50,000 hours B-10 life. Stator shall be bolted to seal plate for easy motor replacement.

.4 The motor shall have a heat sensor thermostat and overload attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 200°F. The high temperature shutoff will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The thermostat shall reset automatically when the motor cools to a safe operating temperature.

.5 The common motor pump shall be of #416 stainless steel threaded to take pump impeller and impeller.

.6 Motor shall be protected by one rotary mechanical seal. Seal face shall be carbon and ceramic and lapped to a flatness of one light band.

.4 The pump impeller shall be of the recessed type to provide an open unobstructed passage through the volute for the solids. Impeller shall be engineered thermoplastic (MC/MGF) or ductile iron (MGH) and shall be threaded onto stainless steel shaft.

.5 All iron castings shall be pre-treated with phosphate and chromic rinse and to be painted before machining, and all machined surfaces exposed to the sewage water to be re-painted. All fasteners to be 302 stainless steel.

.6 The motor power cord shall be 14 GA SJOW/SJOWA or SOOW. The cable jacket shall be sealed at the motor entrance by means of a rubber compression washer and compression nut. A heat shrink tube filled with epoxy shall seal the outer cable jacket and the individual leads to prevent water from entering the motor housing.

.7 The pump shall be complete with integral float and power cord.

.8 High level alarm system with audible signal and test button suited for 120/1/60 with plug. Supply sufficient cord length to nearest plug.

.9 Sump System

.1 Factory assembled 750 mm (30") diameter basin.

.2 Packaged basin units with basin and cover designed for off-set mounting.

.3 System includes fiberglass basin with anti-floatation ring, epoxy coated steel cover with separate cover for access to each pump and controls, control panel mounting sleeve, galvanized lifting chain and 100 mm (4") inlet.

.4 Depth of sump to be as indicated on drawings but not less than 750 mm (30") below inlet pipe.

.5 Provide guiderail in pit for all pumps with 2 hp motor or greater.

.10 Acceptable manufacturers:

.1 Myers WHR5H-03

.2 Barnes

.3 Grundfos

Part 3 Execution

3.1 SEWAGE SUMPS AND PUMPS

.1 Install in accordance with manufacturers recommendations.

.2 Clean sump upon completion.

.3 Confirm operation of pumps, controls, and high level alarms.

3.2 FIELD QUALITY CONTROL

.1 Check power supply.

.2 Check starter protective devices.

.3 Start up, check for proper and safe operation.

.4 Check settings and operation of all hand-off-auto selector switch, operating, safety and limit controls, audible and visual alarms, over-temperature and other protective devices.

.5 Adjust flow from water-cooled bearings.

.6 Adjust impeller shaft stuffing boxes, packing glands.

.7 Demonstrate equipment operation as directed by consultant.

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.

.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 ASTM C-1053 -Specifications for Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications.

.3 ASTM D4101 Specifications for polypropylene Injection and Extrusion Materials.

.4 CSA B181.3 Polyolefin and Polyvinylidene Fluoride (PVDF) Laboratory Drainage Systems.

Part 2 Products

2.1 GLASS PIPING AND FITTINGS

.1 UL classified borosilicate glass piping and fittings.

.2 Acceptable materials:

.1 Kimax

.2 Zurn

2.2 PVDF PLASTIC PIPING AND FITTINGS

.1 Schedule 40 polyvinylidene fluoride (PVDF) complete with flame spread index of 25 or less and a smoke developed index of 50 or less for all above ground piping to approval of authority having jurisdiction.

.2 Acceptable materials:

.1 IPEX Plenumline

.2 Orion Plenum Plus

2.3 PIPE JOINTS

.1 Above Ground:

.1 Glass Piping:
300 Series stainless steel compression fitting with Buna-N-Rubber liner and Tetra-Fluoro-Ethylene gasket.

.2 PVDF Piping Fusion Weld:
Provide threaded coupling fittings in Science desks.

.3 Polypropylene Piping:
Compression joint or mechanical joint in accordance with manufacturer’s instructions.

.2 Underground:

.1 Polypropylene Piping:
Socket weld joints and fittings.

.3 Couplings: provide approved adapters for connections to other pipe materials.

2.4 NEUTRALIZING TANK

.1 Rotationally molded low density polyethylene sump.

.2 15 mm (1/2") extruded high density polyethylene top and inspection ports complete with neoprene or EPDM gasket to suit. Provide secondary 3/32 steel top and extention for in floor installation.

.3 Series 60 high density polyethylene fittings.

.4 Provide initial charge of limestone and store one (1) additional charge where directed on site.

.5 Provide 110V Model 47D PH monitor complete with alarm, PH electrode and co-axial cable. Install to manufacturers recommendations. Provide cable in conduit to standards of Electrical Division.

.6 Acceptable materials:

.1 SMS Model AN-30

2.5 SOLIDS INTERCEPTOR

.1 Rotationally molded low density polyethylene sump.

.2 15 mm (1/2") extruded high density polyethylene top complete with neoprene or EPDM gasket to suit. Provide 0.25 mm (3/32") steel top and extention for in floor installation.

.3 Series 60 high density polyethylene fittings.

.4 Acceptable material:

.1 SMS Model SI-LG

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with Provincial Plumbing Code, local authority having jurisdiction, and manufacturer’s requirements and recommendations.

.2 Install buried pipe on 150 mm (6") bed of washed clean sand, shaped to accommodate fittings, to line and grade as indicated. Backfill with washed 300 mm (12") cover of clean sand. Pipe shall be fully supported throughout its length.

.3 Install above ground piping parallel and close to walls and ceilings to conserve headroom and space, and to grade as indicated. All underground glass piping fittings shall be protected with a 5 mm (20 mil) polyvinyl film wrapping prior to backfilling. All underground glass piping shall be covered with polystyrene prior to backfilling.

.4 Neutralizing System:

.1 Independently support tank from connected piping. Provide supplemental support as required.

.2 Install to manufacturer’s requirements and recommendations.

.3 Provide the initial charge of limestone.

.4 Fill neutralization tank with water to drain level.

.5 Solids Interceptor

.1 Independently support tank from connected piping. Provide supplemental support as required.

.2 Install to manufacturer's requirements and recommendations.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Indicate:

.1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled.

.2 Wiring and schematic diagrams.

.3 Dimensions and recommended installation.

.4 Pump performance and efficiency curves.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance and engineering data for incorporation into manual specified in general requirements

.2 Data to include:

.1 Manufacturer's name, type, model year, capacity, and serial number.

.2 Details of operation, servicing, and maintenance.

.3 Recommended spare parts list with names and addresses.

Part 2 Products

2.1 THERMOSTATIC WATER CONTROLLER (3 Port)

.1 1/2" inlets 1/2" outlets thermostatic controller with swivel action check stops, removable cartridge with strainer, stainless steel piston and liquid fill thermal motor with bellows mounted out of water. Volume control shut off valve, bimetal dial thermometer (3" face, range 20° – 240°F), brass pipe, fittings and unions. Standard valve and piping finish is rough bronze.

.2 Acceptable materials:

.1 Refer to drawing schedule.

2.2 ANCHOR BOLTS AND TEMPLATES

.1 Supply for installation by other Divisions.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

.1 Check power supply.

.2 Check starter protective devices.

.3 Start up, check for proper and safe operation.

.4 Check settings and operation of all hand-off-auto selector switch, operating, safety and limit controls, audible and visual alarms, over-temperature and other protective devices.

.5 Adjust flow from water-cooled bearings.

.6 Adjust impeller shaft stuffing boxes, packing glands.

.7 Demonstrate equipment operation as directed by consultant.

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 Sections of Division 1 and to General Mechanical Requirements Section.

1.2 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Perform work in accordance with the recommendations of and the requirements of:

.1 Local and district bylaws and regulations.

.2 N.F.P.A.14 “Installation of Standpipe and Hose Systems".

.3 The Ontario Building Code.

.4 U.L.C. or Factory Mutual approval for hose, valve and extinguisher requirements.

.5 N.F.P.A.10 “Standard for Portable Fire Extinguishers”.

.6 The Ontario Fire Code.

1.3 SUBMITTALS

.1 Submit shop drawings and maintenance data in accordance with general requirements.

1.4 COORDINATION

.1 Confirm fire extinguisher cabinet locations and quantities from both architectural and mechanical drawings and report any discrepancies to consultant prior to bid close.

.2 Coordinate location of cabinet with other trades and provide protection against damage during construction.

Part 2 Products

2.1 MULTI-PURPOSE DRY CHEMICAL EXTINGUISHERS (CLASS ABC)

.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 Mechanical Rooms 10 lb ABC rating

.2 Corridor/Gym/Finished Areas 5 lb ABC rating complete with cabinet

.3 Acceptable materials:

.1 Wilson & Cousins

.2 National

2.2 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.

2.3 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 Manufacturer:

.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 FIRE BLANKET

.1 Hang blanket on wall in cabinet as indicated, to manufacturers' recommendations.

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 materials:

.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:

Chrome plated flexible supply pipes each with screwdriver stop, reducers, escutcheon and chrome plated nipple.

.1 Acceptable materials:

.1 Delta 47T900 Series

.2 McGuire

.2 Waste:
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.

.1 Acceptable materials:

.1 Delta 33T200 Series

.2 McGuire

.3 'P' Traps:

Cast brass P trap with cleanout on each fixture not having integral trap.

Chrome plated in all exposed places.

.1 Acceptable materials:

.1 Delta 33T300 Series

.2 McQuire

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.

.2 Drinking fountains:

.1 In accordance with CAN/CSA B45S1.

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.

.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 National Air Duct Cleaners Association (NADCA): “Assessment, Cleaning & Restoration of HVAC Systems (ACR).

.3 National Air Duct Cleaners Association (NADCA): “Understanding Microbial Contamination in HVAC Systems”.

.4 National Air Duct Cleaners Association (NADCA): “Introduction to HVAC System Cleaning Services”.

.5 National Air Duct Cleaners Association (NADCA): Standard 05 “Requirements for the Installation of Service Openings in HVAC Systems”.

.6 Underwriters’ Laboratories (UL): UL Standard 181.

.7 American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE): Standard 62, "Ventilation for Acceptable Indoor Air Quality".

.8 Environmental Protection Agency (EPA): "Building Air Quality".

.9 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): “HVAC Duct Construction Standards - Metal and Flexible”.

.10 North American Insulation Manufacturers Association (NAIMA): "Cleaning Fibrous Glass Insulated Air Duct Systems".

1.2 SPECIAL PROVISIONS

.1 Qualification of the HVAC System Cleaning Contractor

.2 Membership: The HVAC system cleaning contractor shall be a certified member of the National Air Duct Cleaners Association (NADCA), or shall maintain membership in a nationally recognized non-profit industry organization dedicated to the cleaning of HVAC systems.

.3 Certification: The HVAC system cleaning contractor shall have a minimum of one (1) Air System Cleaning Specialist (ASCS) certified by NADCA on a full time basis, or shall have staff certified by a nationally recognized certification program and organization dedicated to the cleaning of HVAC systems.

.4 Supervisor Qualifications: A person certified as an ASCS by NADCA, or maintaining an equivalent certification by a nationally recognized program and organization, shall be responsible for the total work herein specified.

.5 Experience: The HVAC system cleaning contractor shall submit records of experience in the field of HVAC system cleaning as requested by the owner. Bids shall only be considered from firms, which are regularly engaged in HVAC system maintenance with an emphasis on HVAC system cleaning and decontamination.

.6 Equipment, Materials and Labor: The HVAC system cleaning contractor shall possess and furnish all necessary equipment, materials and labour to adequately perform the specified services.

.1 The contractor shall assure that its employees have received safety equipment training, medical surveillance programs, individual health protection measures, and manufacturer's product and material safety data sheets (MSDS) as required for the work by the U.S. Occupational Safety and Health Administration, and as described by this specification. For work performed in countries outside of the U.S.A., contractors should comply with applicable national safety codes and standards.

.2 The contractor shall maintain a copy of all current MSDS documentation and safety certifications at the site at all times, as well as comply with all other site documentation requirements of applicable OSHA programs and this specification.

.3 Contractor shall submit to the owner all Material Safety Data Sheets (MSDS) for all chemical products proposed to be used in the cleaning process.

.7 Licensing: The HVAC system cleaning contractor shall provide proof of maintaining the proper license(s), if any, as required to do work in this state. Contractor shall comply with all Federal, state and local rules, regulations, and licensing requirements.

1.3 STANDARDS

.1 NADCA Standards: The HVAC system cleaning contractor shall perform the services specified here in accordance with the current published standards of the National Air Duct Cleaners Association (NADCA).

.2 All terms in this specification shall have their meaning defined as stated in the NADCA Standards.

.3 NADCA Standards must be followed with no modifications or deviations being allowed.

1.4 DOCUMENTS

.1 Mechanical Drawings: The owner shall provide the HVAC system cleaning contractor with one copy of the following documents:

.2 Project drawings and specifications.

.3 Approved construction revisions pertaining to the HVAC system.

.4 Any existing indoor air quality (IAQ) assessments or environmental reports prepared for the facility.

Part 2 Products

2.1 SCOPE OF WORK

.1 This section defines the minimum requirements necessary to render HVAC components clean, and to verify the cleanliness through inspection and/or testing in accordance with items specified herein and applicable NADCA Standards.

.2 The Contractor shall be responsible for the removal of visible surface contaminants and deposits from within the HVAC system in strict accordance with these specifications.

.3 The HVAC system includes any interior surface of the facility's existing air distribution system for conditioned spaces and/or occupied zones served by existing Lab Classroom SA fan/Lab Classroom RA fan & new HVAC-5. This includes the entire heating, air-conditioning and ventilation system from the points where the air enters the system to the points where the air is discharged from the system. The return air grilles, return air ducts to the air handling units (AHU), the interior surfaces of the AHU, mixing box, coil compartment, condensate drain pans, humidifiers and dehumidifiers, supply air ducts, fans, fan housing, fan blades, turning vanes, filters, filter housings, reheat coils, and supply diffusers are all considered part of the HVAC system. The HVAC system may also include other components such as dedicated exhaust and ventilation components and make-up air systems.

2.2 HVAC SYSTEM COMPONENT INSPECTIONS AND SITE PREPARATIONS

.1 HVAC System Component Inspections: Prior to the commencement of any cleaning work, the HVAC system cleaning contractor shall perform a visual inspection of the HVAC system to determine appropriate methods, tools, and equipment required to satisfactorily complete this project. The cleanliness inspection should include air handling units and representative areas of the HVAC system components and ductwork. In HVAC systems that include multiple air-handling units, a representative sample of the units should be inspected.

.2 The cleanliness inspection shall be conducted without negatively impacting the indoor environment through excessive disruption of settled dust, microbial amplification or other debris. In cases where contamination is suspected, and/or in sensitive environments where even small amounts of contaminant may be of concern, environmental engineering control measures should be implemented.

.3 Damaged system components found during the inspection shall be documented and brought to the attention of the consultant.

.4 Site Evaluation and Preparations: Contractor shall conduct a site evaluation, and establish a specific, coordinated plan which details how each area of the building will be protected during the various phases of the project.

.5 Inspector Qualifications: Qualified personnel should perform the HVAC cleanliness inspection to determine the need for cleaning. At minimum, such personnel should have an understanding of HVAC system design, and experience in utilizing accepted indoor environmental sampling practices, current industry HVAC cleaning procedures, and applicable industry standards.

2.3 GENERAL HVAC SYSTEM CLEANING REQUIREMENTS

.1 Containment: Debris removed during cleaning shall be collected and precautions must be taken to ensure that Debris is not otherwise dispersed outside the HVAC system during the cleaning process.

.2 Particulate Collection: Where the Particulate Collection Equipment is exhausting inside the building, HEPA filtration with 99.97% collection efficiency for 0.3-micron size (or greater) particles shall be used. When the Particulate Collection Equipment is exhausting outside the building, Mechanical Cleaning operations shall be undertaken only with Particulate Collection Equipment in place, including adequate filtration to contain Debris removed from the HVAC system. When the Particulate Collection Equipment is exhausting outside the building, precautions shall be taken to locate the equipment down wind and away from all air intakes and other points of entry into the building.

.3 Controlling Odors: Measures shall be employed to control odors and/or mist vapors during the cleaning process.

.4 Component Cleaning: Cleaning methods shall be employed such that all HVAC system components must be Visibly Clean as defined in applicable standards (see NADCA Standards). Upon completion, all components must be returned to those settings recorded just prior to cleaning operations.

.5 Air-Volume Control Devices: Dampers and any air-directional mechanical devices inside the HVAC system must have their position marked prior to cleaning and, upon completion, must be restored to their marked position.

.6 Service Openings: The contractor shall utilize service openings, as required for proper cleaning, at various points of the HVAC system for physical and mechanical entry, and inspection.

.7 Contractor shall utilize the existing service openings already installed in the HVAC system where possible.

.8 Other openings shall be created by this contractor where needed and they must be created so they can be sealed by this contractor in accordance with industry codes and standards.

.9 Closures must not significantly hinder, restrict, or alter the airflow within the system.

.10 Closures must be properly insulated to prevent heat loss/gain or condensation on surfaces within the system.

.11 Openings must not compromise the structural integrity of the system.

.12 Construction techniques used in the creation of openings should conform to requirements of applicable building and fire codes, and applicable NFPA, SMACNA and NADCA Standards.

.13 Cutting service openings into flexible duct is not permitted. Flexible duct shall be disconnected at the ends as needed for proper cleaning and inspection.

.14 Rigid fiberglass duct systems shall be resealed in accordance with NAIMA recommended practices. Only closure techniques that comply with UL Standard 181 or UL Standard 181a are suitable for fiberglass duct system closures.

.15 All service openings capable of being re-opened for future inspection or remediation shall be clearly marked and shall have their location reported to the consultant in project report documents.

.16 Ceiling sections (tile): The contractor may remove and reinstall ceiling sections to gain access to HVAC systems during the cleaning process.

.17 Air distribution devices (registers, grilles & diffusers): The contractor shall clean all air distribution devices.

.18 Air handling units, terminal units (VAV, Dual duct boxes, etc.), blowers and exhaust fan: The contractor shall ensure that supply, return, and exhaust fans and blowers are thoroughly cleaned. Areas to be cleaned include blowers, fan housings, plenums (except ceiling supply and return plenums), scrolls, blades, or vanes, shafts, baffles, dampers and drive assemblies. All visible surface contamination deposits shall be removed in accordance with NADCA Standards. Contractor shall:

.19 Clean all air handling units (AHU) internal surfaces, components and condensate collectors and drains.

.20 Assume that a suitable operative drainage system is in place prior to beginning wash down procedures.

.21 Clean all coils and related components, including evaporator fins.

.22 Duct Systems: This Contractor shall:

.23 Create service openings in the system as necessary in order to accommodate cleaning of otherwise inaccessible areas. Provide access doors specified in duct accessories to replace openings.

.24 Mechanically clean all duct systems to remove all visible contaminants, such that the systems are capable of passing Cleaning Verification Tests (see NADCA Standards).

2.4 HEALTH AND SAFETY

.1 Safety Standards: Cleaning contractors shall comply with applicable federal, state, and local requirements for protecting the safety of the contractor's employees, building occupants, and the environment. In particular, all applicable standards of the Occupational Safety and Health Administration (OSHA) shall be followed when working in accordance with this specification.

.2 Occupant Safety: No processes or materials shall be employed in such a manner that they will introduce additional hazards into occupied spaces.

.3 Disposal of Debris: All Debris removed from the HVAC System shall be disposed of in accordance with applicable federal, state and local requirements.

2.5 MECHANICAL CLEANING METHODOLOGY

.1 Source Removal Cleaning Methods:

.2 The HVAC system shall be cleaned using Source Removal mechanical cleaning methods designed to extract contaminants from within the HVAC system and safely remove contaminants from the facility. It is the contractor's responsibility to select Source Removal methods that will render the HVAC system Visibly Clean and capable of passing cleaning verification methods (See applicable NADCA Standards) and other specified tests, in accordance with all general requirements. No cleaning method, or combination of methods, shall be used which could potentially damage components of the HVAC system or negatively alter the integrity of the system.

.1 All methods used shall incorporate the use of vacuum collection devices that are operated continuously during cleaning. A vacuum device shall be connected to the downstream end of the section being cleaned through a predetermined opening. The vacuum collection device must be of sufficient power to render all areas being cleaned under negative pressure, such that containment of debris and the protection of the indoor environment are assured.

.2 All vacuum devices exhausting air inside the building shall be equipped with HEPA filters (minimum efficiency), including hand-held vacuums and wet-vacuums.

.3 All vacuum devices exhausting air outside the facility shall be equipped with Particulate Collection including adequate filtration to contain Debris removed from the HVAC system. Such devices shall exhaust in a manner that will not allow contaminants to re-enter the facility. Release of debris outdoors must not violate any outdoor environmental standards, codes or regulations.

.4 All methods require mechanical agitation devices to dislodge debris adhered to interior HVAC system surfaces, such that debris may be safely conveyed to vacuum collection devices. Acceptable methods will include those, which will not potentially damage the integrity of the ductwork, nor damage porous surface materials such as liners inside the ductwork or system components.

.3 Methods of Cleaning Fibrous Glass Insulated Components:

.1 Fibrous glass thermal or acoustical insulation elements present in any equipment or ductwork shall be thoroughly cleaned with HEPA vacuuming equipment, while the HVAC system is under constant negative pressure, and not permitted to get wet in accordance with applicable NADCA and NAIMA standards and recommendations.

.2 Cleaning methods used shall not cause damage to fibrous glass components and will render the system capable of passing Cleaning Verification Tests (see NADCA Standards).

.4 Damaged Fibrous Glass Material:

.1 Evidence of damage: If there is any evidence of damage, deterioration, delaminating, friable material, mold or fungus growth, or moisture such that fibrous glass materials cannot be restored by cleaning or resurfacing with an acceptable insulation repair coating, they shall be identified for replacement.

.2 Replacement: When requested or specified, Contractor must be capable of remediating exposed damaged insulation in air handlers and/or ductwork requiring replacement.

.3 Replacement material: In the event fiber glass materials must be replaced, all materials shall conform to applicable industry codes and standards, including those of UL and SMACNA.

.4 Replacement of damaged insulation is not covered by this specification.

.5 Cleaning of Coils:

.1 Any cleaning method may be used which will render the Coil Visibly Clean and capable of passing Coil Cleaning Verification (see applicable NADCA Standards). Coil drain pans shall be subject to Non-Porous Surfaces Cleaning Verification. The drain for the condensate drain pan shall be operational. Cleaning methods shall not cause any appreciable damage to, displacement of, inhibit heat transfer, or erosion of the coil surface or fins, and shall conform to coil manufacturer recommendations when available. Coils shall be thoroughly rinsed with clean water to remove any latent residues.

.6 Antimicrobial Agents and Coatings:

.1 Antimicrobial agents shall only be applied if active fungal growth is reasonably suspected, or where unacceptable levels of fungal contamination have been verified through testing.

.2 Application of any antimicrobial agents used to control the growth of fungal or bacteriological contaminants shall be performed after the removal of surface deposits and debris.

.3 When used, antimicrobial treatments and coatings shall be applied in strict accordance with the manufacturer's written recommendations and EPA registration listing.

.4 Antimicrobial coatings shall be applied according to the manufacturer's written instructions. Coatings shall be sprayed directly onto interior ductwork surfaces, rather than "fogged" downstream onto surfaces.

2.6 CLEANLINESS VERFICATION

.1 General:

.1 Verification of HVAC System cleanliness will be determined after mechanical cleaning and before the application of any treatment or introduction of any treatment-related substance to the HVAC system, including biocidal agents and coatings.

.2 Visual Inspection:

.1 The HVAC system shall be inspected visually to ensure that no visible contaminants are present.

.2 If no contaminants are evident through visual inspection, the HVAC system shall be considered clean; however, the consultant reserves the right to further verify system cleanliness through Surface Comparison Testing or the NADCA vacuum test specified in the NADCA standards.

.3 If visible contaminants are evident through visual inspection, those portions of the system where contaminants are visible shall be re-cleaned and subjected to re-inspection for cleanliness.

.4 NADCA vacuum test analysis shall be performed by a qualified third party experienced in testing of this nature through the HVAC commissioning contract.

.3 Verification of Coil Cleaning:

.1 Cleaning must restore the coil pressure drop to within 10 percent of the pressure drop measured when the coil was first installed. If the original pressure drop is not known, the coil will be considered clean only if the coil is free of foreign matter and chemical residue, based on a thorough visual inspection (see NADCA Standards).

2.7 PRE-EXISTING SYSTEM DAMAGE

.1 Contractor is not responsible for problems resulting from prior inappropriate or careless cleaning techniques of others.

2.8 POST-PROJECT REPORT

.1 At the conclusion of the project, the Contractor shall provide a report to the consultant indicating the following:

.1 Success of the cleaning project, as verified through visual inspection and/or gravimetric analysis.

.2 Areas of the system found to be damaged and/or in need of repair.

Part 3 Execution

Not Applicable.

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 REFERENCES

.1 Heating cable must conform to CSA 22.2 No.130-03 (latest edition).

1.3 SUMMARY

.1 Section includes heat tracing for fire-suppression piping with self-regulating, parallel resistance.

1.4 SUBMITTALS

.1 Product Data: For each type of product.

.2 Include:

- .1 Heating cable data sheet.
- .2 Connection kits and accessories data sheet.
- .3 Controller data sheet.
- .4 Controller wiring diagram.

.3 Include rated capacities, operating characteristics, and furnished specialties and accessories.

.4 Schedule heating capacity, length of cable, and electrical power requirement for each electric heating cable required.

.5 Include heat loss calculations for each pipe including pipe and insulation characteristics, heat loss, and watts per foot supplied by the heating cable.

.6 Shop Drawings: For electric heating cable.

- .1 Include plans, elevations, and sections.
- .2 Include diagrams for power, signal, and control wiring.
- .3 Manufacturer to produce detailed design as described below.

.7 Minimum heat trace capacity shall be 8 watts per foot irrespective of heat loss calculation.

.8 Pipe Freeze Protection Detail Drawings: Project-specific Detail Drawings, including details showing:

- .1 Installation and positioning of all components.
- .2 Proper amounts of tracing for valves, pumps, flanges, fittings, instruments, etc.
- .3 Junction box layouts.

.9 Control Panel Drawings: Drawings for each control panel shall include the following:

- .1 Physical arrangement and detail drawings.

.2 Complete power and control wiring diagrams showing all internal wiring connections for electrical and instrument components in each control panel. All wires, terminals, and devices shall be numbered and tagged in accordance with system elementary diagrams.

.10 System Wiring Diagram: Project-specific drawings including:

.1 Interconnect of all major components.

.2 Assignment of circuiting.

.3 Connection of circuit wiring in terminal blocks.

.4 Connection of sensor wiring.

.5 Connection of external alarm wiring.

.11 Controller Setpoint Schedule showing the following:

.1 Circuit addresses.

.2 Circuit set points.

.12 Testing Instructions and Reporting Form: Provide documentation for use in preinstallation testing of heat-tracing system.

1.5 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: For electric heating cables to include in operation and maintenance manuals.

.2 Testing: Completed system test report.

1.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications:

.1 ISO-09001 registered.

.2 Provide products consistent with UL 515A, CSA 22.2 No 130-16, and IEEE 515.1 requirements.

.2 Installer Qualifications:

.1 System Installer to have complete understanding of product and product literature from manufacturer or authorized representative prior to installation.

.2 Electrical connections to be performed by licensed electrician.

.3 Certification: System (Heating Cable and Connection Kits): c-UL-us Listed for freeze protection of standpipes, mains, and branch fire sprinkler piping.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Deliver products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying the following:

.1 Product and Manufacturer.

.2 Length/Quantity.

.3 Lot Number.

.4 Installation and operation Manual.

.5 Material Safety Data Sheet (MSDS).

.2 Store heating cable in clean, dry location with a temperature range of -18° to 60 C (0 to 140 F).

.3 Protect heating cable ends from moisture ingress until final termination of the heating cable is complete.

1.8 WARRANTY

.1 Manufacturer Limited Warranty: Manufacturer agrees to repair or replace heat tracing products listed below that fail in materials or workmanship within specified warranty period.

.2 Covered Products Include:

.1 Heating cables, connection kits, and accessories.

.2 Thermostats, controllers, panels, contactors, sensors, and accessories.

.3 Warranty Period: Two (2) years from date of Ready for Takeover.

.4 Manufacturer's Extended Warranty: Provide Owner an extended product warranty for heat-tracing products for a period of 10 years from date of Ready for Takeover.

Part 2 Products

2.1 SYSTEM DESCRIPTION

.1 Complete pipe freeze protection system for insulated pipes exposed to the risk of freezing. System consists of a self-regulating heating cable, connection kits, accessories, and energy-efficient control and monitoring controller. The heating cable shall have a polyolefin jacket for aboveground fire sprinkler piping, including standpipes, mains, and branch fire sprinkler piping. The monitoring controller must be suitable for integration into the BAS.

2.2 PERFORMANCE REQUIREMENTS

.1 Manufacturer to design complete and functional heat-tracing system. Design must be signed and sealed by a professional engineer.

2.3 SELF-REGULATING, PARALLEL-RESISTANCE HEATING CABLES

.1 Basis of design product: Raychem or nVent XL-Trace.

.2 Comply with UL 515A, CSA 22.2 No 130-16, and IEEE 515.1 requirements.

.3 Heating Element: Pair of parallel No. 16 AWG, nickel-coated, stranded copper bus wires embedded in crosslinked conductive polymer core, which varies heat output in response to temperature along its length. Cable shall be capable of crossing over itself once without overheating.

.4 Electrical Insulating Jacket: Flame-retardant modified polyolefin.

.5 Ground Braid: Tinned-copper braid. Minimum 70 percent for ground path and mechanical ruggedness.

.6 Outer Jacket: Modified polyolefin with ultraviolet inhibitor**.** Outer jacket to be printed with cable model number, agency listings, batch number, and meter marks (for ease of installation within maximum circuit length).

.7 Maximum Operating Temperature (Power On): 154 F (68 C) for and or 12 W/ft was required to suit load.

.8 Maximum Exposure Temperature (Power Off): 185 F (85 C).

.9 Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

.10 Capacities and Characteristics:

.1 Nominal Heat Output at 10 C (50 F): 8 W/ft. (26° W/m) minimum. Provide higher as required based on heat loss calculations.

.2 Piping Diameter: Refer to plans.

.3 Electrical Characteristics for Single-Circuit Connection:

.1 Volts: 208

.2 Phase: Single.

2.4 HEATING CABLE CONNECTION KITS

.1 Basis-of-Design Product: RAYCHEM; RayClic.

.2 Provide power connections, splices/tees, and end seal kits to properly connect and terminate heating cable circuit along specified length of piping.

.3 Install splices, tees, and crosses underneath pipe insulation with service loops installed to allow for future service of piping.

.4 Connection kits shall be rated NEMA 4X to prevent water ingress and corrosion. All components shall be UV stabilized and shall not require cutting into heating-cable core to expose bus wires.

.5 Certification: c-UL-us Listed

.6 Locate connection kits above grade for buried applications.

2.5 ACCESSORIES

.1 Cable Installation Accessories: Fiberglass tape, cable ties, connection kits, and end seals all furnished by manufacturer or as recommended in writing by manufacturer.

.2 Identification: Provide and install "Electric Heat Traced" labels on exterior of pipe insulation every 10 ft. (3m) on opposite sides of pipe, and on all splices, tees, crosses, and power connections for the entire length of heat traced piping.

.3 Thermal Pipe Insulation:

.1 Pipes to be thermally insulated in accordance with manufacturer's written requirements.

.2 Insulation shall be closed-cell in areas subject to freezing and have a flame/smoke spread rating of 25/50.

2.6 APPROVED MANUFACTURERS

.1 Approved manufacturers shall be:

.1 Chromalox

.2 Raychem

.3 3M

.4 Serge Baril

.5 Heron Cable Ind.

.6 Easy Heat (Emerson)

Part 3 Execution

3.1 EXAMINATION

.1 Examine surfaces and substrates to receive electric heating cables for compliance with requirements for installation tolerances and other conditions affecting performance.

.1 Prior to installation of heating cable system, verify that all piping, to be heat traced has passed all hydrostatic/pressure test and is signed off by plumbing inspector.

.2 Ensure surfaces and pipes in contact with electric heating cables are free of burrs and sharp protrusions.

.2 Preinstallation Testing:

.1 Prior to installation of heating cable on piping, an insulation resistance test shall be performed by installing contractor to ensure integrity of heating cable as describe in installation and maintenance manual.

.3 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Protect all heating cable ends from moisture ingress until cable is terminated with end seals.

.1 Basis-of-Design Product: RAYCHEM; RayClic-E end seals.

3.3 INSTALLATION

.1 Install electric heating cable where indicated and in accordance with NFPA 70 and NFPA 13.

.2 All heat-tracing components including power connections, splices, tees, and crosses or end seal, must be installed above grade and protected from abuse or damage. In accordance with NEC and CEC, electrical connections are not permitted to be installed below grade.

.3 In the field, all heating cables shall be meggered with a minimum of 2,500 V dc for self-regulating cable. The following field megger readings shall be taken on each heating cable:

.1 Heating cable shall be meggered when received at Project site before installation.

.2 Heating cable shall be meggered after installation, but before insulation is installed.

.3 Heating cable shall be meggered after insulation is installed.

.4 Heating cable shall be meggered at final commissioning prior to being energized.

.5 Insulation resistance must exceed 1.000 megohms at 2,500 V dc.

.6 All results must meet manufacturer's specification.

.7 Test cables for electrical continuity during installation.

.8 Test insulation integrity before energizing.

.9 Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.

.4 Install electric heating cables after piping has passed all hydrostatic pressure testing and before insulation is installed.

.5 Install electric heating cables in accordance with IEEE 515.1.

.6 Install insulation over piping with electric cables.

.7 Install warning tape on piping insulation where piping is equipped with electric heating cables.

.8 Set field-adjustable switches and circuit-breaker trip ranges.

.9 All heat trace cable shall be fastened to the steel pipes with plastic cable ties or fibreglass tape.

.10 The cable shall run the entire length of each pipe linearly.

.11 Power connection kits shall be installed in a weatherproof surface mounted junction box (suitable to house the connection kit) in the location shown on the drawings.

.12 Provide two runs of cable along the length of piping for all piping greater than or equal to 150mm (6" diameter). Run cable along top and bottom of entire pipe length or as per manufacturer’s recommendations.

.13 Electrical division shall provide power to junction box adjacent to heat trace circuit power connection. All other wiring shall be by this contractor to the standards of the electrical division.

3.4 MONITOR AND CONTROL PANEL

.1 Install in accordance with manufacturer’s instructions.

.2 Locate panel as indicated and mount securely. Plumb, true and square, to adjoining surfaces.

.3 Mount panel at working height. Maintain 1m clearance in front of panel.

3.5 CONNECTIONS

.1 Ground equipment to the requirements of the Electrical Division.

.2 Connect wiring in accordance with the requirements of the Electrical Division.

.3 Connect heat-tracing controls to fire-alarm system in accordance with NFPA 13. Comply with requirements of the Electrical Division.

3.6 FIELD QUALITY CONTROL

.1 Manufacturer's Field Service: Initial start-up and field testing (commissioning) of system shall be performed by factory technician.

.1 System shall be commissioned in accordance with manufacturer's installation and operation manual.

.2 Field Visits to be scheduled at the following intervals:

.1 Preinstallation training.

.2 Final electrical insulation resistance (megger) testing of heating cable after insulation has been installed.

.3 Final commissioning including controller programming (if applicable).

.3 Technician to verify:

.1 Controller parameters are set to the application requirements.

.2 Controller alarm contacts are properly connected to the BMS, as applicable.

.4 Test cables for electrical continuity during installation.

.5 Test insulation integrity before energizing.

.6 Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.

.2 Repeat tests for continuity, insulation resistance, and input power after applying thermal insulation on pipe-mounted cables.

.3 Cables will be considered defective if they do not pass tests and inspections in accordance with manufacturer's testing requirements.

.4 Prepare test and inspection reports.

3.7 PROTECTION

.1 Protect installed heating cables, including nonheating leads, from damage and moisture ingress during construction.

.2 Remove and replace damaged heat-tracing cables.

3.8 INSTALLED LOCATIONS

.1 Install heat trace in all areas indicated on drawings and where subject to freezing. This includes, but is not limited to:

.1 Wet fire protection systems in unheated spaces.

.2 Drip legs of dry standpipe systems in unheated spaces.

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 Proprieties by Mean of the Guarded Hot-Plate Apparatus.

.2 ASTM C518 Standard Test Method for Steady-State Thermal Transmission Proprieties 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 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, 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•FT^2•°F)

.4 Type C-2: Mineral fibre blanket to ASTM C553 Type I, II, and III, ASTM C1136 Type II and IV, and ASTM C1290 Type III:

.1 Jacket: to ASTM C1136, Type II and IV.

.2 Maximum "k" value: 042 W/M•°C (.29 BTU•IN/HR•FT^2•°F)

.5 Manufacturers:

.1 All materials must be supplied by the same manufacturer.

.2 Acceptable Materials:

.1 Johns Manville

.2 Knauf

.3 Manson

2.4 JACKETS

.1 Canvas:

.1 220 g/m^2 (6 oz/sq.yd.) cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.

.2 Lagging adhesive: Compatible with insulation.

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.

.11 Banding: 15 mm (1/2") wide, 0.5 mm (26 gauge) thick stainless steel.

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")
Supply, return and fan exhaust ducts exposed (visible) in space being served	none	
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")
Indoor AHU relief air ducts	C-1	25 mm (1")

.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.

.3 Finishes: Conform to following table:

Application	Rectangular	Round
Indoor, concealed	none	none
Indoor, exposed	Canvas	Canvas

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 Proprieties by Means of the Guarded-Hot-Plate Apparatus.

.3 ASTM C518, Standard Test Method for Steady-State Thermal Transmission Proprieties 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 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.

.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, ASTMC177 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 Materials:

.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 Polyvinyl Chloride (PVC):

.1 Minimum thickness: 20mil (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 (not to be used on below-ambient temperature systems)

.3 Pressure sensitive vinyl tape of matching colour.

.2 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 specialities.

.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")
Refrigerant piping	A-3	25 (1")	25 (1")	25 (1")	25 (1")	25 (1")

.5 Finishes: Conform to the following table:

Application	Piping	Valves & Fittings
Exposed indoors	PVC	PVC
Exposed in mech. rooms	PVC	PVC
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 materials:

.1 Newman Hattersley

.2 Crane

.3 Jenkins

.4 Milwaukee

.5 Toya

2.6 EMERGENCY GAS SOLENOID VALVE

.1 Two (2) way normally closed all bronze construction.

.2 Suitable for 120V and natural gas.

.3 Acceptable material:

.1 Asco.

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 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.

3.3 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.

3.4 PURGING

.1 Purge after pressure test in accordance with CAN/CSA B149.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian Standards Association (CSA).

.1 CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.

.3 American Society for Testing and Materials (ASTM).

.1 ASTM A47/A47M, Specification for Ferritic Malleable Iron Castings.

.2 ASTM A278/A278M, Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures up to 650°F (350°C).

.3 ASTM A516/A516M, Specification for Pressure Vessel Plates, Carbon Steel, for Moderate - and Lower - Temperature Service.

.4 ASTM A536, Specification for Ductile Iron Castings.

.5 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

.4 American Society of Mechanical Engineers (ASME).

.1 ANSI/ASME, Boiler and Pressure Vessels Code (BPVC).

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Indicate on manufacturers' catalogue literature the following:

.1 Sizes, orientation, capacities, performance, etc.

.2 Accessories

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 PIPELINE STRAINER

.1 Pipeline strainer shall provide a means of mechanically removing solids from a flowing fluid. This is accomplished by utilizing a perforated metal mesh.

.2 Strainers shall be installed in pipelines to protect downstream mechanical equipment such as condensers, heat exchangers, pumps, compressors, meters, spray nozzles, turbines, and steam traps from the detrimental effect of sediment, rust, pipe scale, or other extraneous debris.

.3 Types of strainers: Provide strainers that are Y strainer and/or basket strainer.

.4 Strainer end connections shall match the piping specification.

.1 NPS 15 mm to 50 mm (1/2" to 2"): bronze body to ASTM B62, screwed connections.

.2 NPS 65 mm to 300 mm (2 1/2" to 12"): cast steel body to ASTM A278M, Class 30, flanged connections.

.3 NPS 50 mm to 300 mm (2" to 12"): T type with malleable iron body to ASTM A47M, grooved ends.

.5 Strainer components shall include a cover, perforated plate, mesh, wedge wire, gasket, and cover fasteners.

.1 Perforated Plate/Mesh/Wedge Wire: Stainless steel (various grades available).

.2 Gaskets: to suite fluid application.

.3 Fasteners: to match body material.

.6 Mesh sizing: An extremely important consideration in the selection of a strainer is the size of the perforations, mesh or wire opening used in the fabrication of the straining element. Select holes that are actually needed for the application and specified by the equipment manufacturer's request that is being protected.

The following tables illustrate mesh and their respective straining capability. The main criteria for choosing hole and mesh size is the size and quantity of particles which can pass through downstream equipment without causing damage.

Mesh (Openings/In.)	Wire Diameter (In.)	Opening		Percent Open Area
		Inches	Micron	
10	0.032	0.068	727	56.3
16	0.018	0.045	1130	50.7
18	0.017	0.036	979	48.3
20	0.015	0.035	889.0	49.0
30	0.011	0.0223	566.4	44.8
40	0.009	0.0156	396.2	40.2
50	0.009	0.011	279	30.3
60	0.0065	0.0102	259.1	37.3
80	0.005	0.0075	190.5	36.0
100	0.0045	0.0055	139.7	30.3
120	0.0035	0.0048	123	30.1
150	0.0026	0.0041	103	37.2
170	0.0024	0.0035	79	35.1
200	0.0020	0.0030	76.2	33.6
250	0.0016	0.0024	61	36.0
300	0.0012	0.0021	54.2	29.7
325	0.0012	0.0019	47.7	30.0
400	0.0011	0.0014	35.6	36.0

.7 Capacity: The capacity ratio or open area ratio (OAR) of a strainer influences such operating characteristics as the length of time it can operate without cleaning and the created pressure loss. The OAR is the relationship between internal cross sectional area (flow area) of the pipe and the open flow area of the material which makes up the straining element.

The OAR for wye strainers shall not be less than 2.5:1.

The OAR for basket strainers shall not be less than 7:1.

When considering the OAR of a straining element, there are two accepted methods of analysis used by various specifying agencies and manufacturers. One method maintains "line of sight" reasoning and uses the multiple of the open areas for elements in series. In this method, a 60% open area material in series with a 40% open area material has a resultant combined open area of 24% (i.e. as in accordance with Military Standards). An alternative method allows the open area of the more restrictive element in series to be used. This would be 40% for the example above (i.e. as in accordance with Underwriter Laboratories' Standards). The method used influences the estimated operating pressure drop, as well as design decisions such as sizing.

.8 Strainers are made with various dimensions and configurations, manufacturers have tested and published pressure drop results.

Provide strainers designed for reasonable velocities that permit approximately 2 psi pressure drop across the strainer.

Provide basket strainers designed for reasonable velocities that permit approximately 0.5 psi pressure drop across the strainer.

.9 To allow the manufacturer to make selection or recommendations for a particular strainer, as much as possible, the following information should be provided by the Contractor to the Supplier:

- .1 Physical Characteristics
  - .1 Pipe size and schedule
  - .2 Strainer type required.
  - .3 End connections.
  - .4 Material (body, screen, bolting, gaskets).
  - .5 Pressure rating (design/operating — including shock).
  - .6 Temperature rating (design, operating, minimum).
  - .7 Straining element opening size.
  - .8 Capacity:
    - .1 Net effective open area required.
    - .2 Method of net open area calculation.
  - .9 Special requirements (hinged cover, vent tapping, jacketed, etc.).
  - .10 Applicable specifications (military specifications, special nondestructive tests or other quality control requirements).

.2 Flow Data

.1 Liquid:

.1 Description of fluid.

.2 Rate of flow – gallons per minute (gpm) or pounds per hour (lbs/hr).

.3 Viscosity – SSU.

.4 Specific gravity or density.

.5 Temperature.

.6 Concentration (if acid or other corrosive).

.2 Gas:

.1 Description of Gas.

.2 Rate of flow – standard cubic feet per minute (scfm) or actual cubic fee per minute (cfm).

.3 Specific gravity.

.4 Temperature and pressure.

.5 Molecular weight.

.3 Steam:

.1 Rate of flow-pounds per hour (lbs/hr).

.2 Temperature.

.3 Pressure.

.4 Density.

.5 State of flow.

.10 Blowdown connection: NPS 25 mm (1").

.11 Screens at pumps: stainless steel with 1.19 mm (50 mil) perforations (16 mesh).

.12 Working pressure: 860 kPa (125 psi).

Part 3 Execution

3.1 GENERAL

.1 Install as indicated and to manufacturer's recommendations.

.2 Run drain lines (and blow off connections) to terminate above nearest drain.

.3 Maintain proper clearance to permit service and maintenance.

.4 Should deviations beyond allowable clearances arise, request, and follow Consultant's directive.

.5 Check shop drawings for conformance of all tappings for ancillaries and for equipment operating weights.

3.2 STRAINERS

.1 Install in horizontal or down flow lines.

.2 Ensure clearance for removal of basket.

.3 Install ahead each of the following components:

.1 Temperature control valves

.2 Additional locations where indicated on the drawings.

.4 Provide proper mesh strainers for the proper application.

.5 Provide proper mesh strainers as recommended by the manufacturer's product being protected.

.6 Provide basket strainers ahead of all plate heat exchanger or equipment with plate heat exchanger when piping is 100 mm (4") and larger.

.7 The strainer must be installed such that the debris chamber is located at the lowest possible position. A Y strainer in vertical piping must be placed with its screen in the downward position to trap the sediment in the debris collection chamber.

.8 Provide with a blowdown so the element can be flushed out by opening and closing the blowdown valve. This shall be accomplished without flow stoppage or disassembling any piping.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian Standards Association (CSA).

.1 CSA W47.1, Certification of Companies for Fusion Welding of Steel.

.3 American National Standards Institute (ANSI).

.1 ANSI/ASME B16.1, Gray Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.

.2 ANSI/ASME B16.3, Malleable-Iron Threaded Fittings, Classes 150 and 300.

.4 American Society for Testing and Materials (ASTM).

.1 ASTM A47/A47M, Specification for Ferritic Malleable Iron Castings.

.2 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.

.3 ASTM A536, Specification for Ductile Iron Castings.

.4 ASTM B61, Specification for Steam or Valve Bronze Castings.

.5 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

.5 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).

.1 MSS-SP-67, Butterfly Valves.

.2 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.

.3 MSS-SP-71, Cast Iron Swing Check Valves, Flanged and Threaded Ends.

.4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

.5 MSS-SP-85, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Indicate on manufacturers' catalogue literature the following:

.1 Piping

.2 Valves

.3 Accessories

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 STEEL PIPE

.1 Steel pipe: to ASTM A53/A53M, Grade B, as follows:

.1 NPS 32 mm (1 1/4") and smaller: Schedule 40.

.2 Final connection to copper heating elements.

.1 Type “L” copper with 95/5 solder joints and dielectric couplings. Maximum length 600 mm (24").

.3 Pipe Joints

.1 NPS 32 mm (1 1/4") and under: screwed fittings with pulverized lead paste.

.2 Flanges: plain or raised face, slip-on.

.3 Flange gaskets: suitable for hydronic heating up to 110°C (220°F).

.4 Pipe thread: taper.

.5 Bolts and nuts: to ANSI B18.2.1 and ANSI/ASME B18.2.2.

.4 Fittings

.1 Screwed fittings: malleable iron, to ANSI/ASME B16.3, Class 150.

.2 Pipe flanges and flanged fittings:

.1 Cast iron: to ANSI/ASME B16.1, Class 125.

.2 Steel: to ANSI/ASME B16.5.

.3 Butt-welding fittings: steel, to ANSI/ASME B16.9.

.4 Unions: malleable iron, to ASTM A47/A47M and ANSI/ASME B16.3.

2.2 VALVES

.1 Connections:

.1 NPS 32 mm (1 1/4") and smaller: screwed ends.

.2 Gate valves: Application: Isolating equipment, control valves, pipelines:

.1 NPS 50 mm (2") and under:

.1 Mechanical Rooms: Class 125, rising stem, solid wedge disc.

.2 Elsewhere: Class 125, non-rising stem, solid wedge disc.

.2 NPS 65 mm (2 1/2") and over:

.1 Mechanical Rooms:

.1 Rising stem, solid wedge disc, bronze trim.

.1 Operators: handwheel.

.2 Non-rising stem, solid wedge disc, bronze trim.

.1 Operators: handwheel.

.3 Butterfly valves: Application: Isolating each cell or section of multiple component equipment and where indicated.

.1 NPS 32 mm (1 1/4") and smaller: screwed ends.

.4 Globe valves: Application: Throttling, flow control, emergency bypass:

.1 NPS 32 mm (1 1/4") and under:

.1 With PFTE disc, as specified. Bronze.

.2 NPS 65 mm (2 1/2") and over:

.1 With solid bronze disc, bronze trim, cast iron body.

.5 Drain valves: Gate, Class 125, non-rising stem, solid wedge disc, with chain and cap.

.6 Swing check valves:

.1 NPS 32 mm (1 1/4") and under:

.1 Class 150, swing, with PFTE disc, as specified. Bronze. Jenkins 4475TJ.

.2 NPS 65 mm (2 1/2") and over:

.1 Flanged or Grooved ends, Bronze trim, Cast Iron: Gate, Globe, Check.

.7 Ball valves:

.1 NPS 80 mm (3") 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:

.1 NPS 32 mm (1 1/4") and under screwed ends to ANSI B1.20.1 and with hex. shoulders.

.4 Stem: stainless steel tamperproof ball drive.

.5 Ball and seat: replaceable stainless steel solid ball and teflon seats.

.6 Operator: removable lever handle.

.7 Extended handles on chilled water valves.

.8 Full port.

.8 All valves shall be of commercial grade and of same manufacturer.

.9 Acceptable Manufacturers:

.1 Newman Hattersley Canada Ltd.

.2 Jenkins/Crane

.3 Milwaukee

.4 Toyo

.5 Kitz

2.3 BALANCING VALVES

.1 Size 15 mm (1/2") to NPS 32 mm (1 1/4"): Bronze body, brass ball, NPT connections and variable orifice.

.2 Size 40 mm (1 1/2") to larger: Cast iron body, raised flange connections, glove style with brass plug.

.3 Differential pressure readout ports with internal EPT inserts and check values, 6 mm (¼") NPT tapped drain/purge ports, memory stop and calibrated nameplate.

.4 Acceptable materials:

.1 Bell & Gossett Circuit Setters

.2 Armstrong

.3 Taco

.4 Tour & Anderson

.5 Oventrop

2.4 AUTOMATIC AIR VENT

.1 Industrial float vent: cast iron body and NPS 15 mm (1/2") connection and rated at 860 kpa (125 psi) working pressure.

.2 Float: solid material suitable for 115°C (240°F) working temperature.

.3 Plastic vents are not acceptable.

.4 Acceptable materials:

.1 Maid-O-Mist No. 67

.2 Spirax Sarco

Part 3 Execution

3.1 PIPING INSTALLATION

.1 Installation shall be by a licensed pipe fitter.

.2 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

.3 Install concealed pipes close to building structure to keep furring space to minimum. Install to conserve headroom and space. Run exposed piping parallel to walls. Group piping wherever practical.

.4 Slope piping in direction of drainage and for positive venting.

.5 Use eccentric reducers at pipe size change installed to provide positive drainage or positive venting.

.6 Provide clearance for installation of insulation and access for maintenance of equipment, valves and fittings.

.7 Ream pipes, clean scale and dirt, inside and outside, before and after assembly.

.8 Assemble piping using fittings manufactured to ANSI standards.

.9 Saddle type branch fittings may be used on mains if branch line is no larger than half the size of main. Hole saw or drill and ream main to maintain full inside diameter of branch line prior to welding saddle.

3.2 VALVE INSTALLATION

.1 Install rising stem valves in upright position with stem above horizontal.

.2 Install butterfly valves on chilled water and condenser water lines only.

.3 Install gate or ball valves at branch take-offs and to isolate each piece of equipment, and as indicated.

.4 Install globe valves for balancing and in by-pass around control valves as indicated.

.5 Provide silent check valves on discharge of pumps and in vertical pipes with downward flow and as indicated.

.6 Provide swing check valves in horizontal lines as indicated.

.7 Install chain operators on valves NPS 65 mm (2½") and over where installed more than 2400 mm (96") above floor in Boiler Rooms and Mechanical Equipment Rooms.

.8 Provide ball valves for glycol service.

3.3 AIR VENTS

.1 Install at high points of systems.

.2 Install ball valve on automatic air vent inlet.

.3 Extend vent lines in Mechanical Room with screwdriver stop at 1.8 m AFF.

3.4 CIRCUIT BALANCING VALVES

.1 Install flow measuring stations and flow balancing valves as indicated.

.1 On return side of all heating devices (convectors, panels, force flows, radiation, coils, etc.).

.2 On return side of all water or glycol cooling coils.

.3 On return side of all reverse return piping loops and/or branch circuits.

.2 Install to manufacturers requirements.

.3 Minimum valve size shall be one pipe size smaller than piping or 20 mm (¾"), whichever is larger.

.4 Refer to Testing Adjusting and Balancing Section for applicable procedures.

3.5 FILLING OF SYSTEM

.1 Refill system with clean water adding water treatment as specified.

.2 Co-ordinate filling of system with HVAC water treatment contractor.

3.6 TESTING

.1 Test system in accordance with Mechanical General Requirements Section.

.2 For glycol systems, retest with propylene glycol to ASTM E202, inhibited, for use in building system after cleaning. Repair any leaking joints, fittings or valves.

3.7 FLUSHING AND CLEANING

.1 Scope:

.1 Flush new piping only.

.2 Refer to Water Treatment Section.

3.8 EXISTING SYSTEM DISPOSAL

.1 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 (ANSI).

.1 ANSI/ASME B16.1, Gray Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.

.2 ANSI/ASME B16.3, Malleable-Iron Threaded Fittings, Classes 150 and 300.

.3 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).

.4 ANSI/ASME B18.2.2, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).

.5 ANSI/AWWA C111/A21.11, Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.3 American Society for Testing and Materials (ASTM).

.1 ASTM A47/A47M, Specification for Ferritic Malleable Iron Castings.

.2 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.

.3 ASTM A536, Specification for Ductile Iron Castings.

.4 ASTM B61, Specification for Steam or Valve Bronze Castings.

.5 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

.6 ASTM F-1476, Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.

.4 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).

.1 MSS-SP-67, Butterfly Valves.

.2 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.

.3 MSS-SP-71, Cast Iron Swing Check Valves, Flanged and Threaded Ends.

.4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

.5 MSS-SP-85, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Indicate on manufacturers' catalogue literature the following:

.1 Piping

.2 Valves

.3 Accessories

.4 Grooved joint products shall be shown on drawings and product submittals and shall be specifically identified with the applicable Victaulic style or series number.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in general requirements.

1.4 APPLICATION

.1 Hydronic heating over 43°C (110°F).

Part 2 Products

2.1 ACCEPTABLE MATERIALS

.1 Victaulic.

.2 No alternates.

2.2 PIPE

.1 Steel pipe: to ASTM A53/A53M, Grade B, as follows:

.1 NPS 40 mm (1 ½") up to 150 mm (6"): Schedule 40.

.2 Final connection to copper heating elements.

.1 Type “L” copper with 95/5 solder joints and dielectric couplings. Maximum length 600 mm (24").

2.3 PIPE JOINTS

.1 NPS 32 mm (1 ¼") and under: screw fittings with pulverized lead paste. Refer to 23 21 13 Hydronic Piping – Screwed, Welded.

.2 Rolled grooved with Grade E (EPDM) gaskets.

2.4 FITTINGS

.1 Grooved fittings: ASTM A536, Grade 65-45-12, ductile iron; ASTM A234, Grade WPB, wrought steel; or factory-fabricated from ASTM A53 steel pipe.

.2 Grooved joint couplings shall consist of two ductile iron housing segments, pressure responsive elastomer gasket, and ASTM A449 zinc-electroplated steel bolts and nuts. Couplings shall comply with ASTM F-1476, Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.

.1 Rigid: Couplings shall be Victaulic Style 107N Installation-Ready with angled bolt pad design to provide system rigidity and support and hanging in accordance with ANSI B31.1 and B31.9. Couplings must be installed with Grade EHP (EPDM-HP) gaskets, rated for water service to 120°C (250°F).

.2 Flexible: Use in locations where vibration attenuation and stress relief are required. Flexible couplings may be used in lieu of flexible connectors at equipment connections. Three couplings, for each connector, shall be placed in close proximity to the vibration source. Basis of Design: Victaulic Style 177 Installation-Ready, and Style 77.

.3 AGS series two-segment couplings with lead-in chamfer on housing key and wide-width FlushSeal gasket. Basis of Design: Victaulic Style W07 (rigid) and Style W77 (flexible).

.3 Flanges: Victaulic Style 741 / W741.

.4 Hole Cut Products and Branch Connections:

.1 Victaulic Style 920 / 920N Mech. Tee

.2 Victaulic Style 923 Vic-Let Outlet

.3 Victaulic Style 924 Vic-O-Well Thermometer Outlet

2.5 VALVES

.1 Connections:

.1 NPS 32 mm (1 1/4") and smaller: screwed ends.

.2 NPS 40 mm (1 1/2") and larger: rolled grooved ends.

.2 Butterfly valves: Application: Isolating each cell or section of multiple component equipment and where indicated. Valve seat shall be pressure responsive in sizes through NPS 300 mm (12"). The stem shall be offset from the disc centerline to provide complete 360-degree circumferential seating.

.1 NPS 40 mm (1 ½") and over: Victaulic Vic 300 MasterSeal

.3 Drain valves: Gate, Class 125, non-rising stem, solid wedge disc, with chain and cap.

.4 Check valves:

.1 NPS 32 mm (1 ¼") and under:

.1 Class 150, swing, with PFTE disc, as specified.

Bronze. Jenkins 4475TJ.

.2 NPS 40 mm (1 ½") and over: Victaulic Style 716 Vic – check and AGS W715 for NPS 350 mm (14") and over.

.5 Ball valves:

.1 NPS 32 mm (1 ¼") 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: stainless steel 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.

.9 Extended handles on chilled water valves.

.10 Full port.

.11 Jenkins 201SJ.

.6 Strainers:

.1 Tee strainers: NPS 40 mm (1½") and over: Victaulic 730/W730 Tee Type Vic-Strainer.

.2 Wye Strainer: NPS 50 mm (2") and over: Victaulic 732/W732 Wye Type Vic-Strainer.

2.6 PUMP ACCESSORIES

.1 **Series 380 Discharge Vibration Pump Drop**

Factory assembled grooved end vibration pump discharge drop for pipe sizes 3" through 12" (DN80 though DN300). Orange enamel coated assembly, consisting of a Class 150 flange for pump connection, [base elbow for horizontal pump connection] [straight line with concentric reducer for vertical pump connections], tri-service valve assembly consisting of a spring-actuated check [Venturi-Check] valve and butterfly valve with offset stem for 360-degree circumferential seating, and pipe spool with thermometer and pressure ports. Assembly is installation-ready, with flexible couplings to accommodate vibration attenuation and stress relief. Assembly rated for working pressure to 300-psig (2068-kPa). Standard of Acceptance: Victaulic Series 380.

.2 **Series 381 Suction Vibration Isolation Pump Drop**

Factory assembled grooved end vibration pump suction drop for pipe sizes 3" through 12" (DN80 though DN300). Orange enamel coated assembly, consisting of a suction diffuser with stainless steel basket and diffuser and Class 150 flange for pump connection, butterfly valve with offset stem for 360-degree circumferential seating, and pipe spool with thermometer and/or pressure ports. Assembly is installation-ready, with flexible couplings to accommodate vibration attenuation and stress relief. Assembly rated for working pressure to 300-psig (2068-kPa). Standard of Acceptance: Victaulic Series 381.

.3 **Series 382 Strainer Vibration Isolation Pump Drop**

Factory assembled grooved end vibration pump suction drop for pipe sizes 3" through 12" (DN80 though DN300). Orange enamel coated assembly, consisting of a 90-degree base elbow with Class 150 flange for pump connection, Wye pattern strainer with stainless steel perforated metal basket, butterfly valve with offset stem for 360-degree circumferential seating, and pipe spool(s) with thermometer and/or pressure ports. Assembly is installation-ready, with flexible couplings to accommodate vibration attenuation and stress relief. Assembly rated for working pressure to 300-psig (2068-kPa). Standard of Acceptance: Victaulic Series 382.

2.7 VICTAULIC VIC-HEADER

.1 Factory-fabricated grooved end header [manifold] all-in-one assembly for fluid distribution. Header shall consist of an ASTM A53, Grade B, and standard weight pipe spool with required outlet connections. Grooved ends roll grooved to Victaulic [OGS] [AGS] dimensions, with enamel coating or galvanized to project requirements. Standard of Acceptance: Victaulic Vic-Header.

.2 Stainless steel header piping conforms to ASTM A312, Schedule to match adjoining piping system, with RX roll grooved ends for Schedule 5S or 10S pipe through NPS 12 (DN 300).

2.8 BALANCING VALVES

.1 Size 15 mm (1/2") to 50mm (2"): DZR Brass (Ametal®) globe type or bronze body, brass ball, NPT connections and variable orifice. Victaulic Series 786 / 787.

.1 Victaulic Koil-Kits Series 799, 79V, 79A, and 79B may be used at coil connections. The kit shall include a Series 786/787/78K circuit balancing valve or series 76 (where automatic balancing valves are required), Series 78Y Strainer-Ball or Series 78T Union-Ball valve combination, Series 78U Union-Port fitting, and required coil hoses. A Style 793 and/or 794 and/or Pilot R differential pressure controller shall be provided as required. A meter shall be provided by the valve manufacturer that shall remain with the building owner after commissioning.

.2 Combination balancing and control valve: at mechanical contractor and control contractor agreement, combination balancing/control valves will be accepted: ½" – 2" Victaulic TC on/off, Victaulic Series TM Modulating. For sizes 2-1/2" – 6" Fusion C

.3 Pressure Independent balancing and control valve (PIBCV) to be provided where required: Victaulic Series TCP/7CP/Fusion P

.2 Size 65 mm (2 1/2") to larger: Victaulic Tour Anderson Series 788/789.

.3 Differential pressure readout ports with internal EPT inserts and check values, 6 mm (¼")NPT tapped drain/purge ports, memory stop and calibrated nameplate.

.4 Acceptable materials:

.1 Tour & Anderson

.2 No alternates.

2.9 AUTOMATIC AIR VENT

.1 Industrial float vent: cast iron body and NPS 15 mm (1/2") connection and rated at 860 kPa (125 psi) working pressure.

.2 Float: solid material suitable for 115°C (240°F) working temperature.

.3 Plastic vents are not acceptable.

.4 Acceptable materials:

.1 Maid-O-Mist No. 67

.2 Spirax Sarco

2.10 EXPANSION JOINTS AND FLEXIBLE CONNECTIONS

.1 Application: to suit motion.

.2 Minimum length in accordance with manufacturers recommendations to suit offset.

.3 Victaulic Style 150 Mover slip-type expansion joint or Style 155 Expansion Compensators. The expansion joint shall be installed with Style 07 Zero-Flex couplings.

Part 3 Execution

3.1 PIPING INSTALLATION

.1 Installation shall be by a licensed pipe fitter.

.2 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

.3 Install concealed pipes close to building structure to keep furring space to minimum. Install to conserve headroom and space. Run exposed piping parallel to walls. Group piping wherever practical.

.4 Slope piping in direction of drainage and for positive venting.

.5 Use eccentric reducers at pipe size change installed to provide positive drainage or positive venting.

.6 Provide clearance for installation of insulation and access for maintenance of equipment, valves and fittings.

.7 Ream pipes, clean scale and dirt, inside and outside, before and after assembly.

.8 Assemble piping using fittings manufactured to ANSI standards.

.9 Saddle type branch fittings may be used on mains if branch line is no larger than half the size of main. Hole saw or drill and ream main to maintain full inside diameter of branch line prior to welding saddle.

.10 Grooved Joints: Install in accordance with the manufacturer’s latest published installation instructions.

.1 Pipe ends shall be clean and free from indentations, projections and roll marks in the area from pipe end to (and including) groove.

.2 Gasket shall be manufactured by the coupling manufacturer and verified as suitable for the intended service.

.3 A manufacturer’s factory trained representative shall periodically visit the job site and review the installation for best practices. This shall be at the expense of the installing contractor. The installing Contractor shall correct any identified deficiencies.

.4 Victaulic product that has been examined and has not met the visual inspection criteria for proper installation must be corrected and re-examined by Inspection Services prior to the completion of the project. Any Victaulic product that has not been corrected or was not examined will not be considered as part of the successful completion of Inspection Services.

.5 Upon completion of the manufacturer’s inspection of the installation and any identified corrections, the manufacturer will provide the owner or purchaser with a limited warranty on manufacturer’s products.

3.2 PIPE END PREPARATION

.1 Refer to the latest Victaulic installation instructions.

.2 Outside diameter of grooved pipe shall not vary more than the tolerance approved. Any internal or external weld bead or seams in the groove area must be ground smooth and flush. The end of the pipe internally must be cleaned of any material that might interfere with or damage the internal roll.

.3 Pipe surface shall be free from indentations and projections from the end of the pipe to the groove, to provide a leak tight seat for the gasket. All loose paint, scale, dirt, chips, grease and rust must be removed. It is the recommendations of Victaulic that the pipe be square cut.

.4 Bottom of the groove must be free of loose dirt, chips, rust and scale that may interfere with proper coupling assembly.

.5 Groove dimensions shall conform to standard roll groove specifications as published by Victaulic.

.6 Pipe shall be grooved using Victaulic roll grooving system with track enhanced grooving rolls.

3.3 "ZERO-FLEX" COUPLING INSTALLATION

.1 Refer to the latest Victaulic installation instructions.

.2 Pipe must be free from indentation, projections, or roll marks on exterior from the end to the groove, to assure a leak tight seat for the gasket.

.3 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Apply a thin coat of Victaulic Lubricant to gasket lips and outside of gasket.

.4 Place gasket over pipe end, being sure lip does not overhang pipe end.

.5 Align and bring two pipe ends together and slide gasket into position centered between the grooves on each pipe. No portion of the gasket shall extend into the groove on either pipe.

.6 Loosely assemble all segments leaving one nut and bolt off to allow for "swing-over" feature.

.7 With one nut and one bolt removed, use "swing-over" feature to position housings over gasket and into position into the grooves on both pipes.

.8 Remaining bolt shall be inserted. Bolt track head must engage into housing recess.

.9 Nuts shall be tightened alternately and equally and must maintain metal-to-metal contact at the angle bolt-pads. Tighten securely to assure a rigid joint.

3.4 "REDUCING" COUPLING INSTALLATION

.1 Refer to the latest Victaulic installation instructions.

.2 Pipe must be free from indentation, projections, or roll marks on exterior from the end to the groove, to assure a leak tight seat for the gasket.

.3 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Gasket must be thoroughly lubricated.

.4 Place large opening of the gasket over the larger pipe ends until the Assembly Washer touches the pipe end.

.5 Align the pipe centerlines and insert the smaller pipe end in the gasket. Assembly washer provided by Victaulic shall be used.

.6 Coupling housings shall be positioned over the gasket into the groove on each pipe.

.7 Insert bolts and apply nuts.

.8 Nuts must be tightened alternately and equal until housing bolt pads are firmly together – metal-to-metal.

3.5 "OUTLET" COUPLING INSTALLATION

.1 Refer to the latest Victaulic installation instructions.

.2 Pipe must be free from indentation, projections, or roll marks on exterior from the end to the groove, to assure a leak tight seat for the gasket.

.3 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Gasket must be thoroughly lubricated.

.4 Gasket shall be placed on one pipe end so the lips on one side cover the area between the pipe end and the groove. The gasket must not overlap the groove. The pipe ends shall be d to touch the reinforcement ribs inside the gasket.

.5 Bring mating pipe or fitting into position and insert into gasket. The gasket shall not overlap the groove, but fully cover the pipe end.

.6 Housings shall be placed over the gasket and the housing keys must engage into the grooves. Ample lubricant shall be applied to the gasket outlet neck and the upper housing interior.

.7 Insert bolts and apply nuts.

.8 Nuts must be tightened alternately and equally until housing bolt pads are firmly together – metal-to-metal.

3.6 VICTAULIC "FLANGE ADAPTOR" INSTALLATION

.1 Refer to the latest Victaulic installation instructions.

.2 Pipe must be free from indentation, projections, or roll marks on exterior from the end to the groove, to assure a leak tight seat for the gasket.

.3 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade.

.4 Victaulic Flange adaptor shall be opened fully and hinged flange shall be placed around the grooved pipe end with the circular key section locating into the groove.

.5 Standard bolt shall inserted through the mating holes of the Vic-Flange adaptor to secure firmly in the groove.

.6 Gasket shall be fully lubricated and pressed into the cavity between the pipe O.D. and flange recess.

.7 Standard flange bolt shall be place in the hinge hole (opposite the lock bolt) and the bolt assembly shall be directed to mate with the adjoining flange. Remaining flange bolts shall be added and tightened evenly until faces contact firmly.

.8 Where Vic-Flange adaptors do not mate to a hard smooth surface, Victaulic Flange Washers must be used.

3.7 MECHANICAL-T OUTLET INSTALLATION

.1 Refer to the latest Victaulic installation instructions.

.2 Holes must be drilled.

.3 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade.

.4 In preparation for assembly, one nut and bolt shall be removed from the housing. The other nut and bolt shall be loosened until it is flush with the nut and bolt. Remove the tape and lift the gasket from the mechanical-T outlet.

.5 Victaulic lubricant shall be applied to all surfaces of the gasket and the gasket shall be properly repositioned into the housing using alignment tabs.

.6 When assembling the coupling, the lower housing shall be rotated 90 degrees away from the upper housing. Place the upper, or outlet section on to the face of the pipe in line with the outlet hole. The lower section shall then be rotated around the pipe to close the two halves. The locating collar must be in the outlet hole.

.7 Insert bolt and apply nut. Oval neck must engage in recess of the housing.

.8 Nuts shall be tightened alternately and equally until the housing is in complete surface contact in the gasket pocket area and the assembly is rigid.

.9 Where mechanical-T are used as transition pieces between two runs, they must be assembled onto the runs before the branch connections are made.

3.8 VIC-LET STRAPLESS OUTLET & VIC-O-WELL STRAPLESS THERMOMETER & PRESSURE GAUGE INSTALLATION

.1 Refer to the latest Victaulic installation instructions.

.2 Holes must be drilled.

.3 Do not use for branch piping connections where size may not be available. Use first available size and reducer.

.4 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Victaulic lubricant shall be applied to exposed gasket sealing lip.

.5 Vic-Let outlet toe shall align with pipe. Tilt toe into the hole and drop into the pipe. The Vic-Let outlet must be positioned with the heel inside the pipe.

.6 Collar shall be held in position while nut is being hand tightened. Nut shall then be wrench tightened until collar deforms to contact pipe all around. Maintain collar/gasket alignment to prevent gasket pinching. Do not exceed 200 ft. lbs. Vic-Let outlet shall not be reused after initial installation.

3.9 ROUST-A-BOUT PLAIN END PIPE COUPLING INSTALLATION

.1 Refer to the latest Victaulic installation instructions.

.2 Pipe shall be marked as required.

.3 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Apply a thin coat of Victaulic Lubricant to gasket lips and outside of gasket.

.4 Place gasket over pipe end, being sure lip does not overhang pipe end.

.5 The pipe shall be butt and held in position while slide the gasket back into position. The gasket must be centered between the marks.

.6 Housings shall be placed over the gasket.

.7 Insert bolts and apply nuts.

.8 Nuts must be tightened alternately and equally to standard torque specifications as published by Victaulic. Segments must be assembled with equal gaps between the bolt pads.

3.10 VALVE INSTALLATION

.1 Install valves in upright position with stem above horizontal.

.2 Install butterfly valves on chilled water and condenser water lines only.

.3 Install butterfly or ball valves at branch take-offs and to isolate each piece of equipment, and as indicated.

.4 Install globe valves for balancing and in by-pass around control valves as indicated.

.5 Provide silent check valves on discharge of pumps and in vertical pipes with downward flow and as indicated.

.6 Provide swing check valves in horizontal lines as indicated.

.7 Install chain operators on valves NPS 65 mm (2 1/2") and over where installed more than 2400 mm (96") above floor in Boiler Rooms and Mechanical Equipment Rooms.

.8 Provide ball valves for glycol service.

3.11 AIR VENTS

.1 Install at high points of systems.

.2 Install isolating ball valve on automatic air vent inlet.

3.12 CIRCUIT BALANCING VALVES

.1 Install flow measuring stations and flow balancing valves as indicated.

.1 On return side of all heating devices (convectors, panels, force flows, radiation, coils, etc).

.2 On return side of all water or glycol cooling coils.

.3 On return side of all reverse return piping loops and/or branch circuits.

.2 Install to manufacturers requirements.

.3 Tape joints in prefabricated insulation on valves installed in chilled water mains.

.4 Refer to Testing Adjusting and Balancing Section for applicable procedures.

3.13 FLUSHING AND CLEANING

.1 Coordinate flushing and cleaning of mechanical systems with HVAC water treatment contractor**.**

.2 Flush and clean **new** piping system in presence of Consultant.

3.14 FILLING OF SYSTEM

.1 Refill system with clean water adding water treatment as specified.

3.15 TESTING

.1 Test system in accordance with Mechanical General Requirements Section.

.2 For glycol systems, retest with propylene glycol to ASTM E202, inhibited, for use in building system after cleaning. Repair any leaking joints, fittings or valves.

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.

1.2 SPECIAL CONSIDERATIONS FOR VRF REFRIGERANT PIPING SYSTEMS

.1 Refrigerant piping contractors must be trained and certified by VRF equipment supplier. Proof of training certification must be made available upon request.

.2 There shall be minimal use of refrigeration specialties (filter driers, accumulators, receivers, check valves, etc.) in the VRF piping system. Refer and follow Manufacturer's recommendations in this regard.

.3 As noted in Section 1.2.5 of Regulatory Compliance, pressure relief valves shall be 650 PSI rated and installed in pairs (two valves per circuit).

.4 Y style piping joints and headers provided by the manufacturer shall be used to ensure proper refrigerant balance and flow for optimum system capacity and performance.

.5 T style joints and/or joints provided by the installing contractor, or Y joints not purchased from the manufacturer shall not be acceptable.

.6 Approved R-410a flaring block, and approved torque wrenches, both available from VRV manufacturer, shall be used for all flare connections.

.7 All indoor refrigerant lines shall be insulated with minimum ½" wall diameter Armaflex.

.8 All outdoor refrigerant lines shall be insulated with minimum ¾" wall diameter Armaflex and suitable for outdoor service. Exposed insulation shall be protected by aluminum, sheet metal, painted canvas, plastic cover, or painted with an approved UV coating that is water resistant and provides shielding from solar radiation.

.9 Pipe clamps shall fasten around the piping insulation. Pipe clamps that compress the copper directly shall be installed a minimum of 36" away from RefNet joints, and shall be loosely tightened to allow for copper expansion.

.10 Contractor shall provide VRF manufacturer with all actual pipe lengths installed for calculation of refrigerant charge. Refrigerant piping contractor shall supply and charge VRF system with required quantity of R-410a prior to VRF manufacturer commissioning. Refrigerant charging shall be done in the liquid state.

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 Approved 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 Approved 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. Coordinate selection with evaporator coil and condensing unit.

.3 Approved 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 2 mm 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 cush clamps with shoulder bolt and molded thermoplastic cushion, size to suit pipe.

.4 Acceptable materials:

.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 APPLICATION

.1 Soft copper piping is allowed to be used as follows:

.1 For all systems under 3 tons in nominal size, except for exterior piping.

.2 For all vertical risers passing through more than two (2) floors not served by the system. Refer to Piping Through Floors section.

.3 For piping within a residential/long term care/apartment suite served by a variable refrigerant flow system.

.2 Hard Copper shall be used as follows:

.1 For all other systems/applications.

.2 For all exterior piping.

3.3 PIPING THROUGH FLOORS

.1 Refrigerant piping systems containing refrigerants that pass through floors not served by the system shall be installed as per the requirements of CSA B23-2023:

.1 Refrigerant piping shall be installed through a rigid and tight, continuous fire-resisting pipe (stainless steel, cast iron or similar) without openings into any floors not served by the system.

.2 The pipe shall be vented to the floor served by the system.

.3 Soft copper may be used when the shaft extends beyond two (2) storeys in length.

3.4 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.

3.5 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 2.4 m (8') high and at each 7.6 m (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.

3.6 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.

3.7 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.

3.8 INSTRUCTIONS

.1 Post instructions in frame with glass cover in accordance with Operation and Maintenance Manual Section and CSA B52.

3.9 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 manufacturer:

.1 Aquarian Chemicals (905-825-3711)

.2 No alternates

2.2 WATER TREATMENT FOR HYDRONIC SYSTEMS

.1 Hot water heating system: existing system

2.3 CHEMICALS

.1 Provide one (1) year’s supply.

2.4 TEST EQUIPMENT

.1 Provide one (1) set of test equipment for each system to verify performance.

.2 Complete with carrying case, reagents for chemicals, all specialized or supplementary equipment.

2.5 CLEANING CHEMICALS

.1 Provide as required to make system clean.

.2 Cleaner chemical: compatible and of the same manufacturer of the water treatment supplier.

2.6 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.

.5 Commissioning procedures - Closed Circuit Hydronic Systems:

- .1 Analyse water in system.
- .2 Based upon an assumed rate of loss approved by Engineer, establish rate of chemical feed.
- .3 Record types, quantities of chemicals applied.
- .4 Provide written verification of glycol solution concentration.

.6 Training:

- .1 Commission systems, perform tests in presence of, and using assistance of, assigned O&M personnel.
- .2 Train O&M personnel in softener regeneration procedures.

.7 Certificates:

.1 Upon completion, furnish certificates confirming satisfactory installation and performance.

.8 Commissioning Reports:

.1 To include system schematics, test results, test certificates, raw and treated water analyses, design criteria, all other data required by Consultant.

.9 Commissioning activities during Warranty Period:

.1 Check out water treatment systems on regular basis and submit written report to Consultant.

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 two (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:

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.

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 Stainless Steel

.1 To ASTM A480/A480M, Type 304.

.2 Thickness, fabrication and reinforcement: to ASHRAE and SMACNA or as indicated.

.3 Joints: to ASHRAE and SMACNA.

.1 Acceptable material:
Ductmate Canada Ltd.

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 Nexas 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 materials:

.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 materials:

.1 Ductmate Canada Ltd.

.2 Nexus, Exanno Corp.

.3 WDCII.

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 45º entry on branch.

.2 Round main and branch: enter main duct at 45º 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 90º round spin in collars with balancing damper and locking quadrant.

.6 Transitions:

.1 Diverging: 20º maximum included angle.

.2 Converging: 30º 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 materials:

.1 Duro Dyne S-2

.2 Foster

2.6 TAPE

.1 Tape: polyvinyl treated, open weave fiberglass tape, 50 mm (2") wide.

.1 Acceptable material:

.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 WATERTIGHT DUCT

.1 Provide watertight duct for:

.1 Fresh air intake.

.2 Minimum 3000 mm (120") from duct mounted humidifier in all directions.

.3 As indicated.

.2 Form bottom of horizontal duct without longitudinal seams. Solder or weld joints of bottom and side sheets. Seal all other joints with duct sealer.

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 material:

.1 Myatt fig. 485

.2 For steel joist: manufactured joist clamp or steel plate washer.

.1 Acceptable material:

.1 Grinnell fig. 61 or 60

.3 For steel beams: manufactured beam clamps:

.1 Acceptable material:

.1 Grinnell Fig. 60

Part 3 Execution

3.1 GENERAL

.1 The following systems shall conform to these requirements:

System	Class	Material
VAV Supply Science Room Exhaust	A A	Galvanized steel Stainless steel
HVAC Supply and Return General Exhaust Ventilation Plenum Exhaust Plenum	B B B B	Galvanized steel Galvanized steel Galvanized steel Galvanized steel
Individual Exhaust	C	Galvanized 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 mm (")	Spacing 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 WATERTIGHT DUCT

.1 Slope horizontal branch ductwork down towards hoods served. Slope header ducts down toward risers.

.2 Fit base of riser with 150 mm (6") deep drain sump and 25 mm (1") drain connected, with deep seal trap and valve and discharging to open funnel drain.

3.4 SEALING

.1 Apply sealant to outside of joint to manufacturer's recommendations.

.2 Bed tape in sealant and recoat with minimum of one (1) coat of sealant to manufacturers recommendations.

3.5 LEAKAGE TESTS

.1 Co-ordinate leakage testing with TAB contractor. 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 then 3 branch takeoffs and two 90º 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 entire existing systems shall be cleaned and vacuumed prior to reconnection.

.5 Ensure all systems are clean prior to start up.

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 materials:

.1 Nailor

.2 E. H. Price

.3 Titus

2.4 TURNING VANES

.1 Factory or shop fabricated double thickness, to recommendations of SMACNA and as indicated.

.2 Acceptable materials:

.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 material:

.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 materials:

.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 materials:

.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 materials:

.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 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 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 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 materials:

.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 materials:

.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.

.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 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 materials:

.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 materials:

.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 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.

2.4 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 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.

3.3 WIRING

.1 All fire alarm wiring shall be one (1) hour rated and in conduit or as per electrical fire alarm wiring requirement.

3.4 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools, and equipment.

3.5 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.

3.6 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 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 materials:

.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 materials:

.1 T.A. Morrison

.2 Tamco Series 7000

.3 Ruskin

.4 Nailor

.5 E.H. Price

.6 Henderson Industrial

.7 Ventex/Alumavent

.8 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 –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 materials:

.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 material:

.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/m^3 (6 lb/ft^3).

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 material:

.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 material:

.1 Duro Dyne

.2 Ductmate

2.4 JOINT TAPE

.1 Poly-Vinyl treated open weave fiberglass membrane 50 mm (2") wide.

.2 Acceptable materials:

.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 (-90F) to 93°C (200°F).

.3 Acceptable materials:

.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 two (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 Acceptable materials:

.1 Greenheck
.2 Penn-Barry
.3 Cook
.4 Jenco (S & P)/Jenn
.5 Carnes
.6 Acme
.7 Zonex
.8 Twin-City
.9 Reversomatic
.10 Fantech
.11 Aerovent

.9 Provide factory mounted speed control for all direct drive motors.

2.2 ROOF EXHAUSTERS

.1 Centrifugal V belt or direct driven as indicated.

.1 Housing: spun aluminum complete with resilient mounted motor and fan.
.2 Impeller: aluminum non-overloading.
.3 Adjustable motor sheave
.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, cadium plated securing bolts and screw, and sound insulating.

.2 Roof curbs: of same manufacturer as fan and built to suit model specified. Roof curbs to be minimum 500mm (20”) high except where indicated otherwise. Roof curbs for NFPA 96 fans are to be vented.Size, type, and capacity: as indicated

.3 Power feed shall be thru roof curb.

.4 To NFPA 96 requirements where indicated.

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 materials:

.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: as indicated.

2.3 DIFFUSERS

.1 General: volume control dampers with flow straightening devices and blank-off quadrants, as indicated and gaskets.

.2 Type, size, and capacity: as indicated.

2.4 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 FIXED LOUVRES – ALUMINUM

.1 Construction: welded with exposed joints ground flush and smooth.

.2 Material: extruded aluminum alloy 6063-T5.

.3 Blade: stormproof pattern with centre watershed in blade, reinforcing bosses and maximum blade length of 1500 mm (60").

.4 Frame, head, sill and jamb: 100 mm (4") deep one piece extruded aluminum, minimum 3 mm (1/8") thick with approved caulking slot, integral to unit.

.5 Mullions: at 1500 mm (60") maximum centres.

.6 Fastenings: stainless steel (Society of Automotive Engineers) SAE-194-8F with SAE-194-SFB nuts and resilient neoprene washers between aluminum and head of bolt, or between nut, ss washer and aluminum body.

.7 Screen: 15 mm (1/2") exhaust 20 mm (3/4") intake mesh, 2 mm (5/64") diameter wire aluminum birdscreen on inside face of louvres in formed U-frame.

.8 Finish:
Powder Coated
Colour: to Consultant's approval.

.9 Acceptable materials:

.1 Greenheck

.2 Construction Specialties

.3 E.H. Price

.4 Krueger

.5 Ruskin

.6 Ventmaster

.7 Ventex

.8 Nailor

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-90A, Installation of Air Conditioning and Ventilating Systems.

.3 AMCA 99 – Standard Handbook.

.4 AMCA 210 – Laboratory Methods of Testing Fans for Rating Purposes.

.5 ARI 270, Standard for Sound Rating of Outdoor Unitary Equipment.

.6 ANSI/AHRI 340/360 – Performance Rating of Commercial and Industrial Unitary Air Conditioning and Heat Pump Equipment.

.7 AMCA 500 – Test Methods for Louvers, Dampers, and Shutters.

.8 AHRI 260 – Sound Rating of Ducted Air Moving and Conditioning Equipment.

.9 NFPA 90A – Installation of Air Conditioning and Ventilation Systems.

.10 UL-1995 – Standard for Safety for Heating and Cooling Equipment.

.11 C.1 CSA B52-2023, Mechanical Refrigeration Code

.12 C.2 CAN/CSA-C22.2 No 60335 Safety of Household and similar electrical appliances – Heat Pumps, Air-conditioners and dehumidifiers.

1.2 QUALITY ASSURANCE

.1 Manufacturer Qualifications:

.1 Company specializing in manufacturing the products specified in this section with minimum of five years documented experience.

.2 Units shall be manufactured in a facility registered to ISO 9001 manufacturing quality standard.

.3 Air-handling unit assembly shall have UL 1995 certification for safety, including use with electric heat.

.4 Products requiring electric connection shall be listed and classified by ETL and CSA as suitable for the purpose specified and indicated.

.5 Coil performance shall be certified in accordance with AHRI Standard 410.

.6 Air-handling unit shall be AHRI 430 listed and meet NFPA 90A requirements.

.7 All codes, standards, etc. as referenced shall be the latest edition.

1.3 DELIVERY, STORAGE AND PROTECTION

.1 All indoor units, painted or unpainted, shall be completely shrink-wrapped from the factory for protection during shipment. Tarping of bare units is unacceptable.

.2 Inspect for transportation damage and store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.4 START-UP REQUIRMENTS

.1 Do not operate units until ductwork is clean, filters are in place, bearings lubricated, condensate properly trapped, piping connections verified and leak tested, belts aligned and tensioned, all shipping braces have been removed, and fan has been test run under observation.

1.5 PERFORMANCE RATINGS

.1 Unit certification: Units shall conform to CSA-C746-2006 and ARI 340/360-2007 and shall be listed by NRCan as approved for sale in Canada and be compliant with the SB-10 Supplement of the Ontario Building Code. Testing shall be completed by a third party, certified lab.

Part 2 Products

2.1 GENERAL DESCRIPTION

.1 Units shall ship in the number of sections necessary to meet project requirements and shall ship in as many splits as specified in selection software. Split options as follows:

.1 Shipped in sections - shipping split.

2.2 CASING

.1 Construction:

.1 Unit shall be constructed of a complete frame with easily removable panels. Removal of any panel shall not affect the structural integrity of the unit.

.2 All units shall be supplied with 14-gage or heavier, G-90 galvanized steel base rails. Bolton legs are NOT acceptable. Perimeter lifting lugs for overhead lifting shall be provided on each section. Slinging units in place of lifting lugs shall not be acceptable.

.3 Unit shall be thermally broken to minimize the conduction path from the inside of the casing to the outside.

.4 Casing panels (top, sides, and bottom) shall be constructed of galvanized steel, and shall have one of the following exterior finishes as specified:

.1 Pre-painted with a baked enamel finish passing 500-hour salt spray test (ASTM B-117) for pre-painted steel and 125-hour marine level 1 prohesion test (ASTM G-85.A5) for pre-painted steel.

.2 Unpainted G-90 galvanized steel.

.5 Casing panels (top, sides, and bottom) shall be constructed of galvanized steel, and shall have one of the following interior finishes as specified:

.1 Pre-coated with a silver zeolite antimicrobial material registered by the US EPA for use in HVAC applications.

.2 Unpainted G-90 galvanized steel.

.6 Casing panels (top, sides, and bottom) shall be one piece, double-wall construction with insulation sealed between the inner and outer panels. Panel assemblies shall not carry an R-value of less than 13.

.7 Casing deflection shall not exceed a 1:200 ratio when subject to an internal pressure of ± 6-in. wg. Casing leakage rate shall be less than 1% at 6 in. wg of nominal unit airflow or 50 cfm, whichever is greater. Leakage rate shall be tested and documented on a routine basis on random production units. Optionally, factory witness leak testing and/or test reports shall be available.

.8 Side panels shall be easily removable for access to unit and shall seal against a full perimeter automotive style gasket to ensure a tight seal.

.9 The panel retention system shall comply with UL 1995 which states all moving parts (for example, fan blades, blower wheels, pulleys, and belts) that, if accidentally contacted, could cause bodily injury, shall be guarded against accidental contact by an enclosure requiring tools for removal.

.10 Accessibility options shall be as follows:

.1 Hinged double-wall access door on either side with removable access panel(s) on the other side.

.2 Hinged double-wall access doors on both sides.

.3 Removable double-wall access panels on both sides.

.11 Depending on the options selected and the remaining available space inside each section, the following options may be available:

.1 Thermal pane reinforced glass viewports shall be factory-installed on the access panel(s) or door(s) of the section.

.2 Marine lights shall be factory installed with or without GFCI (ground fault circuit interrupter) convenience outlets.

.12 Fan supports, structural members, panels, or flooring shall not be welded, unless aluminum, stainless steel, or other corrosion-resistant material is used. Painted welds on unit exterior steel or galvanized steel are not acceptable.

.13 All coil sections shall be double wall construction with insulation sealed between the inner and outer panels. Panel assemblies shall not carry an R-value of less than 13. Single height coil sections shall have removable frame sections to facilitate vertical coil extraction.

.14 Blow-thru sections shall have a diffuser plate as an integral part of the fan section.

.2 Access Doors:

Access doors shall be one piece, double-wall construction with insulation sealed between the inner and outer panels. Panel assemblies shall not carry an R-value of less than 13.

.3 Drain Pans:

Drain pans shall be insulated double wall stainless steel construction. The pan shall be sloped toward the drain connection. Drain pan shall have 11/2-in. MPT connection exiting through the hand side or opposite side of the casing as specified. One drain outlet shall be supplied for each cooling coil section. Drain pan shall allow no standing water and comply with ASHRAE Standard 62. Where two (2) or more coils are stacked in a coil bank, intermediate drain pans shall be provided and the condensate shall be piped to the bottom drain pan. The bottom coil shall not serve as a drain path for the upper coil.

2.3 FANS

.1 General:

.1 Forward-curved fans shall have one double-width double-inlet (DWDI) fan wheel and scroll. They shall be constructed of galvanized steel with baked enamel. They shall be designed for continuous operation at the maximum rated fan speed and motor horsepower. Fans shall have an AMCA class rating corresponding to the static pressure at which the fan is designed to operate (Class I or II). Completed fan assembly shall be dynamically balanced in accordance with 1989 ARI Guideline G at design operating speed using contract drive and motor if ordered.

.2 Airfoil fan sections shall have one DWDI airfoil fan wheel and scroll. Airfoil blades shall be double thickness design constructed of heavy gage, high strength steel or aluminum continuously welded to the backplate and the spun inlet flange. Entire fan assembly shall be cleaned, primed and painted with alkyd enamel, except for an aluminum fan wheel when supplied. Fans shall have an AMCA class rating corresponding to the static pressure at which the fan is designed to operate (Class I, II, or III). Completed fan assembly shall be dynamically balanced to minimum grade of G 6.3 per ANSI/AMCA 204 at design operating speed using contract drive and motor if ordered.

.3 Plenum fan sections shall have one single-width single-inlet (SWSI) airfoil fan wheel. Airfoil blades shall be double thickness design constructed of heavy gage, high strength steel or aluminum continuously welded to the backplate and the spun inlet flange. Entire fan assembly shall be cleaned, primed and painted with alkyd enamel, except for an aluminum fan wheel when supplied. They shall be designed for continuous operation at the maximum rated fan speed and motor horsepower. Fans shall have an AMCA class rating corresponding to the static pressure at which the fan is designed to operate (Class I, II, or III). Completed fan assembly shall be dynamically balanced to minimum grade of G 6.3 per ANSI/AMCA 204 at design operating speed using contract drive and motor if ordered.

.4 Fan wheels shall be keyed to the shaft and shall be designed for continuous operation at maximum rated fan speed and motor horsepower. Fan wheels and shafts shall be selected with a maximum operating speed 25% below the first critical.

.5 Fan motor shall be mounted within the fan section casing on slide rails equipped with adjusting screws. Motor shall be high efficiency, open dripproof or totally enclosed fan cooled NEMA Design B with size and electrical characteristics as shown on the equipment schedule. Premium efficiency motors shall be available. Motor shall be mounted on a horizontal flat surface and shall not be supported by the fan or its structural members. All three-phase motors shall have a ± 10% voltage utilization range and a 1.15 minimum service factor. Motor shall be compliant with EPACT where applicable. Single-phase motors shall be available up to and including 5 hp.

.2 Performance Ratings:

.1 Fan performance shall be rated and certified in accordance with AHRI Standard 430.

.3 Sound Ratings:

.1 Manufacturer shall submit first through eighth octave sound power for fan discharge and casing radiated sound.

.4 Mounting:

.1 Fan scroll, wheel, shaft, bearings, drives, and motor shall be mounted on a common base assembly. The base assembly is isolated from the outer casing with factory-installed isolators and rubber vibration absorbent fan discharge seal. A canvas style duct connection between fan discharge and cabinet is not acceptable. Units shall use 2-in. deflection spring isolators.

.5 Fan Accessories:

.1 Forward-curved fans:

.1 Variable frequency drives with or without bypass.

.2 Magnetic motor starters.

.3 Motor disconnects.

.4 Belt guards.

.5 Inlet screen.

.2 Airfoil Fans:

.1 Variable frequency drives with or without bypass.

.2 Magnetic motor starters.

.3 Motor disconnects.

.4 Belt guards.

.5 Inlet screen.

.3 Plenum Fans:

.1 Variable frequency drives with or without bypass.

.2 Magnetic motor starters.

.3 Motor disconnects.

.4 Inlet screen and wheel cage.

.6 Flexible Connection:

The base assembly is isolated from the outer casing with factory-installed isolators and rubber vibration absorbent fan discharge seal. A canvas style duct connection between fan discharge and cabinet is not acceptable.

2.4 BEARINGS AND DRIVES

.1 Bearings:

Self-aligning, grease lubricated, anti-friction with lubrication fittings extended to drive side of fan section. Optional grease fittings extended to the exterior of the casing are available.

.1 Size 03 to 110 forward-curved fans: Cartridge type bearings for Class I fans. Heavy-duty pillow block type, self-aligning, regreasable ball or roller type bearings selected for a minimum average life (L50) of 200,000 hours or optionally for an (L50) of 500,000 hours.

.2 Size 03 to 110 airfoil fans: Heavy-duty pillow block type, self-aligning, regreasable ball or roller type bearings selected for a minimum average life (L50) of 200,000 hours or optionally for an (L50) of 500,000 hours.

.3 Size 06 to 110 plenum fans: Heavy-duty pillow block type, self-aligning, regreasable roller type bearings selected for a minimum average life (L50) of 200,000 hours or optionally for an (L50) of 500,000 hours.

.2 Shafts:

Fan shafts shall be solid steel, turned, ground, polished and coated with a rust inhibitor.

.3 V-Belt Drive:

Drive shall be designed for a minimum 1.2 service factor as standard with a 1.5 service factor option and/or a factory-supplied extra set of belts. Drives shall be fixed pitch with optional variable pitch for motors 15 hp and less. All drives shall be factory mounted, with sheaves aligned and belts properly tensioned.

2.5 COILS

.1 All water, steam and direct expansion (DX) refrigerant coils shall be provided to meet the scheduled performance. All coil performance shall be certified in accordance with AHRI Standard 410. All water and direct expansion coils shall be tested at 450 psig air pressure. Direct expansion coils shall be designed and tested in accordance with ASHRAE/ANSI 15 Safety Code for Mechanical Refrigeration (latest edition).

.2 General Fabrication:

.1 All water and refrigerant coils shall have minimum 3/8-in. OD copper tubes mechanically expanded into fins to ensure high thermal performance with lower total flow and pumping requirements. Minimum tube wall thickness shall be 0.016 inches. Optional tube wall thickness of 0.025 in. shall be supplied, if specified.

.2 Aluminum-finned coils shall be supplied with die-formed casing and tube sheets of mill galvanized steel or stainless steel as specified. Copper-finned coils shall be supplied with stainless steel casing and tube sheets.

.3 Hydronic Heating:

.1 Coil headers shall be copper with steel male pipe connections. Headers shall have drain and vent connections accessible from the exterior of the unit.

.2 Configuration: Coils shall be drainable, with non-trapping circuits. Coils will be suitable for a design working pressure of 300 psig at 200 F.

.4 Refrigerant Coils:

.1 Headers shall be constructed of copper with brazed joints.

.2 Standard circuiting selections include:

.1 Single distributor arrangement for sizes 03-17.

.2 Row split intertwined, multiple distributor arrangement for sizes 03-110.

.3 Face split, multiple distributor arrangement for sizes 03-110.

.3 Replaceable nozzle, brass refrigerant distributors and seamless copper distribution tubes are supplied to ensure uniform flow.

.5 VRV systems, where indicated, are to be integrated with air handing unit utilizing a VRV DX coil, VRV Hot Gas Reheat Coil (HGRH), branch selector box, electronic expansion valves and appropriate refrigeration system controls. VRV manufacturer shall provide the DX & HGRH coil(s), electronic expansion valves and associated AHSP controllers. ASHP controllers shall include terminal strip for integration of ASHP sequence with field supplied AHU controller.

2.6 SPLIT-SYSTEM VRV AIR-SOURCE HEAT PUMPS

.1 Split-system air source heat pump units shall be Daikin VRV systems (Variable Refrigerant Volume) distributed by DXS Ontario (416-661-3400).

.2 Each air handling unit shall be served by a minimum of three independent refrigeration circuits for system redundancy.

.3 VRV system shall automatically vary the target evaporating and condensing temperatures based on building load and weather conditions to increase part load efficiency (Variable Refrigerant Temperature). The condensing unit shall also feature customizable operating modes which allows for the manual setting of target evaporating and condensing temperatures.

.4 System shall permit simultaneous heating and cooling for dehumidification purposes.

.5 Installing contractor must be certified by VRF manufacturer. The bidders shall be required to submit training certification proof with bid documents and submittal documents. Untrained contractors who wish to bid this project may contact DXS Ontario (416-661-3400) to arrange training prior to bid day. The manufacturer shall provide a factory trained service technician to start-up each unit. Manufacturer shall provide instruction to the owners' personnel on proper unit operation and maintenance.

.6 The warranty period on all parts and compressors shall commence on the date of initial start-up and shall continue for a period of Ten (10) years not to exceed one hundred and twenty six (126) months from date of shipment. Proper maintenance of the equipment shall be conducted by certified technicians as per the manufacturer or manufacturer's representative requirements. Maintenance logs shall be supplied by the owner upon request. All manufacturer warranty shall be for parts only. All diagnosis and labour warranty shall be carried out by installing contractor as per the warranty requirements of this project.

.7 Installing Contractor must be TSSA certified and shall register all projects sized at 5 tons or greater for air conditioning application and 3 tons or greater for refrigeration applications. A copy of the TSSA registration shall be submitted to the mechanical consultant of record. All components of a refrigeration piping system must have a Canadian Registration Number or CSA certification acceptable to TSSA. All systems shall display appropriate Ozone Depletion Prevention (ODP) tags prior to commissioning. Manufacturer shall not commission any system not displaying proper ODP tag.

.8 Pressure relief valves shall be installed in pairs (two valves per refrigeration circuit) using a purpose built "Y" fitting similar or equal to Superior Products model 3155W. Relief valve assembly must be complete with an integrated ball valve. Assembly shall be supplied and installed on both the liquid and suction line, or liquid and discharge line as per drawing details. Pressure relief valves shall be individually isolated to allow for maintenance and replacement every five years as mandated by the code (refer to CSA B52 section 8.4.2). Pressure relief valves shall be 650 PSI rated and installed in pairs.

.9 VRV refrigeration piping systems shall be installed with the following considerations:

.10 There shall be minimal use of refrigeration specialties (filter driers, accumulators, receivers, check valves, etc.) in the VRF piping system. Refer and follow Manufacturer's recommendations in this regard.

.11 Y-style piping joints and headers provided by the manufacturer shall be used to ensure proper refrigerant balance and flow for optimum system capacity and performance. T-style joints and/or joints provided by the installing contractor, or Y-joints not purchased from the manufacturer shall not be acceptable.

.12 Approved R-410a flaring block, and approved torque wrenches, both available from VRV manufacturer, shall be used for all flare connections.

.13 Contractor shall provide VRV manufacturer with all actual pipe lengths installed for calculation of refrigerant charge. Refrigerant piping contractor shall supply and charge VRV system with required quantity of R-410a prior to VRV manufacturer commissioning. Refrigerant charging shall be done in the liquid state.

.14 The condensing unit shall be factory assembled in North America and pre-wired with all necessary electronic and refrigerant controls. The refrigeration circuit of the condensing unit shall consist of Daikin inverter scroll compressors, motors, fans, heat exchanger, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports, liquid receiver and suction accumulator.

.15 The Daikin inverter scroll compressors shall be high efficiency reluctance DC (digitally commutating), hermetically sealed, variable speed type. Temperatures and pressures shall be read every 20 seconds and calculated. With each reading, the compressor capacity (INV frequency) shall be controlled to eliminate deviation from target value. Non inverter-driven compressors shall not be accepted. Neodymium magnets shall be adopted in the rotor construction to yield a higher torque and efficiency in the compressor instead of the normal ferrite magnet type. Upon complete stop of the compressor, the neodymium magnets will position the rotor into the optimum position for a low torque start. The compressors' motors shall have a cooling system using discharge gas, to avoid sudden changes in temperature resulting in significant stresses on winding and bearings.

.16 The variable speed inverter compressors in Air-Cooled systems shall also use Flash Vapor injection technology with back pressure control for reduced leakage and additional balancing weights on main shaft for increased for increased compressor lifetime.

.17 The fan motor shall have inherent protection and permanently lubricated bearings. The motor shall be provided with a fan guard to prevent contact with moving parts. The condensing unit shall consist of one or more propeller type, direct-drive 600 W fan motors that have multiple speed operation via a DC (digitally commutating) inverter. The condensing unit shall have configurable settings for intermittent fan operation to help minimize snow accumulation on fan blades when the system is off. Night setback control for low noise operation shall automatically limit the maximum speed of the fan motor.

.18 The heat exchanger on the condensing units shall be manufactured from Hi-X seamless copper tubes with N-shape internal grooves mechanically bonded on to aluminum fins to an e-Pass Design. The heat exchanger coil shall be of a waffle louver fin and rifled bore tube design to ensure high efficiency performance. The fins are to be covered with an anti-corrosion hydrophilic blue coating as standard with a salt spray test rating of 1000hr (ASTM B117 & Blister Rating:10), Acetic acid salt spray test of 500hr (ASTM G85 & Blister Rating:10).

.19 The outdoor unit shall be capable of heating operation down to -13°F ambient temperature. Tested factory data on heating capacity and efficiency shall be available. Continuous heating shall be provided during defrost mode for multi-module systems. The outdoor unit shall be capable of cooling operation down to +23°F without any additional low ambient controls.

.20 The outdoor coil shall have a three-circuit heat exchanger design. The lower part of the coil shall be used for inverter cooling, enhancing defrost during heating operation.

.21 Branch selector box cabinets shall have a galvanized steel plate casing and shall house multiple electronic expansion valves and a sub-cooling loop. The unit shall contain sound absorption thermal insulating material made of flame and heat resistant foamed polyethylene. Branch selector boxes shall not require drain pan and drain connections. Manufacturers with branch selector boxes requiring secondary drain pans and drain connections shall coordinate with the installing contractor at no extra cost to the owner.

2.7 REFRIGERATION DETECTION SYSTEM

.1 The Refrigerant detection system shall meet the requirements of CSA B52 and have the following functionality:

- .1 Utilize a set point, nonadjustable in the field, to generate a digital output signal to initiative mitigation actions to both internal safeties and external components in the ductwork (dampers, electric coils etc.). Signal shall be generated in not more than 30 seconds from sensor exposure to refrigerant concentration of 25% LFL (+0$, -1%)
- .2 Sensor within the equipment, near potential source of leaks.
- .3 Field calibration of the system is not allowed.
- .4 Be capable of detecting the refrigerant used in the system.
- .5 Have self diagnostics
- .6 Energize fans upon failure of a self-diagnostic check
- .7 Activate refrigerant safety shut off valves in the event of a leak being detected.

2.8 ENERGY RECOVERY WHEEL

.1 Provide enthalpy wheels factory installed in units where scheduled.

.2 Energy recovery wheel shall be constructed of alternate layers of corrugated and flat aluminum sheet material. Energy recovery wheels constructed out of alternate materials will not be accepted. All surfaces shall be coated or uniformly bound with a non-migrating absorbent specifically developed for the selective transfer of water vapor.

.3 Media shall be engineered to provide corrosion resistance and resistance against attack from laboratory chemicals present in pharmaceutical, hospital, etc. environments as well as attack from external outdoor air conditions. The rotor media shall be capable of being cleaned with low temperature steam without degrading unit performance.

.4 The desiccant material shall be a molecular sieve, and specifically a 3A molecular sieve to minimize cross contamination.

.5 The wheel frames shall consist of evenly spaced steel spokes, galvanized steel outer band and rigid center hub. Adjustable brush seals must be provided along the periphery of the rotor and between the inlet and outlet air passages to effectively prevent air leakage and cross-contamination between airflows.

.6 Cassettes shall be fabricated of heavy duty reinforced galvanized steel or welded structural box tubing. Cassettes shall have a built in adjustable purge section minimizing cross contamination of supply air. Bearings shall be inboard, zero maintenance, permanently sealed roller bearings, or alternatively, external flanged or pillow block bearings.

.7 The rotor drive system shall consist of a self-adjusting belt around the rotor perimeter driven by an AC motor with gear reduction. The variable speed drive shall be specifically designed for heat wheel applications and include: an AC inverter, soft start/stop, rotation detection w/alarm contacts, automatic self-cleaning jog cycle, and self-testing capability. The speed controller shall be capable of accepting a potentiometer, VDC, or mA control signal.

.8 Energy recovery bypass dampers shall be factory installed to allow full bypass around the wheel during economizer modes or to relieve static pressure losses when the heat exchanger is not in use.

.9 The wheel shall be ARI certified by the energy recovery wheel supplier to ARI Standard 1060 and must bear the ARI certification stamp. Private independent testing performed "in accordance with" various standards is not a substitute for ARI certification and shall not be accepted. The wheel shall be listed or recognized by UL or equivalent.

.10 Energy recovery wheel shall be provided with a power block for field power connection by others.

2.9 FILTER SECTIONS

.1 Flat filter sections shall accept 2-in. MERV 13 filters. Sections shall include side access slide rails.

.2 Angle filter sections shall accept 2-in. MERV 13 filters of standard sizes, arranged in a horizontal V formation.

.3 Magnehelic Gauges:

.1 Housing shall be constructed of a die cast aluminum case and bezel with acrylic cover. Exterior finish shall be coated gray to withstand 168 hr salt spray corrosion test.

.2 Accuracy shall be ±2% of full scale throughout range at 70 F (21.1 C).

.3 Pressure limits shall be –20 in. Hg to 15 psig (0.677 bar to 1.034 bar).

.4 Overpressure relief plugs shall open at approximately 25 psig (1.72 kPa).

.5 Temperature limits shall be 20 to 140 F (–6.67 to 60 C).

.6 Diameter of dial face shall be 4 in. (101.6 mm).

.7 Process connections shall be 1/8-in. female NPT duplicate high and low pressure taps — one pair side and one pair back.

.8 Provide magnehelic filter gauges for each filter bank flush mounted into unit casing with factory mounted probes.

2.10 DAMPERS

.1 Mixing boxes, filter-mixing boxes, and exhaust boxes shall have parallel or opposed blades and interconnecting outside-air and return-air dampers.

.1 Standard Dampers:

Damper blades shall be constructed of galvanized steel, with blade seals and stainless steel jamb seals. Blades shall be mechanically fastened to axle rods rotating in self-lubricating synthetic bearings. Maximum leakage rate shall be 4 cfm/ft2 at 1 in. wg (0.25 kPa) differential pressure.

2.11 AIR MIXER

.1 Air mixer of 0.081-in. aluminum construction of size, performance and maximum pressure drop indicated. The air mixer shall mix two or more airstreams of differing temperature to within ±6° F of theoretical mixed-air temperature and provide a more uniform air velocity contour entering a downstream filter or coil bank.

2.12 FIELD SUPPLIED CONTROLS

.1 With the exception of the ASHP safety controls, all required system controls shall be field supplied and installed. This shall include all required sensors (temperature and humidity), actuators, valves and associated microprocessor controllers.

2.13 ELECTRICAL ACCESSORIES

.1 Marine Lights and Convenience Outlets:

.1 Cast, non-ferrous metal, weatherproof, fixture.

.2 Cast, non-ferrous metal, weatherproof, electrical junction box.

.3 Gasketed, heat and shock resistant glass globe protects against moisture and debris.

.4 Cast, non-ferrous metal lamp guard to protect glass globe.

.5 UL listed.

.6 100 watt type ‘A’ lamp maximum capacity.

.7 Each fixture is equipped with a 75 watt, 130 volt, long life, vibration resistant, lamp (8000+ hour typical lamp life), factory installed.

.8 Metallic, single gang, electrical junction box, UL listed.

.9 With convenience outlet: Factory supplied and wired, SPST, toggle switch and 15 amp, 120 vac/60 Hz, NEMA 5-15 type, ground fault circuit interrupt (GFCI) receptacle, UL listed.

.10 Without convenience outlet: Factory supplied and wired, SPST, UL listed toggle switch.

.11 Each fixture is factory wired to an externally mounted switch box. (Field power connections are made to the switch box mounted externally on the unit.)

.12 All factory wiring penetrating through the panel is protected in 'RIGID' type metal conduit.

.2 Kilo Ampere Interrupting Capacity (kAIC) Rating

.1 Equipment shall be rated a interrupting capacity rating of 25 kAIC.

.2 All products supplied to the site shall meet or exceed this kAIC rating.

.3 The kAIC rating may be lowered to match or exceed the available fault current indicated on the Short Circuit Co-ordination Study completed by the electrical trade.

.3 Disconnects:

.1 200-230 volt/3-phase fused and non-fused disconnects shall have the following characteristics:

.1 Visible blades.

.2 Quick-make, quick-break operating mechanism.

.3 Cover padlock hasp and handle lock "OFF."

.4 240 vac maximum.

.5 Factory supplied and installed class RK5 fuses (fused disconnects only).

.6 Horsepower rated for motor applications.

.7 Tangential combination knockouts for field wiring.

.8 Spring reinforced plated copper fuse clips.

.9 NEMA type 1 enclosures.

.10 Insulated, bondable solid neutral assemblies.

.11 UL listed, File E2875.

.12 Meet or exceed NEMA KS1-1990.

.4 Starters:

.5 Bypass for Variable Frequency Drives:

.1 200-230 v/3 Ph/60 Hz (1 to 7.5 Hp), 460-575 v/3 Ph/60 Hz (1 to 20 Hp), 380 v/3 Ph/ 50 Hz (1 to 15 Hp):

.1 4-position panel-mounted disconnect style switch with lockable handle (locks not provided), meets OSHA 1910.

.2 Switch position indication (LINE/OFF/ DRIVE/TEST).

.3 Adjustable motor overload with trip indication (LINE position).

.4 Manual overload reset button.

.5 Horsepower rated for motor applications.

.6 Direct control (no contactors, relays, or holding coils).

.7 Complete isolation of inverter in LINE position.

.8 NEMA 12 type metal enclosures.

.9 Terminal strip provided for field power supply wiring.

.10 Lug connection for field ground wire.

.11 Gold flashed, auxiliary switch contact set (for switch position monitoring).

.12 Factory mounted, wired to VFD and motor, and run tested (motor and VFD must be factory supplied and installed).

.13 UL; UL, Canada; CE listed.

.2 200-230 v/3 Ph/60 Hz (10 to 75 Hp), 460-575 v/3 Ph/60 Hz (25 to 150 Hp), 380 v/3 Ph/50 Hz (20 to 75 Hp):

.1 4-position panel-mounted disconnect style switch with lockable handle (locks not provided), meets OSHA 1910.

.2 Switch position indication (LINE/OFF/ DRIVE/TEST).

.3 Adjustable motor overload with trip indication (in LINE position).

.4 Manual overload reset button.

.5 Horsepower rated for motor applications.

.6 115-v control transformer with fused secondary (fused primary on units over 50 amps).

.7 Contactor for Line Start/Stop.

.8 Door-mounted Line Start and Line Stop pushbuttons.

.9 Complete isolation of inverter in LINE position.

.10 NEMA 12 type metal enclosures.

.11 Terminal strip provided for field power supply wiring.

.12 Lug connection for field ground wire.

.13 Gold flashed, auxiliary switch contact set (for switch position monitoring).

.14 Factory mounted, wired to VFD and motor, and run tested (motor and VFD must be factory supplied and installed).

.15 UL; UL, Canada; CE listed.

.6 Variable Frequency Drives:

.1 Factory-mounted variable frequency drives (VFDs) shall be wired to factory-supplied motors.

.2 Factory-supplied VFDs are programmed and started up from the factory.

.3 The VFD parameters are programmed into the controller and removable keypad. In the event that the VFD fails and needs replacement, the program can then be uploaded to the replacement VFD via the original keypad.

.4 The VFD package as specified herein shall be enclosed in a UL Listed Type 1 enclosure, completely assembled and tested by the manufacturer in a facility registered to ISO 9001:2000. The VFD tolerated voltage window shall allow the VFD to operate from a line of +30% nominal, and –35% nominal voltage as a minimum.

.1 Environmental operating conditions: 0° to 40 C continuous. Variable frequency drives that can operate at 40 C intermittently (during a 24-hour period) are not acceptable and must be oversized. Altitude 0 to 3300 feet above sea level, less than 95% humidity, non-condensing.

.2 Enclosure shall be rated UL type 1 and shall be UL listed as a plenum rated VFD. Variable frequency drives without these ratings are not acceptable.

.5 All VFDs shall have the following standard features:

.1 All VFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. The keypad shall be removable, capable of remote mounting and allow for uploading and downloading of parameter settings as an aid for start-up of multiple VFDs.

.2 The keypad shall include Hand-Off-Auto selections and manual speed control. The drive shall incorporate “bumpless transfer” of speed reference when switching between “Hand” and “Auto” modes. There shall be fault reset and “Help” buttons on the keypad. The Help button shall include “on-line” assistance for programming and troubleshooting.

.3 There shall be a built-in timeclock in the VFD keypad. The clock shall have a battery back up with 10 years minimum life span. The clock shall be used to date and time stamp faults and record operating parameters at the time of fault. If the battery fails, the VFD shall automatically revert to hours of operation since initial power up. The clock shall also be programmable to control start/stop functions, constant speeds, PID parameter sets and output relays. The VFD shall have a digital input that allows an override to the time clock (when in the off mode) for a programmable time frame. There shall be four (4) separate, independent timer functions that have both weekday and weekend settings.

.4 The VFDs shall utilize pre-programmed application macros specifically designed to facilitate start-up. The application macros shall provide one command to reprogram all parameters and customer interfaces for a particular application to reduce programming time. The VFD shall have two (2) user macros to allow the end-user to create and save custom settings.

.5 The VFD shall have cooling fans that are designed for easy replacement. The fans shall be designed for replacement without requiring removing the VFD from the wall or removal of circuit boards. The VFD cooling fans shall operate only when required. To extend the fan and bearing operating life, operating temperature will be monitored and used to cycle the fans on and off as required.

.6 The VFD shall be capable of starting into a coasting load (forward or reverse) up to full speed and accelerate or decelerate to set point without safety tripping or component damage (flying start).

.7 The VFD shall have the ability to automatically restart after an overcurrent, over-voltage, under-voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable.

.8 The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes, 130% overload for 2 seconds. The minimum FLA rating shall meet or exceed the values in the NEC/ UL table 430-150 for 4-pole motors.

.9 The VFD shall have an integral 5% impedance line reactors to reduce the harmonics to the power line and to add protection from AC line transients. The 5% impedance may be from dual (positive and negative DC bus) reactors, or 5% AC line reactors. Variable frequency drives with only one DC reactor shall add AC line reactors.

.10 The VFD shall include a coordinated AC transient protection system consisting of four 120-joule rated MOVs (phase to phase and phase to ground), a capacitor clamp, and 5% impedance reactors.

.11 The VFD shall be capable of sensing a loss of load (broken belt or broken coupling) and signal the loss of load condition. The drive shall be programmable to signal this condition via a keypad warning, relay output and/ or over the serial communications bus. Relay outputs shall include programmable time delays that will allow for drive acceleration from zero speed without signaling a false underload condition.

.12 If the input reference (4 to 20 mA or 2 to 10 v) is lost, the VFD shall give the user the option of either (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) holding the VFD speed based on the last good reference received, or (4) causing a warning to be issued, as selected by the user. The drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communication bus.

.13 The VFD shall have programmable “Sleep” and “Wake up” functions to allow the drive to be started and stopped from the level of a process feedback signal.

.6 All VFDs to have the following adjustments:

.1 Three (3) programmable critical frequency lockout ranges to prevent the VFD from operating the load continuously at an unstable speed.

.2 Two (2) PID set point controllers shall be standard in the drive, allowing pressure or flow signals to be connected to the VFD, using the microprocessor in the VFD for the closed loop control. The VFD shall have 250 mA of 24 vdc auxiliary power and be capable of loop powering a transmitter supplied by others. The PID set point shall be adjustable from the VFD keypad, analog inputs, or over the communications bus. There shall be two parameter sets for the first PID that allow the sets to be switched via a digital input, serial communications or from the keypad for night setback, summer/winter set points, etc. There shall be an independent, second PID loop that can utilize the second analog input and modulate one of the analog outputs to maintain set point of an independent process (i.e,. valves, dampers, etc.). All set points, process variables, etc. shall be accessible from the serial communication network. The set points shall be set in Engineering units and not require a percentage of the transducer input.

.3 Two (2) programmable analog inputs shall accept current or voltage signals.

.4 Two (2) programmable analog outputs (0 to 20 mA or 4 to 20 mA). The outputs may be programmed to output proportional to Frequency, Motor Speed, Output Voltage, Output Current, Motor Torque, Motor Power (kW), DC Bus voltage, Active Reference, and other data.

.5 Six (6) programmable digital inputs for maximum flexibility in interfacing with external devices, typically programmed as follows: There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad, input contact closure, timeclock control, or serial communications) the VFD shall provide a dry contact closure that will signal the damper to open (VFD motor does not operate). When the damper is fully open, a normally open dry contact (end-switch) shall close. The closed end-switch is wired to a VFD digital input and allows VFD motor operation. Two separate safety interlock inputs shall be provided. When either safety is opened, the motor shall be commanded to coast to stop, and the damper shall be commanded to close. The keypad shall display “start enable 1 (or 2) missing.” The safety status shall also be transmitted over the serial communications bus. All digital inputs shall be programmable to initiate upon an application or removal of 24 vdc.

.6 Three (3) programmable digital Form-C relay outputs. The relays shall include programmable on and off delay times and adjustable hysteresis. Default settings shall be for run, not faulted (fail safe), and run permissive. The relays shall be rated for maximum switching current 8 amps at 24 vdc and 0.4 A at 250 vac; Maximum voltage 300 vdc and 250 vac; continuous current rating 2 amps RMS. Outputs shall be true Form C type contacts; open collector outputs are not acceptable.

.7 Seven (7) programmable preset speeds.

.8 Two independently adjustable accelerate and decelerate ramps with 1 to 1800 seconds adjustable time ramps.

.9 The VFD shall include a motor flux optimization circuit that will automatically reduce applied motor voltage to the motor to optimize energy consumption and audible motor noise.

.10 The VFD shall include a carrier frequency control circuit that reduces the carrier frequency based on actual VFD temperature that allows the highest carrier frequency without derating the VFD or operating at high carrier frequency only at low speeds.
The VFD shall include password protection against parameter changes.

.7 The keypad shall include a backlit LCD display. The display shall be in complete English words for programming and fault diagnostics (alphanumeric codes are not acceptable). The keypad shall utilize the following assistants:

.1 Start-up assistants.

.2 Parameter assistants.

.3 Maintenance assistant.

.4 Troubleshooting assistant.

.8 All applicable operating values shall be capable of being displayed in engineering (user) units. A minimum of three operating values from the list below shall be capable of being displayed at all times. The display shall be in complete English words (alphanumeric codes are not acceptable):

.1 Output Frequency

.2 Motor Speed (rpm, percentage, or Engineering units)

.3 Motor Current

.4 Calculated Motor Torque

.5 Calculated Motor Power (kW)

.6 DC Bus Voltage

.7 Output Voltage

.9 The VFD shall include a fireman's override input. Upon receipt of a contact closure from the fireman's control station, the VFD shall operate at an adjustable preset speed. The mode shall override all other inputs (analog/ digital, serial communication, and all keypad commands) and force the motor to run at the adjustable, preset speed. "Override Mode" shall be displayed on the keypad. Upon removal of the override signal, the VFD shall resume normal operation.

.10 Serial Communications:

.1 The VFD shall have an RS-485 port as standard. The standard protocols shall be Modbus, Johnson Controls N2 bus, and Siemens Building Technologies FLN. Optional protocols for LonWorks, BACnet, Profibus, Ethernet, and DeviceNet shall be available. Each individual drive shall have the protocol in the base VFD. The use of third party gateways and multiplexers is not acceptable. All protocols shall be "certified" by the governing authority. Use of noncertified protocols is not allowed.

.2 Serial communication capabilities shall include, but not be limited to: run-stop control, speed set adjustment, proportional/integral/derivative (PID) control adjustments, current limit, accelerate/decelerate time adjustments, and lock and unlock the keypad. The drive shall have the capability of allowing the DDC to monitor feedback such as process variable feedback, output speed/ frequency, current (in amps), percent torque, operating hours (resettable), and drive temperature. The DDC shall also be capable of monitoring the VFD relay output status, digital input status, and all analog input and analog output values. All diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote VFD fault reset shall be possible. The following additional status indications and settings shall be transmitted over the serial communications bus — keypad "Hand" or "Auto" selected, bypass selected, the ability to change the PID set point, and the ability to force the unit to bypass (if bypass is specified). The DDC system shall also be able to monitor if the motor is running in the VFD mode or bypass mode (if bypass is specified) over serial communications. A minimum of 15 field parameters shall be capable of being monitored.

.3 The VFD shall allow the DDC to control the drive's digital and analog outputs via the serial interface. This control shall be independent of any VFD function. For example, the analog outputs may be used for modulating chilled water valves or cooling tower bypass valves. The drive's digital (relay) outputs may be used to actuate a damper, open a valve or control any other device that requires a maintained contact for operation. In addition, all of the drive's digital and analog inputs shall be capable of being monitored by the DDC system.

.4 The VFD shall include an independent PID loop for customer use. The independent PID loop may be used for cooling tower bypass value control, chilled water value control, etc. Both the VFD control PID loop and the independent PID loop shall continue functioning even if the serial communications connection is lost. The VFD shall keep the last good set point command and last good digital output (DO) and analog output (AO) commands in memory in the event the serial communications connection is lost.

.11 EMI/RFI Filters:

.1 All VFDs shall include EMI/RFI filters. The onboard filters shall allow the VFD assembly to be CE Marked and the VFD shall meet product standard EN 61800-3 for the First Environment restricted level.

.12 All VFDs through 50 hp shall be protected from input and output power miswiring. The VFD shall sense this condition and display an alarm on the keypad.

.13 Operational Functions:

.1 The drive shall contain two separate acceleration/ deceleration times with auto tuning for optimum setting (0.1 to 6000 seconds) with choice of linear, S, or C curves that shall be factory programmed to match the fan load and prevent nuisance overcurrent fault trips.

.2 The drive shall be equipped with both local/ remote and manual/auto keys on touchpad.

.3 The drive shall be equipped with a quick setup key.

.4 The drive shall contain 15 preset speeds, which can be activated from the keypad, terminal inputs, and host computer.

.5 The drive shall have the capability of storable special custom user setting.

.6 The drive shall restart into a rotating motor operating in either the forward or reverse direction and match that frequency.

.7 The drive shall have adjustable soft stall (10% to 150%) which reduces frequency and voltage of the inverter to sustain a run in an overload situation factory programmed for each motor's characteristics.

.8 The drive shall be capable of performing a time base pattern run using 4 groups of 8 patterns each using the 15 preset speed values for a maximum of 32 different patterns.

.9 The drive shall have adjustable UL listed electronic overload protection (10% to 100%) factory programmed to match each motor's FLA/RLA ratings.

.10 The drive shall have a custom programmable volt/hertz pattern.

.14 Protective Features:

.1 The drive shall be rated for 200,000 AIC (ampere interrupting capacity). The use of input fuses to achieve this rating shall not be acceptable.

.2 The drive shall have external fault input.

.3 The drive shall be capable of resetting faults remotely and locally.

.4 The drive shall be programmable to alert the following alarms:

.1 Over torque alarm.

.2 Inverter overload pre-alarm.

.3 Motor overload pre-alarm.

.4 Braking resistor overload pre-alarm.

.5 Inverter overheat pre-alarm.

.6 Undercurrent alarm.

.7 Overcurrent pre-alarm.

.8 Communication error alarm.

.9 Cumulative timer alarm.

.10 Executing retry.

.5 The drive shall identify and display the following faults:

.1 Overcurrent during acceleration trip.

.2 Overcurrent during deceleration trip.

.3 Overcurrent during normal run trip.

.4 Overcurrent on the DC Bus during acceleration trip.

.5 Overcurrent on the DC Bus during deceleration trip.

.6 Overcurrent on the DC Bus during normal run trip.

.7 Load end overcurrent trip detected at start-up (output terminals, motor wiring, etc.).

.8 U-phase short circuit trip detected at start-up.

.9 V-phase short circuit trip detected at start-up.

.10 W-phase short circuit trip detected at start-up.

.11 Overvoltage during acceleration trip.

.12 Overvoltage during deceleration trip.

.13 Overvoltage during normal (constant speed) run trip.

.14 Inverter overloaded trip.

.15 Motor overloaded trip.

.16 Inverter overheat trip.

.17 Emergency off trip message.

.18 EEPROM failure during write cycle.

.19 EEPROM abnormality during initial reading.

.20 RAM error.

.21 ROM error.

.22 CPU error.

.23 Communication interruption error.

.24 Gate array error.

.25 Output current detection circuit error.

.26 Option PCB error trip.

.27 Low operating current trip.

.28 Main circuit under voltage trip.

.29 Over torque trip.

.30 Software detected earth fault trip.

.31 Hardware detected earth fault trip.

.32 Inverter type form mismatch error.

.33 EEPROM type form mismatch error.

.15 Monitor Functions:

.1 The drive digital display shall be capable of displaying the following: Frequency, percent current, current amps, percent voltage I/O, voltage in volts I/O, RPM, GPM, I/O watts, torque, and input reference signal, kWh.

.2 The drive shall have 320 programmable parameters which can be changed while the drive is operating.

.3 The drive's 353 parameters shall be adjustable from the 8-key touchpad or computer link.

.4 The drive's 8-key touchpad shall be NEMA 12 rated.

.5 The drive's keypad shall be capable of being extended 15 ft from the drive.

.6 The drive shall contain a reset of all parameters to factory default .7

.7 The drive shall have 2 programmable analog outputs programmable to 17 choices.

.8 The drive shall have one programmable relay output programmable to 67 choices.

.9 The drive shall have 8 programmable digital inputs programmable to 54 choices.

.10 The drive shall have a pulse train output proportional to frequency (48, 96, 360 times frequency).

.11 The drive shall have an elapsed time meter.

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.

.4 Install unit flat and level on house keeping pad and in accordance with manufacturer's installation literature.

.5 Provide piping connections to coils such that individual coils can be isolated, drained and removed. Provide valved pressure gauge connections and thermometer wells on the entering and leaving piping.

.6 Provide valved drain connections with hose end, cap and chain for all coils.

.7 Pipe all drain pan connections the nearest floor drain with appropriately sized trap.

.8 Coordinate installation of VRV ASHP system including all shipped loose accessories. A 208/1/60 field power connection is required at each VRV ASHP branch selector box. A 208/1/60 field power connection is required at each VRV ASHP refrigeration controller. VRV ASHP branch selector boxes, refrigeration controllers, and electronic expansion valve kits shall be installed inside the mechanical room within close proximity to the ASHP DX and HGRH coils.

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 manufacturer 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 REFRIGERATION LEAK DETECTION SYSTEM

.1 This contractor shall provide all wiring between leak detection systems installed within the provided equipment and system components in the spaces served and ductwork system.

.2 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 and refrigerant leak system specific ventilation systems.

.6 De-energize any other potential sources of ignition within the affected system.

.3 All 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.

3.6 TRAINING

.1 Provide two (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.

3.7 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 One (1) year on parts on all components.

.2 Five (5) years on Energy Recovery Wheel media.

.3 Ten (10) years on heat exchanger.

.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 C553, Mineral Fiber Blanket, Thermal Insulation for Commercial and Industrial Applications.

.3 CSA B52, Mechanical Refrigeration Code.

.4 EPS 1/RA/2, Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general conditions.

.2 Indicate major components and accessories including sound power levels of units.

.3 Type of refrigerant used.

1.3 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into manual specified in general conditions.

Part 2 Products

2.1 GENERAL

.1 System type:

.1 Air flow arrangement: horizontal

.2 Cooling: direct expansion

.3 Condensing: air cooled

2.2 OUTDOOR CONDENSING UNITS

.1 General: Factory-assembled, single piece, air-cooled condensing unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, compressor, refrigerant holding charge, and special features required prior to field start-up. Unit shall be rated in accordance with ARI Standard and be CSA approved.

.2 Unit Cabinet:

.1 Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a prepainted baked enamel finish.

.2 A heavy gage roll-formed perimeter base rail with forklift slots and lifting holes shall be provided to facilitate rigging.

.3 Fans:

.1 Condenser fans shall be direct driven, propeller-type, discharging air horizontally.

.2 Fan blades shall be balanced.

.3 Condenser fan discharge openings shall be equipped with PVC coated steel wire safety guards.

.4 Condenser fan and motor shaft shall be corrosion resistant.

.4 Compressor:

.1 Compressor shall be mounted on vibration isolators.

.2 Compressors shall include overload protection.

.5 Condenser Coil:

.1 Condenser coil shall be air-cooled and circuited for integral subcooler.

.2 Coil shall be constructed of aluminum fins (copper fins optional) mechanically bonded to internally grooved seamless copper tubes which are then cleaned, dehydrated, and sealed.

.6 Refrigeration Components:

.1 Refrigeration circuit components shall include liquid line service valve, suction line service valve, liquid filter drier, a full charge of compressor oil, and a holding charge of refrigerant.

.7 Controls and Safeties:

.1 Minimum control functions shall include:

.1 Control wire terminal blocks.

.2 Five-minute recycle protection to prevent compressor short-cycling.

.3 Compressor lockout on auto-reset safety until reset from thermostat.

.2 Minimum Safety devices which are equipped with automatic reset (after resetting first at thermostat), shall include:

.1 High discharge pressure cutout.

.2 Loss-of-charge cutout.

.8 Electrical Requirements:

.1 As indicated on schedule.

.2 Unit electrical power shall be single-point connection.

.3 Unit control circuit shall contain a 24-v transformer for unit control.

.9 Capacity: Refer to schedules.

.10 Provide the following:

.1 Hail Guard Package.

.2 Winter Start Package.

.11 Acceptable materials:

.1 Refer to drawing schedule.

2.3 INDOOR DX COOLING COIL

.1 General: Horizontal direct-expansion cooling coil with casing as indicated

.2 Cooling coil shall be constructed with aluminum plate fins mechanically bonded to nonferrous tubing with all joints brazed.

.3 The casing of encased coils shall be insulated and finished with baked enamel or equivalent corrosion-resistant surface. The casing material shall be galvanized steel. The coil casing shall allow space for attaching field-supplied thermostatic expansion valve.

.4 Capacity: Refer to Schedules.

.5 Acceptable materials:

.1 Refer to drawing schedule.

2.4 WALL HUNG FAN COIL UNIT

.1 Indoor, direct-expansion, wall mounted fan coil, complete with cooling coil, fan, fan motor, piping connectors, electrical controls, microprocessor control system, and integral temperature sensing. Unit shall be furnished with integral wall-mounting bracket and mounting hardware.

.2 Cabinet discharge and inlet grilles shall be attractively styled, high-impact polystyrene. Cabinet shall be fully insulated for improved thermal and acoustic performance.

.3 Fan shall be tangential direct-drive blower type with air intake at the upper front face of the unit and discharge at the bottom front. Automatic, motor-driven vertical air sweep shall be provided.

.4 Coil shall be copper tube with aluminum fins and galvanized steel tube sheets. Fins shall be bonded to the tubes by mechanical expansion. A drip pan under the coil shall have a drain connection for hose attachment to remove condensate. Condensate pan shall have internal trap and auxiliary drip pan under coil header.

.5 Motors shall be open drip-proof, permanently lubricated ball bearing with inherent overload protection. Fan motors shall be 3-speed.

.6 Controls shall consist of a microprocessor based control system which shall control space temperature, determine optimum fan speed, and run self diagnostics. The temperature control range shall be from 18°C to 29°C (64°F to 84°F). The unit shall have the following functions:

.1 An automatic restart after power failure at the same operating conditions as at failure.

.2 A timer function to provide a minimum 24-hour timer cycle for system Auto. Start/Stop.

.3 Temperature-sensing controls shall sense return-air temperature. Indoor-air high discharge temperature shutdown shall be provided.

.4 Indoor coil freeze protection.

.5 Wall mounted thermostat to enter set points and operating conditions.

.6 Auto Stop features shall have integral setback control.

.7 Automatic airsweep control to provide on or off activation of airsweep louvers.

.8 Diagnostics shall provide continuous checks of unit operation and warn of possible malfunctions. Error messages shall be displayed at the unit.

.9 Fan speed control shall be user-selectable: high, medium, low, or microprocessor automatic operation during all operating modes.

.10 A time delay shall prevent compressor restart in less than three minutes.

.7 Filter track with factory-supplied cleanable filters.

.8 Capacity: Refer to schedules.

.9 Acceptable materials: To match interior unit manufacturer.

2.5 REFRIGERANT LEAK DETECTION SYSTEM

.1 Refrigerant coils with multiple compressors shall be alternate tube circuited in order to distribute the cooling effect over the entire coil face at reduced load conditions. (split face coils are not acceptable). Provision for use of thermal expansion valves must be included for variable air volume applications.

.2 Provide refrigerant leak detectors for installation in served space. Detector shall close refrigeration leak safety valve to limit charge released into space/atmosphere.

.3 The Refrigerant detection system shall meet the requirements of CSA B52 and have the following functionality:

.1 Utilize a set point, nonadjustable in the field, to generate a digital output signal to initiative mitigation actions to both internal safeties and external components in the ductwork (dampers, electric coils etc.). Signal shall be generated in not more than 30 seconds from sensor exposure to refrigerant concentration of 25% LFL (+0$, -1%)

.2 Field calibration of the system is not allowed.

.3 Be capable of detecting the refrigerant used in the system.

.4 Have self diagnostics

.5 Energize circulation fans in the event of a leak detection or failed self-diagnostics.

.6 Have a digital output signal for monitoring by other systems

.7 Activate refrigerant safety shut off valves in the event of a leak being detected.

2.6 REFRIGERANT

.1 Refrigerant shall be A1 or A2L Classified.

.2 Refrigerant holding charge shall be applied at factory.

.3 Refrigeration circuit components shall include liquid line service valve, suction line service valve, liquid filter drier, a full charge of compressor oil, a holding charge of refrigerant and leak mitigation solenoid valves.

Part 3 Execution

3.1 GENERAL

.1 Install as indicated, to manufacturers' recommendations.

.2 Manufacturer to certify installation.

.3 Run drain line from cooling coil condensate drain pan to terminate over nearest floor drain.

.4 Provide concrete pad complete with 100 mm x 100 mm x 20 mm (4" x 4" x 3/4") neoprene type vibration isolation.

3.2 EQUIPMENT

.1 Preparation and Start-Up

.1 Provide services of manufacturer’s authorized factory trained mechanic to set and adjust equipment for operation as specified.

.2 Provide results in operation and maintenance manuals

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.

.2 Warranty Duration:

.1 Two (2) year warranty period applies.

.2 Contractor hereby warrants refrigeration compressors for five (5) years.

.3 Warranty Coverage:

.1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 This section is to read in conjunction with Division 1, the general condition, and the General Requirements of the mechanical trades.

1.2 REFERENCES

.1 Tested to ANSI/UL Standard 508.

.2 UL-508 certified for the building and assembly.

.3 CSA or C-UL stickers shall be applied to both the VFD and option panels.

.4 Manufacturers shall be ISO 9001 certified facilities.

1.3 SUBMITTALS

.1 Submit manufacturer’s performance data including dimensional drawings, power circuit diagrams, installation and maintenance manuals, warranty description, VFD's FLA rating, certification agency file numbers and catalogue information.

.2 The specification lists the minimum VFD performance requirements for this project. Each supplier shall list any exceptions to the specification. If no departures from the specification are identified, the supplier shall be bound by the specification.

.3 Harmonic filtering. The manufacturer shall, with the aid of the buyer’s electrical power single line diagram, providing the data required by IEEE-519, perform an analysis to initially demonstrate the supplied equipment will met the IEEE standards after installation. If, as a result of the analysis, it is determined that additional filter equipment is required to meet the IEEE recommendations, then the cost of such equipment shall be included in the bid. A harmonic analysis shall be submitted with the approval drawings to verify compliance with the latest version of IEEE-519 voltage and current distortion limits as shown in table 10.2 and 10.3 at the point of common coupling (PCC). The PCC shall be defined as the consumer–utility interface or primary side of the main distribution transformer.

Part 2 Products

2.1 ACCEPTABLE MANUFACTURERS

.1 Danfoss Graham.

.2 ABB.

.3 AC Tech.

2.2 GENERAL

.1 The VFD shall convert incoming fixed frequency three-phase AC power into a variable frequency and voltage for controlling the speed of three-phase AC motors. The motor current shall closely approximate a sine wave. Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for centrifugal pump and fan control and to eliminate the need for motor derating.

.2 With the motor's rated voltage applied to the VFD input, the VFD shall allow the motor to produce full rated power at rated amps, RMS fundamental volts, and speed without using the motor's service factor. VFD's utilizing sine weighted/coded modulation (with or without 3rd harmonic injection) must provide data verifying that the motors will not draw more than full load current during full load and full speed operation.

.3 Include an input full-wave bridge rectifier and maintain a fundamental power factor near unity regardless of speed or load.

.4 Provide DC link reactors on both the positive and negative rails of the DC bus to minimize power line harmonics. VFD's without DC link reactors shall provide a minimum 5% impedance line reactor.

.5 Full load amp rating shall meet or exceed NEC Table 430-150. The VFD shall be able to provide full rated output current continuously, 110% of rated current for 60 seconds and 160% of rated current for up to 0.5 second while starting.

.6 Provide full torque at any selected frequency from 28 Hz to base speed to allow driving direct drive fans without derating.

.7 An automatic energy optimization selection feature shall be provided in the VFD. This feature shall automatically and continually monitor the motor's speed and load and adjust the applied voltage to maximize energy savings and provide up to an additional 3% to 10% energy savings.

.8 Input and output power circuit switching shall be able to be accomplished without interlocks or damage to the VFD. Switching rate may be up to 1 time per minute on the input and unlimited on the output.

.9 An automatic motor adaptation test algorithm shall measure motor stator resistance and reactance to optimize performance and efficiency. It shall not be necessary to run the motor or de-couple the motor from the load to run the test.

.10 Galvanic and/or optical isolation shall be provided between the VFD's power circuitry and control circuitry to ensure operator safety and to protect connected electronic control equipment from damage caused by voltage spikes, current surges, and ground loop currents. VFD's not including either galvanic or optical isolation on both analog I/O and discrete I/O shall include additional isolation modules.

.11 VFD shall minimize the audible motor noise through the use of an adjustable carrier frequency. The carrier frequency shall be automatically adjusted to optimize motor and VFD efficiencies while reducing motor noise.

.12 VFD's operating 600/3/60 motors not designed to meet Nema MG1 Part 31 should include Output dv/dt (LC) Reactors.

2.3 PROTECTIVE FEATURES

.1 VFD shall be provided with an integral disconnect and Integral Fast Blow Semi-Conductor fuses sized as specified by ULC. Fuses shall be Bussman JJS type or equivalent.

.2 A minimum of Class 20 I2t electronic motor overload protection for single motor applications and thermal-mechanical overloads for multiple motor applications shall be provided.

.3 Protection against input transients, loss of AC line phase, output short circuit, output ground fault, over-voltage, under-voltage, VFD over-temperature and motor over-temperature. The VFD shall display all faults in plain English. Codes are not acceptable.

.4 Protect VFD from sustained power or phase loss. The VFD shall provide full rated output with an input voltage as low as 90% of the nominal.

.5 The VFD shall incorporate a motor preheat circuit to keep the motor warm and prevent condensation build up in the stator.

.6 To prevent breakdown of the motor winding insulation, the VFD shall be designed to comply with IEC Part 34-17. Motors shall have inverter rated insulation (1600V).

.7 VFD shall include a “signal loss detection” circuit to sense the loss of an analog input signal such as 4 to 20 mA or 2 to 10 V DC, and shall be programmable to react as desired in such an instance.

.8 VFD shall function normally when the keypad is removed while the VFD is running and continue to follow remote commands. No warnings or alarms shall be issued as a result of removing the keypad.

.9 VFD shall catch a rotating motor operating forward or reverse up to full speed.

.10 VFD shall be rated for 100,000 amp interrupting capacity (AIC).

.11 VFD shall have externally mounted EMI electromagnetic suppressor to limit the EMI and RFI output from the VFD. VFD to be mounted in an all metal cabinet to limit radiated RFI.

.12 VFD shall include current sensors on all three output phases to detect and report phase loss to the motor. The VFD will identify which of the output phases is low or lost.

.13 VFD shall continue to operate without faulting until input voltage reaches 300 V AC on 208/230 volt VFD’s, and 701V AC on 575 volt VFD’s.

.14 For remote VFD installations, provide an output filter (load side reactor) at each VFD to protect the equipment motor. Coordinate installation with equipment manufacturer.

2.4 INTERFACE FEATURES

.1 Hand/Start, Off/Stop and Auto/Start selector switches shall be provided to start and stop the VFD and determine the speed reference.

.2 The VFD shall be able to be programmed to provide a 24 V DC output signal to indicate that the VFD is in Auto/Remote mode.

.3 The VFD shall provide digital manual speed control. Potentiometers are not acceptable.

.4 Lockable, alphanumeric backlit display keypad can be remotely mounted up to 10 feet away using standard 9-pin cable.

.5 The keypads for all sizes of VFD's shall be identical and interchangeable.

.6 To set up multiple VFD's, it shall be possible to upload all set-up parameters to the VFD's keypad, place that keypad on all other VFD's in turn and download the set-up parameters to each VFD. To facilitate setting up VFD's of various sizes, it shall be possible to download from the keypad only size independent parameters.

.7 Display shall be programmable to display in 9 languages including English, Spanish and French.

.8 The display shall have four lines, with 20 characters on three lines and eight large characters on one line.

.9 A red FAULT light, a yellow WARNING light and a green POWER-ON light shall be provided. These indications shall be visible both on the keypad and on the VFD when the keypad is removed.

.10 A quick set-up menu with factory preset typical HVAC parameters shall be provided on the VFD eliminating the need for macros.

.11 The VFD shall include a standard RS-485 communications port for connection to a Johnson Controls N2 and Siemens FLN serial communication system. The connection shall be software selectable and addressable by the user. The option for Lonworks and BacNet communication must also be available.

.12 As a minimum, the following points shall be controlled and/or accessible:

VFD Start/Stop, Speed reference, Fault diagnostics, and Meter points as follows;

Motor power in HP, Motor power in kW, Motor kW-hr, Motor current, Motor voltage, Hours run, Feedback signal #1, Feedback signal #2, DC link voltage, Thermal load on motor, and Thermal load on VFD, Heat sink temperature.

.13 Four additional Form C 230 volt programmable relays shall be available for factory or field installation within the VFD.

.14 Two set-point control interface (PID control) shall be standard in the unit. VFD shall be able to look at two feedback signals, compare with two set-points and make various process control decisions.

.15 Floating point control interface shall be provided to increase/decrease speed in response to contact closures.

.16 Four simultaneous displays shall be available. They shall include frequency or speed, run time, output amps and output power. VFD's unable to show these four displays simultaneously shall provide panel meters.

.17 Sleep mode shall be provided to automatically stop the VFD when its speed drops below set "sleep" level for a specified time. The VFD shall automatically restart when the speed command exceeds the set "wake" level.

.18 The sleep mode shall be functional in both follower mode and PID mode.

.19 Run permissive circuit shall be provided to accept a "system ready" signal to ensure that the VFD does not start until dampers or other auxiliary equipment are in the proper state for VFD operation. The run permissive circuit shall also be capable of sending an output signal as a start command to actuate external equipment before allowing the VFD to start.

.20 The following displays shall be accessible from the control panel in actual units: Reference Signal Value in actual units, Output Frequency in Hz or percent, Output Amps, Motor HP, Motor kW, kWhr, Output Voltage, DC Bus Voltage, VFD Temperature in degrees, and Motor Speed in engineering units per application (in GPM, CFM, etc.). VFD will read out the selected engineering unit either in a linear, square or cubed relationship to output frequency as appropriate to the unit chosen.

.21 The display shall be programmed to read in inches of water column (in-wg) for an air handler application, pressure per square inch (psi) for a pump application, and temperature (oF) for a cooling tower application.

.22 VFD shall be able to be programmed to sense the loss of load and signal a no load/broken belt warning or fault.

.23 If the temperature of the VFD's heat sink rises to 80°C, the VFD shall automatically reduce its carrier frequency to reduce the heat sink temperature. If the temperature of the heat sink continues to rise the VFD shall automatically reduce its output frequency to the motor. As the VFD's heat sink temperature returns to normal, the VFD shall automatically increase the output frequency to the motor and return the carrier frequency to its normal switching speed.

.24 The VFD shall have temperature controlled cooling fans for quiet operation and minimized losses.

.25 The VFD shall store in memory the last 10 faults and related operational data.

.26 Eight programmable digital inputs shall be provided for interfacing with the systems control and safety interlock circuitry.

.27 Two programmable relay outputs, one Form C 240 V AC, one Form A 30 V AC, shall be provided for remote indication of VFD status.

.28 Three programmable analog inputs shall be provided and shall accept a direct-or-reverse acting signal. Analog reference inputs accepted shall include two voltage (0 to 10 V DC, 2 to 10 V DC) and one current (0 to 20 mA, 4 to 20 mA) input.

.29 Two programmable 0 to 20 mA analog outputs shall be provided for indication of VFD status. These outputs shall be programmable for output speed, frequency, current and power. They shall also be programmable to provide a selected 24 V DC status indication.

.30 Under fire mode conditions, the VFD shall be able to be programmed to automatically default to a preset speed.

.31 A contact/relay shall be provided to shut the fans down upon fire alarm signal.

2.5 ADJUSTMENTS

.1 VFD shall have an adjustable carrier frequency in steps of not less than 0.1 kHz to allow tuning the VFD to the motor.

.2 Sixteen preset speeds shall be provided.

.3 Four acceleration and four deceleration ramps shall be provided. Accel and decel time shall be adjustable over the range from 0 to 3,600 seconds to base speed. The shape of these curves shall be automatically contoured to ensure no-trip acceleration and deceleration.

.4 Four current limit settings shall be provided.

.5 If the VFD trips on one of the following conditions, the VFD shall be programmable for automatic or manual reset: under-voltage, over-voltage, current limit and inverter overload.

.6 The number of restart attempts shall be selectable from 0 through 20 or infinitely and the time between attempts shall be adjustable from 0 through 600 seconds.

.7 An automatic “on delay” may be selected from 0 to 120 seconds.

2.6 SERVICE CONDITIONS

.1 Unit shall operate in ambient temperature of -10 to 40°C (14 to 104°F).

.2 Unit shall operate in 0 to 95% relative humidity, non-condensing.

.3 Operate in elevation up to 3,300 feet without derating.

.4 Maximum AC line voltage variation, -10 to +10% of nominal with full output.

.5 No side clearance shall be required for cooling of any units. All power and control wiring shall be done from the bottom.

2.7 FACTORY TESTING

.1 To ensure quality and minimize infantile failures at the jobsite, the manufacturer shall test the complete VFD. The VFD shall operate a dynamometer at full load and speed and shall be cycled during the test.

.2 All optional features shall be functionally tested at the factory for proper operation.

2.8 BYPASS SWITCH

.1 Bypass Controller - Automatic transfer to line power via contactors. When in the “Drive” mode, the bypass contactor is open and the drive output contactor is closed. In the “Bypass” position, the drive output contactor is open, and the bypass contactor is closed via Start/stop command. Start/stop via customer supplied maintained contact shall be Dry type 115V compatible and shall function in both the “Drive” and “Bypass” modes. The design shall include single-phase protection in both the VFD and bypass modes.

Part 3 Execution

3.1 START-UP SERVICE

.1 The manufacturer shall provide start-up and commissioning of the VFD and its optional circuits by a factory certified service technician who is experienced in start-up and repair services. Sales personnel and other agents who are not factory certified shall not be acceptable as commissioning agents. Start-up services shall include checking for verification of proper operation and installation for the VFD, its options and its interface wiring to the building automation system.

3.2 EXAMINATION

.1 Contractor to verify that job site conditions for installation meet factory recommended and code-required conditions for VFD installation prior to start-up, including clearance spacing, temperature, contamination, dust, and moisture of the environment. Separate conduit installation of the motor wiring, power wiring, and control wiring, and installation per the manufacturer's recommendations shall be verified.

3.3 INSTALLATION

.1 Install to manufacturer’s recommendations.

.2 Install to the requirements of the local Hydro codes. Obtain hydro permits and pay all fees.

.3 Install in an accessible location and proper service height from floor.

.4 Install in clean, dry, and conditioned environment.

.5 The VFD is to be covered and protected from installation dust and contamination until the environment is cleaned and ready for operation. The VFD shall not be operated while the unit is covered.

.6 Wiring of devices to be to the standards of Electrical Division.

.7 Provide one manufacturer of VFD’s throughout the project.

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 The VFD shall be warranted by the manufacturer for a period of five (5) years from date of Ready for Takeover. The warranty shall include parts, labour, travel costs and living expenses incurred by the manufacturer to provide factory authorized on-site service. The warranty shall be provided by the VFD manufacturer.

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 New indoor AHU with DX heating & cooling connected to remote rooftop VRF air source heat pump with backup hydronic hot water coil connected to existing hydronic loop.
.3 Removal of existing pneumatic and/or electric thermostats and TCV's with new DDC thermostats and TCV's in renovation spaces.
.4 Remove any redundant or obsolete pneumatic tubing in the area of construction.
.5 Upgrade existing controls in the area of construction.
.6 New intake/exhaust louver motorized dampers/actuators.
.7 New fume hood control.
.8 Heat loss alarm.
.9 Thermostat rough-in by Electrical Contractor.
.0 Ventilation lockout.
.11 Minimum outside air schedule.
.12 CO2 controls
.13 Mechanical cooling 24.5degC (+/- 1degC).
.14 New VVT damper control.
.15 Trending.
.16 Summary page in graphics (fan status, MAT, SAT, CO2, Schedule).
.17 Revision summary control drawings.
.18 Controller locations shown on graphics.
.19 Standby schedule for all systems.
.20 Global humidity used on economizers.

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' 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 one (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.

2.2 NETWORK ARCHITECTURE

.1 The controllers on the local network shall communicate via a two (2) wire LonTalk TP/FT-10 network.

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 m^2 (10 cfm per ft^2) 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 (2) years 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 20degC (lock out on cooling)
  -heat provided from heatpump down to 5 deg C
  -below 5 deg 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

Division 26 Common Requirements for Electrical

Division 28 Electronic Safety and Security

END OF SECTION

Part 1 General

1.1 GENERAL INSTRUCTIONS

.1 Comply with the General Conditions, Supplementary Conditions, and all of General Requirements, Mechanical and Electrical Divisions.

1.2 FEES

.1 The contractor is to determine general inspection fees with Electrical Safety Authority and include as part of tender.

1.3 EQUIPMENT ALLOWANCES

.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.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 This Section covers items common to Electrical Divisions.

.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 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 coordinated 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.

1.6 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 coordination 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 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 78 mm diameter or larger, including hangers or tray.

.6 Provide CAD drawings (minimum file version AutoCAD 2013) in addition to hard copies.

1.7 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.

1.8 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.

.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.

1.9 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, 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.

1.10 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 effect these offsets, transitions, and changes in direction.

1.11 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

1.12 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 (modifications)

.12 Classroom control panels

.13 Starters, contactors and control devices

.14 Wiring for mechanical equipment

.15 Wiring for owner's equipment

.16 Commissioning and Integrated System Testing

.17 Electrical contractor closeout requirements (minimum of 3% but not less than $5,000.00)

.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.

1.13 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 ballasts

.4 Emergency battery units and fixtures

.5 Starters, contactors and control devices

.6 Classroom control panels

.7 Firestopping materials

.8 Wiring devices

.9 Occupancy sensors / Lighting Controls

.10 Roof cone

.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" x 11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11" x 17".

.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 (2) 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 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 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.

1.15 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.

1.16 PERMITS, FEES AND INSPECTION

.1 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.

.2 Reproduce drawings and specifications required by Electrical Safety Authority at no cost.

.3 Notify Consultant of changes required by Electrical Safety Authority prior to making changes.

.4 Furnish Certificates of Acceptance to Engineer from Electrical Safety Authority and other authorities having jurisdiction upon completion of work.

.5 This contractor must furnish any certificates required to indicate that the work completed conforms with laws and regulations of authorities having jurisdiction.

1.17 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.

1.18 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.

1.19 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.

1.20 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.

1.21 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.

1.22 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.

	Prime
up to 208 V	yellow
Fire alarm	red

.4 This contractor must paint all system junction boxes and covers in conformance with the above schedule.

1.23 PROTECTION OF OPENINGS

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

1.24 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.25 MANUFACTURERS AND CSA LABELS

.1 All labels must be visible and legible after equipment is installed.

1.26 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").

1.27 LOCATION OF OUTLETS

.1 Do not install outlets back-to-back in wall; allow minimum 150 mm (6") horizontal clearance between boxes.

.2 Owner may 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.

1.28 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").

1.29 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.

1.30 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.

1.31 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.

1.32 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.

1.33 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 year from the date of ready for takeover will be corrected at the contractors 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.

1.34 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.

1.35 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 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 hardcopy.

.1 Electronic submission/pdf file is required to be bookmarked. Any submission received without bookmarking will be immediately returned as unacceptable.

.2 Hardcopy 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 Any special warranties on equipment required (i.e. LED lighting, digital lighting control).

.12 Certificate of completion from all associated sub-contractors.

.13 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 maintenance manuals, as well as a PDF file of the entire approved manual on a USB stick. Only one USB stick is to be provided containing both the approved manual and as-built drawings.

1.36 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:

.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" (Signature of Contractor) (date).

.2 Submit hard copy to Consultant for approval. When returned, make corrections (if any) as directed.

.3 Once approved, submit completed reproducible paper as-built drawings as well as a scanned pdf file copy on USB stick with Operating and Maintenance Manuals.

1.37 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.

1.38 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 Integrated Life Safety Systems Commissioning.

.4 Testing of Integrated Fire Protection and Life Safety Systems Certificate.

.5 Fire Alarm Verification Certificate.

1.39 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 (including photos of each breaker).

.6 Lighting Control System.

.7 Outlet cover circuit labels.

1.40 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.

1.41 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.

1.42 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.

1.43 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.

1.44 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.

.13 Ensure firestop manufacturer representative performs on site inspections and certifies installation. Submit inspection reports/certification at time of ready for takeover.

1.45 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.

1.46 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 180º, 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.

1.47 DELIVERY STORAGE & 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.

1.48 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.

1.49 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.

1.50 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.

1.51 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.

1.52 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.

1.53 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.

1.54 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.

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 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.

.15 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.

END OF SECTION

Part 1 General

1.1 INTENT

.1 Life safety and fire protection systems are to be installed to comply with the provisions of the current Ontario Building and Fire Codes. As a result, testing of these integrated systems must be performed as a whole to ensure the proper operation and inter-relationship between systems (functional testing).

.2 The testing is to provide functional verification and documented confirmation that these building systems satisfy the intent of the Building Code.

.3 These systems as applicable to any given project include but are not limited to fire alarm devices, door hold open devices, fire smoke dampers and elevator recalls.

1.2 GENERAL

.1 This testing process is the responsibility of the Integrated Testing Firm as a sub-contractor to the electrical trade. Electrical trade to include all costs associated with the Integrated Testing Coordinator in contract.

.2 This process must be coordinated with suppliers and sub-contractors associated with these systems (mechanical and/or electrical).

.3 This process must be coordinated with the project construction schedule and be completed, including all associated documentation, prior to the consultant's certification of the project for occupancy.

.4 All applicable contractors, sub-contractors, and suppliers are to include all required costs in their respective tender costs.

.5 All work is to be performed in accordance with CAN/ULC S1001-2011. Special consideration is to be given to the Sample Integrated Testing Plan (ITP), the review of life safety system design documents, and the provision of test plans and reports.

.6 The work to be performed by this contractor is also described in CAN/ULC S1001-2011.

.7 Refer to CAN/ULC S1001-11 Rev1-2019 Informative Annex (C) for Sample Integrated Testing Plan (ITP).

1.3 QUALITY ASSURANCE

.1 The following criteria must be met in order to be considered an acceptable Integrated Testing Coordinator for this project:

.1 Manufacturers: Firms regularly engaged in functional testing and implementation of life safety and fire protection systems for not less than five years.

.2 Qualifications: Firms with at least five years of successful experience in facility construction, inspection, acceptance testing or commissioning as it relates to fire protection and life safety and equipment similar to that required for this project.

.3 The Contractor shall be an established commissioning contractor that has had and currently maintains a locally run and operated business for at least five (5) years.

.4 The Contractor shall show satisfactory evidence, upon request, that he maintains a fully equipped service organization capable of furnishing adequate inspection and service to the systems.

.2 For bidder information only, experienced Life Safety Systems Testing Firms include these listed below or local branches of the companies noted in the vicinity of this project:

.1 ITC Solutions
20 Hanson Ave Unit 3
Kitchener, ON, N2C 2E2

.2 Troy Life and Fire Safety
805 Boxwood Dr., Unit #201
Cambridge, Ontario N3E 1A4

.3 Lonergan Engineering
3A-235 Industrial Parkway South
Aurora, Ontario L4G 3V5

NOTE: This agent must be a third party firm NOT associated with this project in any way and be under contract with the electrical sub-contractor not the fire alarm supplier.

.3 Other firms to these listed above, who feel they are capable, must submit in writing, to the Consultant's office confirmation of the items listed in the criteria above, a minimum of one week prior to tender close in order to be considered as a bidder.

1.4 GENERAL REQUIREMENTS

.1 The Commissioning Process shall generally encompass and co-ordinate the following key areas:

.1 Integrated systems testing planning.

.2 Integrated systems testing implementation (functional testing).

.3 Integrated systems testing documentation

1.5 RESPONSIBILITIES

.1 General Contractor:

.1 The general contractor shall verify completeness of the building envelope, perimeter and interior items which affect proper operation of the noted systems.

.2 The general contractor will assure participation and co-operation of Sub-Contractors and Specialty Contractors (mechanical, electrical, building management, etc.) under the General Contractor's jurisdiction as required for the commissioning process.

.2 Mechanical Contractor:

.1 Verify Functional performance of associated mechanical systems for compliance with design intent as specified in the appropriate Specification sections.

.2 Provide the documentation with standard Functional performance reports on completion of the testing.

.3 Verify submissions for system operation and maintenance manuals, as-built documents, spare parts listing, special tools listing, and other items as may be specified.

.3 Electrical Contractor:

.1 The Integrated Life Safety Systems Testing Coordinator (ITC) is being retained by the electrical contractor, however; this contractor's work to satisfy the ITC requirements shall be included in the tender price.

.2 Verify Functional performance of electrical systems for compliance with design intent as specified in the appropriate Specification sections.

.3 Provide the documentation with standard Functional performance reports on completion of the testing.

.4 Verify submissions for electrical system operation and maintenance manuals, as-built documents, spare parts listing, special tools listing, and other items as may be specified.

.5 As a minimum this contractor must include for:

.1 Providing the ITC with documentation of design and shop drawings.

.2 Provide documents for sequence of operation and maintenance of system.

.3 Testing of all components and accessories to confirm Alarm/Supervisory/Trouble at the fire panel.

.4 Testing and operation of any generator (s) as applicable to the project.

.5 Other items that may be requested by the ITC.

.6 Re-commissioning of any items that may have failed.

.7 Re-setting of the system to proper operation after tests are completed.

.8 Provide written confirmation that life safety systems are installed in accordance with applicable codes and standards, as well as the scope of the project engineering documents.

.4 Equipment Manufacturers:

.1 The equipment manufacturers shall be responsible for providing labour, material, equipment, etc., required within the scope of the respective equipment to facilitate the commissioning process.

.2 The equipment manufacturers will perform Pre-Functional and Functional Performance Tests required by the commissioning process.

.5 Design Engineer:

.1 The design engineer shall review and provide written confirmation of acceptance of the Integrated Testing Pan (ITP).

.2 The design engineer shall observe Functional Performance Testing, at his discretion.

.3 The design engineer shall provide technical capabilities for resolution of deficiencies, where required.

.4 The design engineer shall provide necessary information to assist Integrated Test Coordinator including written confirmation of life safety systems installation in accordance with project engineering documents and are ready for integrated testing.

Part 2 Commissioning Process

2.1 OPERATIONS AND MAINTENANCE MANUALS

.1 Furnish Final, reviewed Operation and Maintenance Manuals to the Consultant fourteen (14) days prior to scheduled Functional Performance Tests.

2.2 FUNCTIONAL PERFORMANCE TEST

.1 The contractor shall be responsible for the Functional Performance Tests. These tests ensure that all equipment and systems are installed in accordance with the Specifications, Drawings and manufacturers' requirements.

.2 The contractor shall be responsible for coordinating schedule for Functional tests of various equipment and systems.

.3 In the Functional Test, all noted systems and sub-systems shall be checked for the following:

.1 Verify that each element has been properly installed, properly identified, and that all connections have been made correctly.

.2 Verify that tests, meter readings, and specific mechanical/electrical performance characteristics agree with those required by equipment or system manufacturer.

.3 Re-commission any item(s) that may have failed.

.4 Notify the consultant in writing, at least fourteen (14) days prior to the date of Functional Performance Testing. Schedule the Functional performance tests over a period of consecutive business days.

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.

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 (194ºF) rated T90 for indoor above grade installations and RW90 for below grade installations.

.4 Minimum wire size shall be 8 AWG for all 120V circuits exceeding 60 meters in length.

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.

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 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 Junction and pull boxes must conform to CSA C22.2 No. 40 (latest edition)

2.2 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 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.

3.2 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 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 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.**

2.4 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

Not Applicable.

Part 2 Products

2.1 MATERIALS

.1 Grounding equipment must conform to CSA C22.2 No 41 (latest edition).

2.2 EQUIPMENT

.1 Insulated grounding conductors: green with insulation type that matches specified phase conductors. Gauge shall be in conformance with the latest edition of the Electrical Safety Code to suit required installation conditions.

.2 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:

.1 Grounding and bonding bushings.

.2 Protective type clamps.

.3 Bolted type conductor connectors.

.4 Bonding jumpers, straps.

.5 Pressure wire connectors.

Part 3 Execution

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. **Where EMT is used, run ground wire in conduit.**

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Use mechanical connectors for grounding connections to equipment provided with lugs.

.5 Soldered joints not permitted.

.6 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

3.2 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Frames of motors, starters, control panels, elevators and distribution panels.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Electrical General Requirements Section.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

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.56-1977(R1977), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .3 CSA C22.2 No.83-M1985(R1992), Electrical Metallic Tubing.

Part 2 Products

2.1 CONDUITS

.1 Epoxy coated conduit: to CSA C22.2 No.45, with zinc coating and corrosion resistant epoxy finish inside and outside.

.2 Electrical metallic tubing (EMT) with couplings: to CSA C22.2 No.83.

.3 Flexible metal conduit: to CSA C22.2 No.56, aluminum and liquid-tight flexible metal.

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 Coating: same as conduit.

.5 Factory "ells" where 90° bends are required for 27 mm (1") and larger conduits.

.6 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 Use electrical metallic tubing (EMT) for all branch circuits unless specified otherwise.

.4 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.

.5 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.

.6 Conduits terminating at electrical equipment in sprinklered areas are to be provided with insulated compression style connectors equal to Thomas & Betts Cat. #TC8XXSC or approved equal.

.7 **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 (½").

.8 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.9 Mechanically bend steel conduit over 27 mm (1") diameter.

.10 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.11 Install fish cord in empty conduits.

.12 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.

.13 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.

.14 Dry conduits out before installing wire.

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 This analysis is to be performed by an independent, third party firm.

.2 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.

.3 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.

.4 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.

.5 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 addendum's 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 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.

.11 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 and HVAC Units.

2.2 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 MOCP.

.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.

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 digital image of each breaker indicating final settings and placement of labels

3.3 SERIES RATING LABELS

.1 Provide lamacoid 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.**

3.4 ACCEPTABLE TESTING FIRMS

.1 MVA Engineering (519) 668-4698
.2 GT Wood Company Ltd. (905) 272-1696
.3 Brosz & Associates (905) 472-6660
.4 K-Tek Electro-services Ltd. (905) 640-2002

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 Telecommunication network system rough-in.

.2 Public address system rough-in.

.3 Classroom control panels.

Part 2 Products

2.1 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 Telecommunication Network installation shall be by Owner's approved vendor.

2.2 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.

2.3 CLASSROOM CONTROL PANELS

.1 Provide surface mounted Classroom Hub Control Panels as detailed on the drawings.

.2 Modular control panels shall be constructed of structurally sound 6063 T5 alloy satin anodized aluminum frame .08mm thick with high pressure plastic laminate faced panels of lightweight particle core and 0.5mm thick plastic laminate backing sheet. Plastic laminate colour as selected by the Architect from Arborite or Formica, furniture finish, from manufacturer's standard colour range. Complete assembly to meet flame spread ratings in areas used.

.3 Units to be complete with backboxes fabricated from heavy gauge satin coat steel with suitable barriers and continuous knockouts. Satin anodized faceplates shall be pre-punched to accept detailed components.

.4 All panels shall be vandal resistant and removable with special tools for service access.

.5 Fabricate units in accordance with reviewed shop drawings with extruded aluminum frames and solid plastic laminated face panels.

.6 Panels to be removable from aluminum frames with rounded profile edging.

.7 Front panels to have colour finish as selected by the Architect.

.8 Panels to have all openings, mounting hardware, etc. for services as required for installation of mechanical and electrical services.

PANELS MUST BE COMPLETE WITH RECESSED OPENING FOR TELEPHONE HANDSET. REFER TO CONTROL PANEL DETAIL ON DESIGN DRAWINGS.

.9 Units to be full height from 200 mm off floor to underside of ceiling panels. Standard unit dimensions are 16" in width, 4" deep.

.10 Acceptable Manufacturer (basis of design):

.1 Swift Path Solutions.

.11 Acceptable Alternate (no other alternates accepted):

.1 Control Hub Solutions Inc.

Part 3 Execution

3.1 TELECOMMUNICATION NETWORK SYSTEM ROUGH-IN

.1 Conduits terminated into ceiling spaces must be within 3m (10') of zone conduits (if applicable).

.2 Ensure specified zone conduits are installed back to service backboard.

.3 Outlets are to be installed complete with 25 mm (1") conduit to corridor ceiling space or nearest zone conduit (if applicable).

.4 Provide insulated bushings on all conduits terminated in ceiling space.

.5 A 25mm (1") conduit is to be installed from elevator machine room to voice service backboard.

3.2 PUBLIC ADDRESS SYSTEM ROUGH-IN

.1 Conduits terminated into ceiling spaces must be within 1m (10') of cable management system.

.2 Outlets are to be installed complete with 21 mm (3/4") conduit to corridor ceiling space or nearest cable management system.

.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.

3.3 CLASSROOM CONTROL PANELS

.1 Electrical trade to supply and install units in accordance with manufacturers' recommendations and reviewed shop drawings complete with all frames, cut outs, face panels, etc., to provide a complete installation.

.2 It is the electrical trade's responsibility to coordinate complete installation of all mechanical, electrical and miscellaneous services in all control panels. Components within control panels will vary from room to room.

3.4 EQUIPMENT ALLOWANCES

.1 The electrical contractor shall include in their bid the cost to add six (6) additional voice / data outlets (rough-in only) to be installed at locations determined by the Owner and coordinated through the Mechanical Trade for new BAS panels (6 in total). Provide 4" single gang backbox complete with 3/4" (21mm) C conduit to ceiling space or to nearest cable management system.

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 (1) 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 lamacoid label on feeder breaker. Lamacoid label to state "Series Rating Breaker." Lamacoid label to be size 2.**

.5 Bus and breakers must be rated for interrupting capacity 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

.15 Power distribution circuit breaker panelboards (400 AMP or larger) must be one of the following:

- .1 Eaton CAT# POW-R-Line-C PRL-3A or PRL-4A
- .2 Schneider Electric CAT# I-Line Series (Bolt-On)

.3 Siemens CAT# P2 Series (up to 600A mains and maximum 100A-3P branch breakers)

.4 Siemens CAT# S5 Series (up to 1200A mains with branch breakers above 100A-3P)

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 lamacoids 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.

.5 Moulded case circuit breakers 250 Amps and above are to operate by means of a solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and long time, short time, instantaneous tripping for phase and ground fault short circuit protection (if indicated or applicable by the Electrical Safety Code versus the breaker amperage). Unless otherwise specified, complete system selective co-ordination shall be provided by the individually adjustable time/current curve shaping elements as following:

.1 Breakers shall have fixed rating plug determining breaker continuous current rating.

.2 All breakers shall have adjustable long delay pickup and time, L.

.3 All breakers shall have individual adjustments for short delay pickup and time, S; including I2t settings in time adjustment.

.4 Breakers shall have adjustable instantaneous pickup, I; that if required by co-ordination study can be turned off, (I).

.5 If required by Electrical Safety Code breakers shall have individually adjustable ground fault current pick-up and time, G; including I2t settings in time adjustment.

.6 Unless otherwise specified, for the low voltage systems provide an electronic trip unit as specified above for the following moulded case circuit breakers:

.1 Mains or ties in main switchboard: LS trip unit with fixed instantaneous over-ride exceeding maximum value of fault at the point of installation.

.2 Feeders exceeding 250A trip setting: LS trip unit with fixed instantaneous over-ride exceeding maximum value of fault at downstream panelboard.

Part 3 Execution

3.1 INSTALLATION

.1 Install circuit breakers as indicated complete with all necessary mounting hardware and filler panels if necessary.

.2 Provie lamacoid labels for series rating breakers. Lamacoid label to state “Series Rating Breaker.” Lamacoid 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 SWITCHES

.1 Line Voltage Wall Switches

- .1 AC switches must conform to CSA C22.2 No. 111 (latest edition).
- .2 AC switches with following features:
  - .1 Terminal holes approved for No. 10 AWG wire.
  - .2 Silver alloy contacts.
  - .3 Urea or melamine molding for parts subject to carbon tracking.
  - .4 Suitable for back and side wiring.
  - .5 Toggle style (Rocker style) (architect to select colour).
- .3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.
- .4 AC Switches of one manufacturer throughout project.
- .5 Occupancy sensor switches shall be dual technology style (PIR and Ultrasonic) where noted on the drawings.
- .6 Acceptable Materials:
  - .1 Single Pole : Hubbell Cat #HBL1201
  - .2 Three Way: Hubbell Cat. #HBL1203
  - .3 Four Way: Hubbell Cat. #HBL1204
  - .4 Keyed: Hubbell Cat. #HBL1221 Series
    - .1 Keys: Hubbell Cat. #HBL1209
  - .5 Motor Rated: Hubbell Cat. #HBL1221PL
  - .6 Single Relay Occupancy Sensor includes:
    - .1 Legrand Cat. #DW-100
    - .2 Greengate Cat. #ONW-D-1001
    - .3 Sensorswitch Cat. #WSXA Series
- .7 Acceptable toggle switch alternate manufacturers include:
  - .1 Pass & Seymour
  - .2 Leviton.

2.2 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 Standard Devices

.1 Standard duplex receptacle: Hubbell Cat # HBL5252CN

.2 T-slot receptacles: Hubbell Cat. #HBL5352

.2 Decora Style Devices

.1 Ground fault protected T-slot receptacles: Hubbell Cat. # GF20L A

.2 Decora style duplex receptacle: Hubbell Cat. # HBL2152

.3 Decora T-slot receptacle: Hubbell Cat. # HBL2162

.6 Acceptable alternate manufacturers include:

.1 Pass & Seymour

.2 Leviton

.7 Residential grade equivalents for materials noted above for use within residential dwelling units.

2.3 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 GFCI receptacles at grade, provide extra-duty single gang horizontal die cast receptacle covers. NEMA 3R rated complete with lockable hasp and reinforced hinge. Suitable for use with 12-gauge cord sets. Intermatic Cat. # WP1010HMXD or equal.

.7 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).

.8 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 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches at height specified in Electrical General Requirements Section or as indicated.

.2 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height specified in Electrical General Requirements Section or as indicated.

.3 Where split receptacle has one portion switched mount vertically and switch upper portion.

.3 Occupancy sensors:

.1 Occupancy sensors shall be set to five (5) minutes “delay to off” unless otherwise noted.

.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.

3.2 EQUIPMENT ALLOWANCES

.1 The electrical contractor shall include in their bid the cost to add six (6) additional 120V 15A duplex receptacles c/w to be installed at locations determined by the Owner and coordinated through the Mechanical Trade for new BAS panels (6 in total). Each additional receptacle shall be on a dedicated circuit complete with branch wiring and breaker.

.2 Allow up to 100 feet of conduit and wiring per receptacle complete with new breaker for fully functional live devices. Exact location and panel source to be determined on site by Owner during construction. Provide updated typed panel schedules for all panels at the completion of the project.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.2 No.248.12/94, Low Voltage Fuses Part 12: Class R (Bi-National Standard with, UL 248-12 (1st Edition).

.2 CSA C22.2 No. 106-M92 (latest edition).

1.2 MAINTENANCE MATERIAL

.1 Three spare fuses of each type and size installed.

1.3 DELIVERY AND STORAGE

.1 Ship fuses in original containers.

.2 Store fuses in original containers in moisture free location.

Part 2 Products

2.1 FUSES GENERAL

.1 Fuses: product of one manufacturer for entire project .

.2 Fuses specified below must conform to CSA C22.2 No. 106 (latest edition). Fuses conforming to standard C22.2 No. 106-1953 will be rejected.

.3 Fuses must provide a fully coordinated system for both overload and fault conditions.

2.2 FUSE TYPES

.1 Class J fuses (formerly HRCI- J).

.1 Time delay, capable of carrying 500% of its rated current for 10 s minimum.

.2 Fast acting as noted.

.2 Class R fuses (formerly HRCI- R). For UL Class RK1 fuses, peak let-through current and I^2t values not to exceed limits of UL 198E-1982, table 10.2.

2.3 ACCEPTABLE PRODUCTS

.1 Motor Protection:

1-600 A: Mersen Type AJT

.2 Other acceptable manufacturers:

.1 GEC

.2 Little Fuse

Part 3 Execution

3.1 INSTALLATION

.1 Install fuses in mounting devices immediately before energizing circuit.

.2 Ensure correct fuses fitted to physically matched mounting devices.

.1 Install Class R rejection clips for HRCI-R fuses.

.3 Ensure correct fuses fitted to assigned electrical circuit.

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

Manufacturer	General Purpose	Weather Proof
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.

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 One (1) operating coil.

.2 Three (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 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 FINISHES

.1 Apply finishes to enclosure in accordance with Electrical General Requirements Section.

2.4 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.

2.5 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.

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.

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 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.

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%.

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 LED's must be tested in conformance with IESNA LM80 standard.

.2 LED's 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 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, 345º horizontal and 180º 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.

2.6 EMERGENCY LIGHTING UNITS (SELF CONTAINED)

.1 Emergency lighting units must conform to CSA C22.2 No 141 (latest edition).

.2 Supply voltage: as noted on drawings.

.3 Battery: sealed, maintenance free, 10 year life.

Note: Battery units must be capable of supplying the wattage indicated for a minimum of 30 minutes or as specified.

.4 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.

.5 Solid state transfer circuit. EM backup AC fail operation.

.6 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

.7 Signal lights: “AC Power ON” condition and “charging” condition.

.8 Lamp type: integral high output LED, 100,000 hours at L70.

.9 Ceiling mount brackets and recessed mounting kit as required to suit installation.

.10 Auxiliary equipment:

.1 Test switch.

2.7 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 900mm (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 as indicated.

.8 Direct “heads” on units to illuminate path(s) of exit.

.9 Install emergency lighting units at 300mm (12") below finished ceiling, unless indicated otherwise.

.10 Provide a 15 A 120 V duplex receptacle (connected to circuit indicated) adjacent to unit. **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 two (2) per fixture.

.12 All battery units are to be provided with a visible lamacoid 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.

.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 30)

.7 Actual period of testing (time of day)

3.6 ADDITIONAL INSTALLED EXIT SIGNS

.1 The electrical contractor is to include in their bid the cost to add two (2) additional standard exit lighting units to be installed and tested in locations as directed by the consultant. Note: This installation and test will be occurring after the initial testing/certification testing is complete.

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 27 26 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 luminaries 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 (Greengate).

.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 seven (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 (1) 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 (1) 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, LRMC-212, LRMC-213, LMPL-201, LMRC-311, LMRC-312, LMRC-313.

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-S529 (latest edition), Smoke Detectors.

.5 CAN/ULC-S530 (latest edition), Heat Actuated Fire Detectors, Fire Alarm.

.6 CAN/ULC-S536 (latest edition), Inspection and Testing of Fire Alarm Systems.

.7 CAN/ULC-S537 (latest edition), Verification of Fire Alarm Systems.

.8 OBC (latest edition), Ontario Building Code.

1.2 DESCRIPTION OF SYSTEM

.1 System includes:

.1 Renovation work required on existing base building single stage fire alarm system, including required tie-ins of new fire alarm signalling & initiating devices to the main control panel **Edwards EST3 Series** to carry out fire alarm and protection functions.

.2 Addressable and conventional automatic alarm initiating devices.

.3 Audible and visual signal devices.

.4 End-of-line devices.

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.

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 MAINTENANCE MATERIALS

.1 Include:

.1 10% spare glass rods for total number of manual pull box stations if applicable.

1.7 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.**

1.8 SYSTEM OPERATION

.1 Refer to partial Fire Alarm Sequence of Operation for specific fire alarm sequence functions related to the system modifications which generally include the following:

.1 Activation of audible and visual signal devices.

.2 Cause alarm to be indicated on control panel and remote annunciator(s).

.3 Cause system trouble indications.

.4 Activate auxiliary functions.

.5 System silence parameters.

.6 System reset parameters.

Part 2 Products

2.1 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.

2.2 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 57ºC (1 35ºF). The heat detector shall be rated for ceiling installation at a minimum of 21.3m (70') centres and be suitable for wall mount applications.

2.3 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 57ºC (135ºF) and a rate-of-rise alarm point of 9ºC (15ºF) per minute. The heat detector shall be rated for ceiling installation at a minimum of 21.3 m (70') centres and be suitable for wall mount applications.

2.4 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: 0ºC to 49ºC (32ºF to 120ºF)

.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.

2.5 STANDARD DETECTOR MOUNTING BASES

.1 Provide standard detector mounting bases suitable for mounting on North American 1-gang, 85 mm (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.

2.6 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.

.1 with integral red alarm LED, and terminals for remote alarm LED.

2.7 AUDIBLE/VISUAL SIGNAL DEVICES

.1 150 mm (6") Bells: surface mounted bell, vibration type 24Vdc, 150 mm (6"), 92dBA rating at 3 m (10'), red finish, FM and ULC listed.

.2 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.

2.8 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.

2.9 ANCILLARY DEVICES

.1 Relay unit to initiate fan shutdown on HVAC-5 Unit.

.2 Relay unit to facilitate elevator recall functions as indicated.

2.10 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.

2.11 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.

2.12 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.

2.13 DOOR HOLD OPEN DEVICES

.1 Units to be complete with the following features:

.1 Wall mounted style.

.2 Long life electromagnet.

.3 Low current operation.

.4 Completely silent operation.

.5 25 lbf (111N) minimum holding force.

.6 Adjustable swivel contact plate.

.7 Brushed zinc finish.

.8 Maintenance free operation.

.9 Water resistant design.

.10 ULC, CSA, and FM approved.

2.14 FIRE SMOKE DAMPERS

.1 Fire smoke dampers c/w integral smoke detectors shall be provided by the mechanical contractor but connected into the fire alarm system by this Division.

.2 Provide 120V 15A circuit and fire alarm connections to all fire smoke dampers c/w integral smoke detector. Power to fire smoke dampers can be daisy chained together based on area from the nearest local panel.

.3 Coordinate exact location and connection requirements with mechanical contractor prior to rough-in. Refer to mechanical drawings for further details and requirements.

2.15 SYSTEM WIRING

.1 The system wiring must be FSA rated in conformance with the Electrical Safety Code to suit the type of installation.

.2 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.

.3 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.

.4 Signal wiring is to be cross connected in a class ‘B’ configuration.

.5 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.

.6 **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.**

2.16 APPROVED EQUIPMENT

DEVICE	**EDWARDS (Existing Edwards EST3 Series)**
Intelligent Devices	
Smoke Detectors	SIGA-PS
Duct Type Smoke Detector (c/w Air Sampling Tubes)	SIGA-SD c/w SIGA-PS
Control Module	SIGA-CR
Isolator Module	SIGA-IM
Conventional and Auxiliary Devices	
150 mm (6”) Bells	439D Series or MB Series
Strobe	G1R-VM
Door Holder	1500 Series

Part 3 Execution

3.1 INSTALLATION

.1 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.

.2 Connect alarm circuits to main control panel.

.3 Locate and install signal devices and connect to signalling circuits.

.4 Connect signalling circuits to main control panel.

.5 Install end-of-line devices at end of applicable alarm and signalling circuits.

.6 Locate and install door releasing devices.
Note: Door holders must release by way of local smoke detector and signal from main control panel. Provide additional relays to suit.

.7 Locate and install remote relay units to control fan shut down.

.8 Elevator controllers are to be connected with 4 #14 conductors in conduit from fire alarm control panel to signal elevator recall in the event of a general alarm.

.9 **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 **Provide “Integrated Testing” of this life safety system in conformance with the noted specification section. Include all associated costs in tender.**

3.8 AUDIBILITY TESTING

.1 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 ADDITIONAL INSTALLED FIRE ALARM SYSTEM COMPONENTS

.1 The electrical contractor is to include in their bid the cost to add two (2) additional fire detection devices (heat or smoke detectors) to be installed and verified in locations as directed by the consultant.

.2 The electrical contractor is to include in their bid the cost to add two (2) additional fire smoke damper connections and 120V loss of power trouble signal with associated module and including four (4) additional isolation modules to be installed and verified as directed by the consultant.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for design, supply and installation of temporary excavation support and protection systems forming a part of the permanent foundation system of the building.

1.2 SITE CONDITIONS

.1 Examine Site:

.1 Note all characteristics and features affecting work. No allowance will be made for difficulties encountered or expenses incurred on account of any site conditions or any growth or item existing thereon, visible or known to exist when bid is submitted.

.2 Underground Services:

.1 Notify public utilities or municipal authorities in advance of planned excavations adjacent to their services. Take care not to damage or displace encountered known and unknown services. When such services are encountered, immediately notify Consultant, and protect, brace and support active services. Where repairs become necessary, use the following procedure:

.2 Known Services:

.1 Repair at no expense to Owner.

.3 Unknown Services:

.1 Forward complete breakdown of estimated cost of such work. Proceed immediately with repairs upon receipt of written approval of cost of such repair work.

.4 In the case of damage to an essential service, notify Consultant immediately and repair service under Consultant's direction. Inform Consultant of services encountered which require adjustment, relocation or abandonment and arrange for disconnection and capping of pipe.

1.3 GEOTECHNICAL SITE INVESTIGATION REPORT

.1 Review in detail geotechnical site investigation report. Information given in Geotechnical Site Investigation Report was obtained for use of Owner in execution of design. It is presented in good faith to assist Construction Manager. No guarantee is made as to its detailed accuracy for every site location.

1.4 LEVELS

.1 Existing grade levels shown on drawings are furnished in good faith for the guidance of the Construction Manager. Check and verify levels at site. Should the actual grade levels of the site be other than shown, no claims will be entertained unless notification is made in writing to the Consultant. Do not proceed with the work until Consultant's approval is received. Allow Consultant sufficient time to inspect such claim.

1.5 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Stockpile materials in designated areas. Stockpile topsoil and each type of fill material separately to prevent integration. Stockpile granular materials so as to prevent segregation.

.2 Keep surrounding roads free of soil deposits from material hauling trucks. Load trucks carefully to prevent spillage and wind drift.

.3 To protect neighbourhood from wind-blown sand and dust, sprinkle with water entire excavated area and stockpiled excavated materials when required.

.4 Protect adjacent property from damage which may occur from any cause in the performance of the work of this Section.

.5 Do not interfere with use of adjacent buildings.

.6 Take precautions against movement, settlement or collapse of sidewalks, public services adjoining property and be liable for all damage to same.

.7 Before commencing work verify location of survey monuments in the areas in which the work is to be executed. Should any of the monuments be disturbed due to the work be responsible for the expenditures incurred in restoring the monuments.

.8 Take precautions against movement or settlement of existing building. Provide and place bracing and shoring necessary for the safety and support of the structure and execute the work in a manner to prevent movement, settlement, damage or injury caused thereby or resulting therefrom.

.9 Shoring and Trench Timbering:

.1 In addition to requirements of local authorities, carry out in accordance with requirements of the Occupational Health and Safety Act, RSO 1990 C.0.1 and regulations for construction projects, and all other applicable regulations of the Ontario Ministry of Labour. In addition, follow recommendations of the Construction Safety Association brochure, "Shoring and Timbering in Trenches, latest edition", wherever applicable.

.10 Shoring and Bracing:

.1 Erect and maintain necessary shoring and bracing for excavations in a manner that will properly retain banks of excavations and prevent cave-in. Shoring to be erected in a manner that will allow all other work to be carried out while shoring is still in place. Shoring installation shall be entirely clear of footings, foundations, walls or other such work so that it may be removed entirely or in sections when it is no longer required or when directed without causing any damage or injury to structural work that has been completed.

2 Products

2.1 MATERIALS

.1 Fill Material:

.1 For base under floor slabs and other locations as recommended by geotechnical investigation report, shall be Granular 'A' material in accordance with OPSS Form No. 1010, well grade and maximum aggregate size of 3/4".

.2 Material shall be maintained at optimum moisture content during placing and while compacting work is in progress, in strict accordance with inspection engineer's instructions and to his approval.

3 Execution

3.1 PREPARATION

.1 Clear and remove, from site, obstructions to excavating. Establish and maintain accurate lines and levels as required. Provide batter boards, line stakes and templates, and establish permanent reference lines and bench marks required.

3.2 EXCAVATION - GENERAL

.1 Excavate with due regard for the peculiarities of soil conditions and take precautions to protect adjacent foundations and property.

.2 Excavate and remove sod, debris, topsoil or fill deposited within the building area. Remove topsoil to its full depth over the areas to be excavated or graded.

.3 Stockpile topsoil in a neat pile where directed. Remove surplus topsoil not required for regrading or landscaping from the site.

.4 Stockpile excavated material approved for re-use on the site so that such material will not interfere with site drainage, drainage of adjacent properties, or building operations. Remove subsoil and excavated material not required for regrading outside the building from the site, including material excavated by other Sections.

.5 Excavate to extent, elevations and depths required for completion of work, leaving sufficient space for removal of formwork, application of and installation of weeping drains. Excavate and construct for slabs, ramps, and driveways, to lines, elevations and cross sections shown on drawings to allow finishing sections to install their work to required thicknesses.

.6 Keep excavation free of water by bailing, pumping or system of drainage as required, and provide pumps, suction and discharge lines of sufficient capacity. Maintain until such time as permanent drainage system is installed or until Consultant's approval for removal of equipment is obtained. Take all necessary measures to prevent flow of water into excavation.

.7 Protect bottom and sides of excavated pits and trenches from freezing.

.8 Keep bottoms of excavations clean and clear of loose materials leveled and stepped at changes of levels except excavations made for drainage purposes which are to slope as required.

.9 If removal of earth causes displacement of adjacent earth, remove disturbed earth at no additional cost to Owner.

.10 Remove soft, wet or unconsolidated ground, quicksand and organic material encountered in excavating and fill void with well compacted, clean, dry fill of quality as herein specified. Where these conditions occur under or near footings, special arrangements will be made by Consultant. Similarly treat wells, cesspools, pits, etc. if encountered.

.11 After completion of excavation and prior to placing concrete or fill, notify inspection engineer so they may make inspection of exposed bearing surfaces. In event founding levels are subjected to rain or other moisture after inspection and approval but prior to installation of concrete, notify inspection engineer to re-examine all exposed bearing surfaces. Do not place concrete until re-examination has taken place and approval given.

.12 Provide protection to keep surface against which concrete or fill is to be placed free of frost. Thaw frozen surfaces against which concrete or fill is to be placed to unfrozen depth. Remove thawed softened material to firm base at no extra cost to Owner.

.13 Should nature of subsoil at depths shown prove to be unsatisfactory for placing of structural work thereon, then upon Consultant's written order, excavate to greater depth until satisfactory bottom is reached. Payment for such additional excavation and backfill will be on basis of contract unit prices.

.14 If excavations reveal seepage zones, springs or other unexpected subsurface conditions which may necessitate revisions or additions to any drainage system, inform Consultant immediately for remedial action.

.15 Excavated surfaces scheduled to receive concrete skim slabs shall be protected from excessive traffic and other disturbances and shall not be left exposed for extended periods of time.

3.3 TRENCH EXCAVATING

.1 Excavate with suitable machinery or by hand as may be necessary to depths and dimensions shown or required.

.2 Cut and trim sides of trenches evenly and as near vertical as possible, shore as required to prevent cave-ins.

.3 Keep bottoms of trenches clean and clear of loose material. Slope or grade as required. Hand trim at least last 4" of trench excavations to ensure minimum disturbance to load bearing value of trench bottoms.

3.4 BACKFILLING

.1 Proceed promptly with backfilling as building progresses and work to be backfilled has been inspected and approval to backfill obtained. Place backfill in 8" thick maximum layers. Compact each layer before placing next. Maintain optimum moisture content to achieve required densities.

.2 Backfill evenly on both sides of foundation walls to avoid unequal fill pressures on walls.

.3 Fill over-excavations under bearing surfaces and footings, or within pyramid enclosed by 7 in 10 slope from bearing surface with concrete of same strength as specified for footings. Fill over-excavation under all other areas with approved sand/gravel mixture and compact as directed. Fill over excavation at no additional cost to Owner.

.4 Withdraw shoring material during backfill.

.5 Place fill around foundation walls to that footings will have a minimum 5'-0" coverage, measured at 45 deg angle from bottom of footing to protect against frost until final grading is complete.

.6 Compaction equipment to be of size and type to permit required compaction without causing lateral forces resulting in displacement of foundation walls. Exercise caution in this regard to avoid movement of foundations.

.7 Backfill and fill shall not be placed over debris, organic matter, snow, ice or frozen ground. Fill shall not be placed at ambient air temperatures below 0EC without approval.

.8 Take care to avoid damage to waterproofing or displacement of waterlines, drains, conduit and other underground installations.

.9 Prior to placing fill for concrete floor slabs on earth, consolidate subgrade to obtain same compaction specified for fill material.

.10 Compact soil materials to not less than the following percentages of maximum dry unit weight in accordance with ASTM D 698.

Location	Fill Material	Max. Lift Thickness	Minimum Compaction
Under exterior slabs-on-grade	25 mm Crushed Gravel	6”	95%
	Native satisfactory clay, or imported clay suitable for backfill, to a minimum of 600 mm below rough grade.	6” lifts	100%
Against exterior side of foundations	Native satisfactory clay, or imported clay suitable for backfill.	6” lifts to 24” total	95%
Under paved areas	Native clay, or imported clay suitable for backfill to bring subgrade to sub-base level of road way, minimum 400 mm below final grade.	6”	100%
Under landscape areas	Native clay, or imported clay suitable for backfill, to a minimum 200 mm below final grade.	8”	95%
Other locations	Native clay, or imported clay suitable for backfill.	8”	98%

.11 Coordinate with Work of other Sections for the lines and levels of uncompacted subgrade required by those Sections.

.12 Compact with mechanical tampers, areas adjoining vulnerable building components which cannot be thoroughly compacted by drawn equipment. Install Granular 'A' where required, as recommended by Geotechnical Investigation Report.

3.5 TESTING

.1 Sequentially test each stage of backfill commencing at founding elevations and continuing through installation of subsequent lifts or material and compaction thereof.

.2 Do not proceed with installation of any material until preceding surface or layer meets design criteria. Owner will engage and pay for independent testing agency to conduct testing in addition to tests noted in paragraph above.

3.6 COMPACTION

.1 Density of fill in place shall be in accordance with latest revision of ASTM D698-91, 98% Standard Proctor Density for all fill unless specifically noted otherwise. Fill to underside of asphalt base - 98% Standard Proctor Density.

.2 Maintain optimum moisture content during backfill and fill compaction to achieve required density. Deposit in layers of such thickness that equipment being used for compacting can produce specified density.

.3 Puddling or flooding with water for consolidating granular fill will not be permitted. Addition of water is limited only to extent required to provide optimum moisture level of fill material.

.4 During and immediately after levelling, thoroughly compact each layer of fill by use of compaction equipment of size and type to permit required compaction without causing lateral forces resulting in displacement of foundation walls. Exercise caution in this regard to avoid movement of foundations.

.5 After a period adequate to reveal settlement has passed, place additional fill and compact in all depressions. Make good any subsequent settlement without extra cost to Owner.

3.7 WATER ON PREPARED SURFACES

.1 Promptly remove by approved methods, water rising from seeping or resulting from rainfall wherever such water is on surface of subgrade soil and compacted fill.

.2 Where proper drainage and pumping is not carried out as specified herein and any prepared subgrade soil under structural work, and any compacted fill under concrete slabs is softened or disturbed by water due to improper drainage and pumping, Construction Manager under this Section shall (A) without extra cost to Owner, remove unsatisfactory soil and fill; and (B) bear all incidental costs in connection with additional excavation, backfilling and structural work for footings and foundations, and additional excavation and placing and compacting of granular fill under concrete slab base course.

3.8 ROUGH GRADING

.1 Rough grade to profiles shown on required levels to allow installation of follow-up materials to produce final grades at levels indicated. Rough grade surface to be suitable to accept follow-up sections work.

3.9 DISPOSAL OF DEBRIS AND SURPLUS MATERIAL

.1 Remove from site and legally dispose of all rubbish, rocks and surplus materials resulting from site stripping, excavation and grading work.

.2 Vehicles employed in the cartage of this material shall not be loaded beyond the rated limits, nor in such a manner as to cause spillage. Any spillage or tire tracking occurring upon public property or upon the property of others, shall not be allowed to remain to become a hazard and a nuisance but shall be cleaned up immediately.

.3 Break rock, concrete and unit masonry into pieces not exceeding 24" in any dimension.

END OF SECTION

1 General

1.1 SUMMARY

.1 This section includes requirements for supply and installation of perimeter foundation and under-slab drainage system consisting of fabric wrapped perforated drainage materials, non-perforated leads to drainage trench required for the following:

.1 Foundations.

.2 Underslab Areas.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals:

.1 Samples: Submit samples of materials to Consultant for review and acceptance as follows:

.1 Drainage Pipe: Provide a 305mm (12”) length of perforated and non-perforated pipe and end connection.

.2 Drainage Composite: Provide 406mm x 406mm (16” x 16”) length of each type of composite drainage panel specified.

.3 Filter Fabric: Provide 406mm x 406mm (16” x 16”) filter cloth sample for review and acceptance.

.2 Data Sheets: Manufacturer's descriptive literature and recommended method of installation.

.3 Certificates: Manufacturer's certificates attesting that products meet specification requirements.

.3 Informational Submittals:

.1 Certificates:

.1 Submit manufacturer's test data and certification that drainage materials meet project requirements a minimum of two (2) weeks before beginning work of this Section.

.2 Submit proposed source of granular bedding and filter materials a minimum of two (2) weeks before beginning work of this Section, indicate gradation and certification of expected flow rate of granular materials.

.2 Product Data: Submit manufacturer’s product literature for each product listed including manufacturer’s recommended installation procedures and any modifications required to suit installation conditions.

1.3 QUALITY ASSURANCE

.1 Construction Manager executing work of this Section shall employ installers having a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 The underslab drainage system shall be inspected by the Consultant prior to backfilling work.

1.4 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Deliver materials on manufacturer's original skids, or in original unopened protective packing.

.2 Protect materials during transportation, storage and installation to avoid physical damage.

2 Products

2.1 PIPING MATERIALS

.1 Drainage Piping:

.1 Perforated P.V.C. pipe conforming to CAN/CSA B1800-11, diameter indicated on the drawings. Diameters up to and including 150mm (6") shall be DWV pipe, Schedule 40. Diameters greater than 150mm (6") shall be DWV pipe, Series 100.

.2 Perforations shall be 13mm (1/2") diameter holes spaced at 150mm (6") on centre along the length of the pipe and alternating at 60 deg each side of the vertical centerline.

.3 Drainage system shall be complete with pipe couplings, 45 deg "wye" fittings, floor cleanouts, and necessary material for complete assembly of the drainage system.

.2 Cast Iron Piping: Cast iron pipe and fittings in accordance with CAN/CSA B70-12, size to accommodate drainage piping.

.3 Filter Cloth Membrane:

.1 Woven polypropylene geotextile, needle punched, filter cloth membrane.

.4 Cast Iron Cleanouts: Cast iron cleanout having round flanged couplings, cast iron housing; secured, medium duty loading class, cast iron cover; and cast iron ferrule and countersunk, brass cleanout plug.

.5 Sand: Clean, inorganic well graded natural concrete sand conforming to CAN/CSA-A23.1-09/A23.2-09.

.6 Gravel: Free from loam, or other deleterious materials with maximum particle size of 50mm (1") and maximum 5% passing No. 200 sieve.

.7 Accessories: Drainage piping couplings (for pipe that does not have bell connectors), end caps, and access covers, all as required for complete system.

2.2 WEEPING TILE COVER MATERIALS

.1 Geotextile Cloth: Polypropylene fibre, polyester fibre, or combination of both geotextile cloth having an nominal flow rate of 4,480 to 13,440 L/min/m^2 in accordance with ASTM D4491; non-woven, needle-punched continuous filament or woven, monofilament or multifilament and as follows:

.1 Trench Wrap: Flat material, width sufficient to wrap trench and overlap a minimum of 150mm (6").

.2 Pipe Wrap: Sock material, diameter sufficient to wrap drainage.

.2 Coarse Gravel: Gravel surrounding perforated drainage piping having the following nominal dimensions:

Sieve Size	Percent Passing
50mm (2”)	100
38mm (1-1/2”)	90 - 100
28mm (1-1/8”)	25 - 60
19mm (¾”)	0 - 15
10 mm (3/8”)	0 - 5

3 Execution

3.1 INSPECTION

.1 Check graded subgrade for conformity with elevations and cross-sections before placing drainage material.

.2 Check for unstable areas and areas requiring additional compaction.

.3 Notify Consultant of unsatisfactory surfaces and conditions.

.4 Do not begin installation of drainage material until deficiencies have been corrected.

3.2 INSTALLATION – FOUNDATION AND UNDERSLAB DRAIN PIPING

.1 Cut and excavate trenches receiving drainage piping to locations and levels to provide proper slope to outlets; dig trench having a minimum of 100mm (4”) clearance on each side of drainage piping.

.2 Excavate for underslab drainage system after subgrade material has been compacted; prior to before drainage course has been placed; dig trench having minimum of 6” clearance on each side of drainage piping.

.3 Grade bottom of trench for correct drainage and lay filter cloth and place coarse gravel bed to pipe base elevation

.4 Join pipe with proper fittings and couplings to provide a tightly-fitted system, and as follows:

.1 Cap ends of lines and install cleanouts as indicated.

.2 Cleanouts are to be accessible from the surface and have a cover mounted flush with the floor.

.3 Install one cleanout for every 22860mm (75’) of drainage piping where cleanouts are not indicated.

.4 Verify cleanout locations with Consultant on site; move as directed by Consultant.

.5 Place plugs in ends of uncompleted pipe at end of each day or when work stops.

.5 Place remainder of coarse gravel and wrap gravel with filter cloth.

3.3 BACKFILLING

.1 Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

.2 Verify installed drainage piping is fully functional and connected to storm drainage system; correct any deficiencies before starting backfilling operations.

.3 Place coarse gravel fill over and around non-perforated pipe to nominal compacted depth of 305mm (12”) over pipe.

.4 Place remainder of fill in accordance with Section 31 23 33 for the specific location.

3.4 PROTECTION

.1 Take extreme care during trenching operations, installation of drainage piping and backfilling not to damage or displace other utilities.

END OF SECTION

25-7706-RFT - Glenview Park Secondary School Elevator and Science Laboratory Renovation

Opening Date: March 6, 2025 10:05 AM

Closing Date: March 26, 2025 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	25-7706-RFT Glenview Park Secondary School Elevator and Science Laboratory Renovation as per scope of work	UOM	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. Reference information is provided below

Question #1 Reference
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 and 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.

Question #2 Reference
“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
  - its headquarters or main office in Ontario, or
  - at least 250 full-time employees in Ontario at the time of the applicable procurement process.

Question #4 Reference
The Board will require General Contractors on the approved Roster List to have their IHSA - Certificate of Recognition (COR®) by January 2026. Although not mandatory for this bid opportunity, the Board requests bidders to respond to the question below YES or NO.
NOTE: By responding NO, you acknowledge the deadline requirement above.

Confirm your organization will comply with this Act. YES or NO. If no, please explain.	
Does your company qualify as an Ontario Business under the BOBI Act? YES or NO	
If you answered NO to Question #2 above, is your company a Canadian business? YES or NO	
Does your company have a current IHSA - Certificate of Recognition (COR®)? - YES or NO	

Specifications

Bidder's Contact Information

A Site Supervisor and Project Manager, assigned to manage and supervise the Work, must be named in this form. Personnel will be subject to approval by the Board and cannot be changed without prior written approval from the Board.

A dedicated Site Supervisor is required full-time for this project. If your company is awarded more than one project/contract, a different Site Supervisor is required for each project. In the event of this situation, you have the option to name and include a resume for an alternative Site Supervisor at this time.

If providing an alternative Site Supervisor with your submission, it is understood, that the alternative Site Supervisor will only be reviewed if the first Site Supervisor has already been accepted and working on another WRDSB project.

Note: resumes are required to be uploaded in the document section. Optional for alternative Site Supervisor

.

Title	Name *	E-mail *	Cell Phone Number *	
Project Manager				*
Site Supervisor				*
Alternative 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.

Upload a resume for each person named in the Specification section.

- Project Manager - Resume * (mandatory)
- Site Supervisor - Resume * (mandatory)
- Optional - Alternative Site Supervisor - Resume (only if Site Supervisor #1 is assigned to another WRDSB project prior to this award) (optional)

BONDING UPLOAD SECTION

Refer to the Bonding Requirements Section of the Terms and Conditions.

Bonding is 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, please upload a pdf document stating: Not Applicable.

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 pdf file, please upload it in both fields and indicate one is a “duplicate”

The date on the Bonds must be the Closing Date

Tender # and Project Title must be included on the Bonds

- 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.		