



**Waterloo Region
District School Board**

REQUEST FOR TENDER

24-7531-RFT

Jacob Hespeler Secondary School Heat Pump Replacement

ISSUE DATE: February 29, 2024.

ELECTRONIC SUBMISSIONS will be received by the Bidding System no later than 2:00 p.m. local time, on March 26, 2024.

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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 Mechanical



1.1.3 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. Bidders 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: Junior 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: WalterFedy

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 only and are based on dollar thresholds outlined in WRDSB Administrative [Procedure 4570 Procurement](#).

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	FEB 29, 2024
Non-Mandatory Pre-Bid Site Examination	Date: Thursday, March 7, 2024 Time: 2:30 PM 355 Holiday Inn Dr, Cambridge, ON N3C 1Z2 Main Entrance
Deadline for Questions	MAR 19, 2024
Closing Date and Time	MAR 26, 2024, 2:00 pm local time
Anticipated Contract Start / Work begins	JUL 02, 2024
Substantial Completion Date	SEPT. 06, 2024
Ready for Takeover	AUG 30, 2024
Deemed Complete Date	OCT 18, 2024

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 site 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's Single Point of 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 to not make any business decisions, assignment or any sub-contract for the execution of the Work, before receiving a Purchase Order form 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) “workday” hours** 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 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 \$100,000 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 Contractor Roster List

- 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 projects size categories based on the award.

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** 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

The project involves replacing and relocating 16 aging heat pumps on the 2nd and 3rd floor levels. Certain heat pumps will be floor mounted within newly constructed enclosures, while others will be replaced in their current ceiling positions.

Renovation will also include Electrical panel upgrades and full replacement of acoustic ceiling tiles and lighting within certain corridors on the 2nd floor level.

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 73 – Supplementary Bid Information

a) General Contractor

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.

b) Identified Price Form (Not Applicable)

Such work and amounts ARE included in the Bid Price.

The Board has requested these prices for information purposes only and does not intend to modify any Scope of Work based on the prices indicated.

NOTE – Information below is for Reference purposes only. Bidders will complete all price bid forms electronically through bids&tenders. Do not complete or submit this sheet.

Reference/Information Only

Description	Lump Sum

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 [Administrative Procedure 4360 Principles of Business Conduct for Board Employees](#)

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. Construction Act
- iii. Architect Act
- iv. Canada Revenue Agency (CRA) regulations
- v. Accessibility for Ontarians with Disabilities Act (AODA)
- vi. Workplace Safety and Insurance Act (WSIB)
- vii. Occupational Health and Safety Act
- viii. Trade Agreements (CETA/CFTA)

- ix. Education Act
- x. [Fighting Against Forced Labour and Child Labour in Supply Chains Act](#)
- xi. [WRDBS Procurement Services Policies website](#)
- xii. [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 Single Point of 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, agents and their respective successors and assigns, from and against all actions claims and demands whatsoever which may be brought against or made upon any of the Indemnified Parties and against all losses, liability, judgments, claims, costs, demands or expenses which the Indemnified Parties may sustain, suffer, or be put to resulting from or arising out of the Bidder's failure to exercise reasonable care, skill or diligence in the performance or rendering of any Work or service required hereunder to be performed or rendered by the Bidder, its agents, servants, employees or subcontractors, or any of them as well as for the infringement of or use of any intellectual property rights including any copyright or patent arising out of the reproduction or use in any manner of any plans, designs, drawings, specifications, information, negatives, data, material, sketches, notes, documents, memoranda, or computer software furnished by the Bidder in the performance of this Contract.

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 \$10,000,000 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. **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 \$2,000,000 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.), must 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 Single Point of 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 themselves, 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. 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	<p><u>Amend</u> Article A-1.3 by <u>deleting</u> all of the words after “<i>Contract Documents</i>” and <u>replace</u> them with the following”</p> <p>“attain</p> <p>.1 <i>Substantial Performance of the Work</i> by the 6th day of September in the year 2024. .2 (if applicable) <i>Occupancy</i> by the 26 day of August in the year 2024, and .3 <i>Ready-for-Takeover</i> by the 30 day of August in the year 2024.”</p>
SC1.1		

ARTICLE A-3 – CONTRACT DOCUMENTS

SC2.1	A-3.1	<p><u>Add</u> the following documents to the list of <i>Contract Documents</i> in Article A-3.1:</p> <ul style="list-style-type: none"> • Waterloo Region District School Board’s Supplementary Conditions & Amendments to Standard Construction Document CCDC 2-2020 Stipulated Price Subcontract, May 2022 Version, including any Special Supplementary Conditions listed in Appendix 2 thereto • <i>Drawings</i> • <i>Specifications</i> • Performance Bond (Form 32 -Performance Bond under Section 85.1 of the <i>Act</i>) if applicable • Labour and Material Payment Bond (Form 31 – Labour and Material Payment Bond under Section 85.1 of the <i>Act</i>), if applicable
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ARTICLE A-4 – CONTRACT PRICE

SC3.1	A-4.4	<p><u>Delete</u> Article A-4.4 and <u>replace</u> it with the following:</p> <p>“4.4 The <i>Contract Price</i> shall remain fixed for the duration of the <i>Contract Time</i>, subject only to adjustments as provided for in the <i>Contract Documents</i>. For certainty, and without limiting the general application of the preceding sentence, the <i>Contractor</i> assumes all risks in connection with cost increases for overhead, <i>Products</i>, <i>Labour</i>, and <i>Construction Equipment</i> prescribed by the <i>Contract Documents</i> for the performance of the <i>Work</i>, and the <i>Contractor</i> assumes all responsibility for liabilities and additional costs that may arise as a result of the <i>Contractor’s</i> inclusion of any <i>Product</i>, <i>Construction Equipment</i>, <i>Supplier</i>, or <i>Subcontractor</i> in its calculation of the <i>Contract Price</i>.”</p>
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ARTICLE A-5 – PAYMENT

SC4.1	A-5.1	<p><u>Delete</u> Article A- 5.1 in its entirety including all subparagraphs and <u>replace</u> it with the following:</p>
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		<p>"5.1 Subject to the provisions of the <i>Contract Documents</i> and the <i>Construction Act</i>, the <i>Owner</i> shall:</p> <p>.1 make progress payments to the <i>Contractor</i> on account of the <i>Contract Price</i> when due together with such <i>Value Added Taxes</i> as may be applicable to such payments,</p> <p>.2 upon <i>Substantial Performance of the Work</i> as certified by the <i>Consultant</i>, and on the 61st day after the publication of the certificate of <i>Substantial Performance of the Work</i>, in accordance with the <i>Construction Act</i>, there being no claims for lien registered against the title to the <i>Place of the Work</i> and no written notices of lien delivered to the <i>Owner</i>, pay the <i>Contractor</i> the unpaid balance of the 10% holdback, together with such <i>Value Added Taxes</i> as may be applicable to such payment, less any amount stated in the <i>Owner's Notice of Non-Payment</i>.</p> <p>.3 after <i>Ready-for-Takeover</i> has been achieved in accordance with the <i>Contract Documents</i> and the <i>Work</i> is complete, there being no claims for lien registered against the title to the <i>Place of the Work</i> and no written notices of lien delivered to the <i>Owner</i>, pay the <i>Contractor</i> any unpaid balance of the <i>Contract Price</i> in accordance with GC 5.5 – FINAL PAYMENT, excluding <i>Deficiency Holdback</i>, together with such <i>Value Added Taxes</i> as may be applicable to such payment."</p>
SC 4.2	A-5.2.1	<p><u>Delete</u> subparagraph 5.2.1 in its entirety and <u>replace</u> it with the following:</p> <p>"5.1 Should either party fail to make payments as they become due under the terms of the <i>Contract</i> or in an award by arbitration or court, interest shall also become due and payable on such unpaid amounts at the prejudgment interest rate prescribed by the <i>Courts of Justice Act</i> (Ontario), as it may change from time to time."</p>

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

SC3.1	A-9	<p><u>Add</u> new ARTICLE A-9 CONFLICT OF INTEREST as follows:</p> <p>"ARTICLE A-9 CONFLICT OF INTEREST</p> <p>9.1 The <i>Contractor</i>, <i>Subcontractors</i> and <i>Suppliers</i> and any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall not engage in any activity or provide any services where such activity or the provision of such services creates a conflict of interest (actually or potentially, in the sole opinion of the <i>Owner</i>) with the provision of the <i>Work</i> pursuant to the <i>Contract</i>. The <i>Contractor</i> acknowledges and agrees that a conflict of interest, as described in this Article A-9, includes, but is not limited to, the use of <i>Confidential Information</i> where the <i>Owner</i> has not specifically authorized such use.</p> <p>9.2 The <i>Contractor</i> shall disclose to the <i>Owner</i>, in writing, without delay, any actual or potential situation that may be reasonably interpreted as either a conflict of interest or a potential conflict of interest, including the retention of any <i>Subcontractor</i> or <i>Supplier</i> that is directly or indirectly affiliated with or related to the <i>Contractor</i>.</p> <p>9.3 The <i>Contractor</i> covenants and agrees that it will not hire or retain the services of any employee or previous employee of the <i>Owner</i> where to do so constitutes a breach by such employee or previous employee of the <i>Owner's</i> conflict of interest policy, as it may be amended from time to time, until after completion of the <i>Work</i> under the <i>Contract</i>.</p> <p>9.4 It is of the essence of the <i>Contract</i> that the <i>Owner</i> shall not have direct or indirect liability to any <i>Subcontractor</i> or <i>Supplier</i>, and that the <i>Owner</i> relies on the maintenance of an arm's-length relationship between the <i>Contractor</i> and its <i>Subcontractors and Suppliers</i>. Consistent with this fundamental term of the <i>Contract</i>, the <i>Contractor</i> will not enter into any agreement</p>
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		<p>or understanding with any <i>Subcontractor or Supplier</i>, whether as part of any contract or any written or oral collateral agreement, pursuant to which the parties thereto agree to cooperate in the presentation of a claim for payment against the <i>Owner</i>, directly or through the <i>Contractor</i>, where such claim is, in whole or in part, in respect of a disputed claim by the <i>Subcontractor or Supplier</i> against the <i>Contractor</i>, where the payment to the <i>Subcontractor or Supplier</i> by the <i>Contractor</i> is agreed to be conditional or contingent on the ability to recover those amounts or a portion thereof from the <i>Owner</i>, failing which the <i>Contractor</i> shall be saved harmless from all or a portion of those claims. The <i>Contractor</i> acknowledges that any such agreement would undermine the required arm's-length relationship and constitute a conflict of interest. For greater certainty, the <i>Contractor</i> shall only be entitled to advance claims against the <i>Owner</i> for amounts pertaining to <i>Subcontractor or Supplier</i> claims where the <i>Contractor</i> has actually paid or unconditionally acknowledged liability for those claims or where those claims are the subject of litigation or binding arbitration between the <i>Subcontractor or Supplier</i> and the <i>Contractor</i> has been found liable for those claims.</p> <p>9.5 Notwithstanding paragraph 7.1.2 of GC 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, OR TERMINATE THE CONTRACT, a breach of this Article A-9 by the <i>Contractor</i>, any of the <i>Subcontractors</i>, or any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall entitle the <i>Owner</i> to terminate the <i>Contract</i>, in addition to any other rights and remedies that the <i>Owner</i> has in the <i>Contract</i>, in law, or in equity."</p>
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***NEW* ARTICLE A-10 TIME OF THE ESSENCE**

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

DEFINITIONS

<i>Revisions to Existing Definitions</i>		
SC5.1	Consultant	<p><u>Amend</u> the definition of "Consultant" by <u>adding</u> the following to the end of the definition:</p> <p>"For the purposes of the <i>Contract</i>, the terms "<i>Consultant</i>", "<i>Architect</i>" and "<i>Engineer</i>" shall be considered synonymous."</p>
SC5.2	Payment Legislation/Construction Act	<p><u>Delete</u> the Definition of <i>Payment Legislation</i> and replace it with "Construction Act" as follows:</p> <p>"Construction Act</p> <p><i>Construction Act</i> means the <i>Construction Act</i>, R.S.O. 1990, c. C.30, as amended, including all regulations passed under it that are enforceable as of the date of execution of this <i>Contract</i>. For certainty, the first procurement process for the <i>Project</i> (<i>i.e.</i>, the "improvement" as that term is defined in the <i>Construction Act</i>) commenced on or after October 1, 2019."</p>
SC5.3	Ready-for-Takeover	<p><u>Amend</u> the Definition of <i>Ready-for-Takeover</i> by deleting all the words after "as verified" and replacing them with "and approved by the <i>Owner</i>."</p>
<i>New Definitions</i>		
	Adjudication	<p><u>Add</u> the following definition:</p> <p>"Adjudication</p> <p><i>Adjudication</i> means construction dispute interim adjudication as defined under the <i>Construction Act</i>."</p>
	Close-Out Documentation	<p><u>Add</u> the following new definition:</p> <p>"Close-Out Documentation</p> <p><i>Close-Out Documentation</i> has the meaning given to it under GC 5.4.2."</p>
	Confidential Information	<p><u>Add</u> the following definition:</p> <p>"Confidential Information</p> <p><i>Confidential Information</i> means all the information or material of the <i>Owner</i> that is of a proprietary or confidential nature, whether it is identified as proprietary or confidential or not, including but not limited to information and material of every kind and description (such as drawings and move-lists) which is communicated to or comes into the possession or control of the <i>Contractor</i> at any time, but <i>Confidential Information</i> shall not include information that:</p> <ol style="list-style-type: none"> .1 is or becomes generally available to the public without fault or breach on the part of the <i>Contractor</i>, including without limitation breach of any duty of confidentiality owed by the <i>Contractor</i> to the <i>Owner</i> or to any third party, but only after that information becomes generally available to the public; .2 the <i>Contractor</i> can demonstrate to have been rightfully obtained by the <i>Contractor</i> from a third party who had the right to transfer or disclose it to the <i>Contractor</i> free of any obligation of confidence;

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

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

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

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

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	<p><u>Delete</u> GC 1.1.3 in its entirety and <u>replace</u> it with the following:</p> <p>“1.1.3 The <i>Contractor</i> shall review the <i>Contract Documents</i> and shall report promptly to the <i>Consultant</i> any error, inconsistency, or omission the <i>Contractor</i> may discover. Such review by the <i>Contractor</i> shall be undertaken with the standard of care described in GC 3.13.1. Except for its obligation to make such a review and report the result, the <i>Contractor</i> does not assume any responsibility to the <i>Owner</i> or to the <i>Consultant</i> for the accuracy of the <i>Contract Documents</i>. Provided it has exercised the degree of care and skill described in this GC 1.1.3, the <i>Contractor</i> shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the <i>Contract Documents</i>, which the <i>Contractor</i> could not reasonably have discovered through the exercise of the required standard of care.”</p>
SC5.2	1.1.4	<p><u>Delete</u> GC 1.1.4 in its entirety and <u>replace</u> it with the following:</p> <p>“1.1.4 Except for the obligation to complete the review prescribed in GC 1.1.3, and report the results as set out in this GC 1.1.4, the <i>Contractor</i> is not responsible for errors, omissions or inconsistencies in the <i>Contract Documents</i>. If there are errors, omissions or inconsistencies discovered by or made known to the <i>Contractor</i> as part of its review under GC 1.1.3 or at any time during the performance of the <i>Work</i>, the <i>Contractor</i> shall immediately notify the <i>Consultant</i>, and request instructions, a <i>Supplemental Instruction</i>, <i>Change Order</i>, or <i>Change Directive</i>, as the case may require, and shall not proceed with the <i>Work</i> affected until the <i>Contractor</i> has received corrected or additional information from the <i>Consultant</i>. The <i>Contractor</i> shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the <i>Contract Documents</i>, which the <i>Contractor</i> could not reasonably have discovered through the exercise of care and skill described in GC 3.13.”</p>
	1.1.5.1	<p><u>Delete</u> GC 1.1.5.1 and <u>replace</u> with the following:</p> <p>“.1 the order of priority of documents, from highest to lowest, shall be:</p> <ul style="list-style-type: none"> .1 Supplementary Conditions; .2 the Agreement between the Owner and the Contractor; .3 the Definitions; .4 the General Conditions; .5 Division 01 of the <i>Specifications</i>

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

GC 1.3 RIGHTS AND REMEDIES

SC6.1	1.3.2	<p>In paragraph 1.3.2 <u>delete</u> the word “No” from the beginning of the paragraph and <u>replace</u> it with the words:</p> <p>“Except with respect to the requirements set out in paragraphs 6.4.1, 6.5.4, 6.6.1 and 8.3.2, no...”</p>
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***NEW* GC 1.5 EXAMINATION OF DOCUMENTS AND SITE**

SC8.1	1.5	<p><u>Add</u> new GC 1.5 – EXAMINATION OF DOCUMENTS AND SITE as follows:</p> <p>“GC 1.5 EXAMINATION OF DOCUMENTS AND SITE</p> <p>1.5.1 The <i>Contractor</i> declares and represents that in tendering for the <i>Work</i>, and in entering into a Contract with the <i>Owner</i> for the performance of the <i>Work</i>, it has investigated for itself the character of the <i>Work</i> to be done, based on information generally available from a visit to the <i>Place of the Work</i> and to the standard set out under GC 3.14.1 and further represents and warrants and acknowledges that it considered and took into account in the <i>Contract Price</i> all reasonably known impacts and restrictions arising from the COVID-19 pandemic, including without limitation corresponding legislative changes that may impact performance of the <i>Project</i>, various weather conditions that may affect the <i>Work</i>, the availability of supplies and labour or other conditions or risks that the <i>Contractor</i> knew about or reasonably ought to have known about prior to the date of the <i>Contract</i>. The <i>Contractor</i> has assumed and does hereby assume all risk of known conditions now existing or arising in the course of the <i>Work</i> which might or could make the <i>Work</i>, or any items thereof more expensive in character, more onerous to fulfill than was contemplated or known when the tender was made or the <i>Contract</i> signed.</p> <p>1.5.2 The <i>Contractor</i> also declares that prior to commencement of the <i>Work</i>, where in tendering for the <i>Work</i> and in entering into this <i>Contract</i>, the <i>Contractor</i> relied upon information furnished by the <i>Owner</i> or any of its agents or servants respecting the nature or confirmation of the ground at the site of the <i>Work</i>, the <i>Contractor</i> shall review to the standard specified in GC 3.14.1, the accuracy of the information furnished by the <i>Owner</i>. If a condition is materially different than what is stated in the information furnished by the <i>Owner</i>, the <i>Contractor</i> shall, no later than five (5) <i>Working Days</i> after the first observation of such condition(s), deliver to the <i>Owner</i> and to the <i>Consultant</i> a <i>Notice in Writing</i> specifying the materially different condition and the <i>Contractor</i> shall not proceed with the affected part of the <i>Work</i> until receiving written direction from the <i>Owner</i> or the <i>Consultant</i>. Where the <i>Contractor</i> fails to provide prompt <i>Notice in Writing</i> in accordance with this GC 1.5.2, the <i>Contractor</i> expressly waives and releases the <i>Owner</i> from all claims with respect to the said information with respect to the <i>Work</i>.</p>
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PART 2 ADMINISTRATION OF THE CONTRACT

GC 2.2 ROLE OF THE CONSULTANT

SC11.1	2.2.5	<p><u>Delete</u> paragraph 2.2.4 and <u>replace</u> it with the following:</p> <p>“2.2.4 Upon receipt of an application for payment that satisfies the requirement of a <i>Proper Invoice</i>, based on the <i>Consultant’s</i> observations and evaluation of the <i>Contractor’s</i> application for payment, the <i>Consultant</i> will determine the amounts owing to the <i>Contractor</i> under the <i>Contract</i> and will issue certificates for payment as provided in Article A-5 - PAYMENT, GC 5.3 - PAYMENT, GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK, and GC 5.5 - FINAL PAYMENT. If the <i>Consultant</i> determines that the amount payable to the <i>Contractor</i> differs from the amount stated in a <i>Proper</i></p>
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		<i>Invoice, the Consultant shall notify the Owner as provided in GC 5.3.1.2 and prepare a draft of the applicable Notice of Non-Payment for the amount in dispute.</i>
	2.2.6	In the first sentence of paragraph 2.2.6, <u>delete</u> the words “Except with respect to GC 5.1 – FINANCING INFORMATION REQUIRED OF THE OWNER”.
	2.2.12	At paragraph 2.2.12, <u>insert</u> the following at end of that paragraph: “If, in the opinion of the Contractor, the Supplemental Instruction involves an adjustment in the Contract Price or in the Contract Time, it shall, within ten (10) Working Days of receipt of a Supplemental Instruction, provide the Consultant with a notice in writing to that effect. Failure to provide written notification within the time stipulated in this paragraph 2.2.12 shall be deemed an acceptance of the Supplemental Instruction by the Contractor, without any adjustment in the Contract Price or Contract Time.”

GC 2.3 REVIEW AND INSPECTION OF THE WORK

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

GC 2.4 DEFECTIVE WORK

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

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

PART 3 EXECUTION OF THE WORK

GC 3.1 CONTROL OF THE WORK

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

GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

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

		health and safety legislation in force at the <i>Place of the Work</i> , including all of the responsibilities of the “constructor”, pursuant to the <i>OHSA</i> .”
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GC 3.3 TEMPORARY WORK

SC14.1	3.3.2	In paragraph 3.3.2, in the second line after the words “where required by law”, insert “or by the <i>Consultant</i> ”.
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GC 3.4 CONSTRUCTION SCHEDULE

SC17.1	3.4.1	<p><u>Delete</u> GC 3.4.1 in its entirety and <u>replace</u> it with the following:</p> <p>“3.4.1 The <i>Contractor</i> shall:</p> <ol style="list-style-type: none"> 1 within five (5) calendar days of receiving written confirmation of the award of the <i>Contract</i>, prepare and submit to the <i>Owner</i> and the <i>Consultant</i> for their review and approval, a construction schedule in the format indicated below that indicates the timing of the activities of the <i>Work</i> and provides sufficient detail of the critical events and their inter-relationship to demonstrate the <i>Work</i> will be performed in conformity with the <i>Contract Time</i> and in accordance with the <i>Contract Documents</i>. Such schedule is to include a delivery schedule for <i>Products</i> whose delivery is critical to the schedule for the <i>Work</i> or are required by the <i>Contract</i> to be included in a <i>Products</i> delivery schedule. The <i>Contractor</i> shall employ construction scheduling software, being the latest version of “Microsoft Project”, that permits the progress of the <i>Work</i> to be monitored in relation to the critical path established in the schedule. The <i>Contractor</i> shall provide such schedule and any successor or revised schedules in both original digital file format (<i>e.g.</i>, .mpp format for Microsoft Project), portable data file (PDF) format, and hard copy. Once accepted by the <i>Owner</i> and the <i>Consultant</i>, the construction schedule submitted by the <i>Contractor</i> shall become the baseline “Construction Schedule”; .2 provide the expertise and resources, such resources including manpower equipment and tools, as are necessary on a best efforts basis to maintain progress under the accepted baseline <i>Construction Schedule</i> or revised construction schedule accepted by the <i>Owner</i> pursuant to GC 3.4 CONSTRUCTION SCHEDULE, which includes without limitation, the <i>Contractor’s</i> use of all possible and, if necessary, extraordinary measures, to bring the progress of the <i>Work</i> into compliance with the <i>Construction Schedule</i>, such as (i) increasing the presence of its own forces at the <i>Place of the Work</i>; (ii) directing any <i>Subcontractors</i> or <i>Suppliers</i> to increase their labour forces and equipment; (iii) working overtime and extra shifts; and (iv) providing any additional supervision and coordination of the <i>Project</i>, all at the <i>Contractor’s</i> own cost and expense save and except where GC 6.5.1, 6.5.2, or 6.5.3 apply; and, .3 monitor the progress of the <i>Work</i> on a weekly basis relative to the baseline <i>Construction Schedule</i>, or any revised <i>Construction Schedule</i> accepted by the <i>Owner</i> pursuant to GC 3.4 CONSTRUCTION SCHEDULE, deliver a <i>Construction Schedule Update</i> to the <i>Consultant</i> and <i>Owner</i> with each application for payment, at a minimum, or as may be reasonably required
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		<p>by the <i>Consultant</i> and advise the <i>Consultant</i> and the <i>Owner</i> weekly in writing of any variation from the baseline or slippage in the schedule; and,</p> <p>.4 if after applying the expertise and resources required under paragraph 3.4.1.2, the <i>Contractor</i> forms the opinion that the slippage in schedule reported in paragraph 3.4.1.3 cannot be recovered by the <i>Contractor</i>, it shall, in the same notice provided under paragraph 3.4.1.3, indicate to the <i>Consultant</i> if the <i>Contractor</i> intends to apply for an extension of <i>Contract Time</i> as provided in PART 6 —CHANGES IN THE WORK; and,</p> <p>.5 ensure that the <i>Contract Price</i> shall include all costs required to phase or stage the <i>Work</i>.”</p>
	3.4.2	<p><u>Add</u> new GC 3.4.2 and GC 3.4.3 as follows:</p> <p>“3.4.2 If, at any time, it should appear to the <i>Owner</i> or the <i>Consultant</i> that the actual progress of the <i>Work</i> is behind schedule or is likely to become behind schedule, or if the <i>Contractor</i> has given notice of such to the <i>Owner</i> or the <i>Consultant</i> pursuant to GC 3.4.1.3, the <i>Contractor</i> shall, either at the request of the <i>Owner</i> or the <i>Consultant</i>, or following giving notice pursuant to GC 3.4.1.3, take appropriate steps to cause the actual progress of the <i>Work</i> to conform to the schedule or minimize the resulting delay. Within 5 calendar days of the request by the <i>Owner</i> or the <i>Consultant</i> or the notice being given pursuant to GC 3.4.1.3, the <i>Contractor</i> shall produce and present to the <i>Owner</i> and the <i>Consultant</i> a plan demonstrating how the <i>Contractor</i> will recover the performance of the <i>Work</i> to align with the currently approved <i>Construction Schedule</i>.</p> <p>3.4.3 The <i>Contractor</i> shall not amend the <i>Construction Schedule</i> without the prior written consent of the <i>Owner</i>.. Any revisions to the <i>Construction Schedule</i> approved by the <i>Owner</i> shall not be deemed to be an extension of the <i>Contract Time</i>. All requests by the <i>Contractor</i> for a revision to the <i>Construction Schedule</i> that include an extension to the <i>Contract Time</i> must be approved by the <i>Owner</i> through an executed <i>Change Order</i>.”</p>

GC 3.5 SUPERVISION

SC17.1	3.5.1	<p><u>Delete</u> GC 3.5.1 and <u>replace</u> it with the following:</p> <p>“3.5.1 The <i>Contractor</i> shall employ a competent full-time superintendent, acceptable to the <i>Owner</i> and <i>Consultant</i>, who shall be in full time attendance at the <i>Place of the Work</i> while the <i>Work</i> is being performed. The superintendent shall not be changed by the <i>Contractor</i> without valid reason which shall be provided in writing and shall not be changed without prior consultation with and agreement by the <i>Owner</i> and the <i>Consultant</i>. The <i>Contractor</i> shall replace the superintendent within 7 <i>Working Days</i> of the <i>Owner’s</i> written notification, if the superintendent’s performance is not acceptable to the <i>Owner</i>. The <i>Contractor</i> shall provide the <i>Owner</i> and the <i>Consultant</i> with the names, addresses and telephone numbers of the superintendent referred to in this GC 3.5.1 and other responsible persons who may be contacted for emergency and other reasons during non-working hours. .”</p>
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	3.5.2	<p><u>Delete</u> GC 3.5.2 and <u>replace</u> it with the following:</p> <p>“3.5.2 The superintendent, and any project manager appointed by the <i>Contractor</i>, shall represent the <i>Contractor</i> at the <i>Place of the Work</i> and shall have full authority to act on written instructions given by the <i>Consultant</i> and/or the <i>Owner</i>. Instructions given to the superintendent or the project manager shall be deemed to have been given to the <i>Contractor</i> and both the superintendent and any project manager shall have full authority to act on behalf of the <i>Contractor</i> and bind the <i>Contractor</i> in matters related to the <i>Contract</i>.”</p>
	3.5.3 to 3.5.6	<p><u>Add</u> new GC 3.5.3, 3.5.4, 3.5.5 and 3.5.6 as follows:</p> <p>“3.5.3 The <i>Owner</i> may, at any time during the course of the <i>Work</i>, request the replacement of the appointed representative(s). Immediately upon receipt of the request, the <i>Contractor</i> shall make arrangements to appoint an acceptable replacement, which is approved by the <i>Owner</i>.</p> <p>3.5.4 The supervisory staff assigned to the <i>Project</i> shall also be fully competent to implement efficiently all requirements for scheduling, coordination, field engineering, reviews, inspections and submittals defined in the <i>Specifications</i>, and have a minimum 5 years documented “Superintendent/Project Management” experience.</p> <p>3.5.5 The <i>Consultant and Owner</i> shall reserve the right to review the record of experience and credentials of supervisory staff assigned to the <i>Project</i> prior to commencement of the <i>Work</i>.</p> <p>3.5.6 A superintendent assigned to the <i>Work</i> shall be “Gold Seal Certified” as per the Canadian Construction Association; or a superintendent that can demonstrate the requisite experience and success related to the <i>Project</i> to the sole satisfaction of the <i>Owner</i>.”</p>

GC 3.6 SUBCONTRACTORS AND SUPPLIERS

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

3.6.9 & 3.6.10	<p>“3.6.7 The <i>Contractor</i> represents and warrants that it has confirmed the availability of its <i>Subcontractors</i> for the <i>Project</i> and, in particular, for the performance of their respective portions of the <i>Work</i> to ensure completion of the <i>Project</i> within the <i>Contract Price</i> and the <i>Contract Time</i>.</p> <p>3.6.8 The <i>Consultant</i> or the <i>Owner</i>, acting reasonably, may from time to time require the <i>Contractor</i> to remove from the <i>Project</i> any personnel of the <i>Contractor</i>, including project managers, superintendents or <i>Subcontractors</i>. Such persons shall be replaced by the <i>Contractor</i> in a timely fashion to the satisfaction of the <i>Consultant</i> or the <i>Owner</i>, as the case may be, at no cost to the <i>Owner</i>.</p> <p>3.6.9 Where provided in the <i>Contract</i>, the <i>Owner</i> may assign to the <i>Contractor</i>, and the <i>Contractor</i> agrees to accept, any contract procured by the <i>Owner</i> for <i>Work</i> or services required on the <i>Project</i> that has been pre-tendered or pre-negotiated by the <i>Owner</i>, and upon such assignment, the <i>Owner</i> shall have no further liability to any party for such contract.</p> <p>3.6.10 The <i>Contractor</i> covenants that each subcontract or supply contract which the <i>Contractor</i> enters into for the purpose of performing the <i>Work</i> shall expressly provide for the assignment thereof to the <i>Owner</i> (at the option of the <i>Owner</i>) and the assumption by the <i>Owner</i> of the obligations of the <i>Contractor</i> thereunder, upon the termination of the <i>Contract</i> and upon written notice by the <i>Owner</i> to the other parties to such subcontracts or supply contracts, without the imposition of further terms or conditions; provided, however, that until the <i>Owner</i> has given such notice, nothing herein contained shall be deemed to create any contractual or other liability upon the <i>Owner</i> for the performance of obligations under such subcontracts or supply contracts and the <i>Contractor</i> shall be fully responsible for all of its obligations and liabilities (if any) under such subcontracts and supply contracts.”</p>
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GC 3.7 LABOUR AND PRODUCTS

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

		<p>jeopardizes the safety of the <i>Owner's</i> operations or who are considered by the <i>Owner</i> or the <i>Consultant</i> to be unskilled or otherwise objectionable. Immediately upon receipt of the request, the <i>Contractor</i> shall make arrangements to appoint an acceptable replacement.</p> <p>3.7.5 The <i>Contractor</i> shall cooperate with the <i>Owner</i> and its representatives and shall take all reasonable and necessary actions to maintain stable and harmonious labour relations with respect to the <i>Work</i> at the <i>Place of the Work</i>, including cooperation to attempt to avoid <i>Work</i> stoppages, trade union jurisdictional disputes and other <i>Labour Disputes</i>. Any costs arising from labour disputes shall be at the sole expense of the <i>Contractor</i>.</p> <p>3.7.6 The cost for overtime required beyond the normal <i>Working Day</i> to complete individual construction operations of a continuous nature, such as pouring or finishing of concrete or similar work, or <i>Work</i> that the <i>Contractor</i> elects to perform at overtime rates without the <i>Owner</i> requesting it, shall not be chargeable to the <i>Owner</i>.</p> <p>3.7.7 All manufactured <i>Products</i> which are identified by their proprietary names or by part or catalogue number in the <i>Specifications</i> shall be used by the <i>Contractor</i>. No substitutes for such specified <i>Products</i> shall be used without the written approval of the <i>Owner</i> and the <i>Consultant</i>. Substitutes will only be considered by the <i>Consultant</i> when submitted in sufficient time to permit proper review and investigation. When requesting approval for the use of substitutes, the <i>Contractor</i> shall include in its submission any proposed change in the <i>Contract Price</i>. The <i>Contractor</i> shall use all proprietary <i>Products</i> in strict accordance with the manufacturer's directions. Where there is a choice of proprietary <i>Products</i> specified for one use, the <i>Contractor</i> may select any one of the <i>Products</i> so specified for this use.</p> <p>3.7.8 Materials, appliances, equipment and other <i>Products</i> are sometimes specified by reference to brand names, proprietary names, trademarks or symbols. In such cases, the name of a manufacturer, distributor, <i>Supplier</i> or dealer is sometimes given to assist the <i>Contractor</i> to find a source <i>Supplier</i>. This shall not relieve the <i>Contractor</i> from its responsibility from finding its own source of supply even if the source names no longer supplies the <i>Product</i> specified. If the <i>Contractor</i> is unable to obtain the specified <i>Product</i>, the <i>Contractor</i> shall supply a substitute product equal to or better than the specified <i>Product</i>, as approved by the <i>Consultant</i> with no extra compensation. Should the <i>Contractor</i> be unable to obtain a substitute <i>Product</i> equal to or superior to the specified <i>Product</i> and the <i>Owner</i> accepts a different <i>Product</i>, the <i>Contract Price</i> shall be adjusted accordingly, as approved by the <i>Consultant</i>."</p>
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GC 3.8 SHOP DRAWINGS

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

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

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

SC22.1	GC 3.9	<u>Add</u> new GC 3.9 – USE OF THE WORK as follows: "GC 3.9 USE OF THE WORK 3.9.1 The <i>Contractor</i> shall confine <i>Construction Equipment</i> , <i>Temporary Work</i> , storage of <i>Products</i> , waste products and debris, and operations of employees and <i>Subcontractors</i> to limits indicated by laws, ordinances, permits, by the direction of the <i>Owner</i> or the <i>Consultant</i> , or the <i>Contract Documents</i> and shall not unreasonably encumber the <i>Place of the Work</i> . 3.9.2 The <i>Contractor</i> shall not load or permit to be loaded any part of the <i>Work</i> with a weight
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		<p>or force that will endanger the safety of the <i>Work</i>.</p> <p>3.9.3 The <i>Owner</i> shall have the right to enter or occupy the <i>Place of the Work</i> in whole or in part for the purpose of placing fittings and equipment, or for other use before <i>Substantial Performance of the Work</i>, if, in the opinion of the <i>Consultant</i>, such entry and occupation does not prevent or substantially interfere with the <i>Contractor</i> in the performance of the <i>Contract</i> within the <i>Contract Time</i>. Such entry or occupation shall neither be considered as acceptance of the <i>Work</i> or in any way relieves the <i>Contractor</i> from its responsibility to complete the <i>Contract</i>."</p>
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***NEW* GC 3.10 CUTTING AND REMEDIAL WORK**

SC23.1	GC 3.10	<p><u>Add</u> new GC 3.10 – CUTTING AND REMEDIAL WORK as follows:</p> <p>"GC 3.10 CUTTING AND REMEDIAL WORK</p> <p>3.10.1 The <i>Contractor</i> shall perform the cutting and remedial work required to make the affected parts of the <i>Work</i> come together properly. Such cutting and remedial work shall be performed by specialists familiar with the <i>Products</i> affected and shall be performed in a manner to neither damage nor endanger the <i>Work</i>.</p> <p>3.10.2 The <i>Contractor</i> shall coordinate the <i>Work</i> to ensure all cutting and remedial work required is kept to a minimum.</p> <p>3.10.3 Unless specifically stated otherwise in the <i>Specifications</i>, the <i>Contractor</i> shall do all cutting and making good necessary for the proper installation and performance of the <i>Work</i>.</p> <p>3.10.4 To avoid unnecessary cutting, the <i>Contractor</i> shall lay out its work and advise the <i>Subcontractors</i>, when necessary, where to leave holes for installation of pipes and other work."</p>
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***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	<p>Add new paragraphs 3.11.1, 3.11.2, 3.11.3, 3.11.4, 3.11.5, and 3.11.6 as follows:</p> <p>"3.11.1 The <i>Contractor</i> shall maintain the <i>Work</i> in a safe and tidy condition and free from the accumulation of waste products and debris, other than that caused by the <i>Owner</i>, other contractors or their employees. The <i>Contractor</i> shall remove accumulated waste and debris at least once a week as a minimum or as required by the nature of the <i>Work</i>.</p> <p>3.11.2 Before applying for <i>Substantial Performance of the Work</i>, the <i>Contractor</i> shall remove waste products and debris, other than that resulting from the work of the <i>Owner</i>, other contractors or their employees, and shall leave the <i>Place of the Work</i> clean and suitable for use or occupancy by the <i>Owner</i>. The <i>Contractor</i> shall remove products, tools, materials,</p>
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		<p><i>Construction Equipment, and Temporary Work</i> not required for the performance of the remaining work.</p> <p>3.11.3 As a condition precedent to submitting its application for final payment, the <i>Contractor</i> shall remove any remaining products, tools, materials, <i>Construction Equipment, Temporary Work</i>, and waste products and debris, other than those resulting from the work of the <i>Owner</i>, other contractors or their employees.</p> <p>3.11.4 The <i>Contractor</i> shall clean up garbage during and after construction and maintain the <i>Place of the Work</i> in a neat and orderly condition on a daily basis. Prior to leaving the <i>Place of the Work</i> and following completion of the <i>Work</i>, the <i>Contractor</i> shall make good all damage to the building and its components caused by the performance of the <i>Work</i> or by any <i>Subcontractor</i> or <i>Supplier</i>. The <i>Contractor</i> shall leave the <i>Place of the Work</i> in a clean and finished state; remove all <i>Construction Equipment</i> and materials; remove all paint, stains, labels, dirt, etc. from the <i>Place of the Work</i>; and touch up all damaged painted areas (if applicable). The <i>Contractor</i> shall be responsible for restoring those areas of the <i>Place of the Work</i>, impacted by the <i>Work</i>, to their original condition.”</p> <p>3.11.5 Without limitation to or waiver of the <i>Owner’s</i> other rights and remedies, the <i>Owner</i> shall have the right to back charge to the <i>Contractor</i> the cost of damage to the site caused by transportation in and out of the <i>Place of the Work</i> by the <i>Contractor, Subcontractors</i> or <i>Suppliers</i>, if not repaired before final payment.</p> <p>3.11.6 The <i>Contractor</i> shall dispose of debris at a location and in a manner acceptable to the <i>Owner</i> (and to the authorities having jurisdiction at the <i>Place of the Work</i> and at the disposal area) and the <i>Contractor</i> shall cover containers with tarpaulins.”</p>
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***NEW* GC 3.12 EXCESS SOIL MANAGEMENT**

SC25.1	GC 3.12	<p>Add new GC 3.12 – EXCESS SOIL MANAGEMENT as follows:</p> <p>“GC 3.12 EXCESS SOIL MANAGEMENT</p> <p>3.12.1 The <i>Contractor</i> shall be solely responsible for the proper management of all <i>Excess Soil</i> at the <i>Place of the Work</i> and for performance of the <i>Work</i> in compliance with the rules, regulations and practices required by the <i>Excess Soil Regulation</i> until such time as <i>Ready-for-Takeover</i> is achieved. Without restricting the generality of the previous sentence, the <i>Contractor’s</i> responsibility under this GC 3.12 includes the designation, transportation, tracking, temporary and/or final placement, record keeping, and reporting of all <i>Excess Soil</i> in connection with the <i>Work</i> all in compliance with the <i>Excess Soil Regulation</i>.</p> <p>3.12.3 The <i>Contractor</i> shall indemnify and save harmless the <i>Owner</i>, their agents, officers, directors, administrators, employees, consultants, successors and assigns from and against the consequences of any and all health and safety infractions committed directly by the <i>Contractor</i>, or those for whom it is responsible at law, under the <i>Excess Soil Regulation</i>, or any environmental protection legislation, including the payment of legal fees and disbursements on a substantial indemnity basis. Such indemnity shall apply to the extent</p>
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		to which the <i>Owner</i> is not covered by insurance.”
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***NEW* GC 3.13 CONTRACTOR STANDARD OF CARE**

SC25.1	3.13	<p><u>Add</u> a new GC 3.13 – CONTRACTOR STANDARD OF CARE as follows:</p> <p>“GC 3.13 CONTRACTOR STANDARD OF CARE</p> <p>“3.13.1 In performing its services and obligations under the <i>Contract</i>, the <i>Contractor</i> shall exercise the standard of care, skill and diligence that would normally be provided by an experienced and prudent contractor supplying similar services for similar projects. The <i>Contractor</i> acknowledges and agrees that throughout the <i>Contract</i>, the performance of the <i>Contractor’s</i> obligations, duties and responsibilities shall be interpreted in accordance with this standard. The <i>Contractor</i> shall exercise the same standard of care, skill and diligence in respect of any <i>Products</i>, personnel or procedures which it may recommend to the <i>Owner</i> or employ on the <i>Project</i>.</p> <p>3.13.2 The <i>Contractor</i> further represents, covenants and warrants to the <i>Owner</i> that:</p> <ol style="list-style-type: none"> .1 the personnel it assigns to the <i>Project</i> are appropriately experienced; .2 it has a sufficient staff of qualified and competent personnel to replace any of its appointed representatives, subject to the <i>Owner’s</i> approval, in the event of death, incapacity, removal or resignation; and .3 there are no pending, threatened or anticipated claims, liabilities or contingent liabilities that would have a material effect on the financial ability of the <i>Contractor</i> to perform its work under the <i>Contract</i>.”
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PART 4 ALLOWANCES

GC 4.1 CASH ALLOWANCES

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

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

PART 5 PAYMENT

GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

SC28.1	5.1	<u>Delete</u> GC 5.1 – FINANCING INFORMATION REQUIRED OF THE OWNER and all paragraphs thereunder, including any reference to GC 5.1 throughout the <i>Contract</i> .
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GC 5.2 APPLICATIONS FOR PAYMENT

SC29.1	5.2.1	<u>Delete</u> GC 5.2.1 and <u>replace</u> it with the following: "5.2.1 Upon execution of the <i>Contract</i> , and in any event prior to the <i>Contractor</i> submitting its first application for payment, the <i>Owner</i> shall issue a purchase order to the <i>Contractor</i> for the performance of the <i>Contract</i> . The number indicated on such purchase order must be clearly identifiable on all applications for payment. Applications for payment shall be dated the last day of each month or an alternative day of each month agreed to in writing by the parties, with each month representing one payment period under the <i>Contract</i> (each a " Payment Period "). Within 3 calendar days of the end of each <i>Payment Period</i> , the <i>Contractor</i> will submit a draft application for payment to the <i>Owner</i> and the <i>Consultant</i> . Upon receipt of the draft application for payment, and within 7 calendar days, a representative of each of the <i>Contractor</i> , <i>Owner</i> , and the <i>Consultant</i> shall attend a meeting to discuss and review the work completed during the <i>Payment Period</i> , including quantities, if applicable (the " Pre-Invoice Submission Meeting "). In the event that the scheduled date for the <i>Pre-Invoice Submission Meeting</i> is not a <i>Working Day</i> , the <i>Pre-Invoice Submission Meeting</i> shall occur on the next <i>Working Day</i> . The <i>Contractor</i> shall bring with it to the <i>Pre-Invoice Submission Meeting</i> the following: .1 a copy of the draft application for payment;
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		<p>.2 any documents the <i>Contractor</i> is required to bring to the <i>Pre-Invoice Submission Meeting</i> as stipulated in the <i>Contract Documents</i> or as reasonably requested by the <i>Owner</i>; and</p> <p>.3 any other documents reasonably requested, in advance, by the <i>Owner</i> or the <i>Consultant</i>."</p>
SC29.2	5.2.2	<p><u>Delete</u> GC 5.2.2 in its entirety and <u>replace</u> it with the following:</p> <p>"5.2.2 Applications for payment shall be given in accordance with the following requirements:</p> <p>.1 Within 5 calendar days following the <i>Pre-Invoice Submission Meeting</i>, the <i>Contractor</i> shall deliver its application for payment to the <i>Owner</i> and to the <i>Consultant</i> for <i>Work</i> performed during the <i>Payment Period</i> ("Proper Invoice Submission Date") subject to the following:</p> <p>.1 If the fifth calendar day following the <i>Pre-Invoice Submission Meeting</i>, to which an invoice relates falls on a day that is not a <i>Working Day</i>, the <i>Proper Invoice Submission Date</i> shall be deemed to fall on the next <i>Working Day</i>.</p> <p>.2 The application for payment must be delivered to the <i>Owner</i> and to the <i>Consultant</i> in the same manner as a <i>Notice in Writing</i> during the hours of 9:00 am to 4:00pm (EST) on the <i>Proper Invoice Submission Date</i>. Delivery to the <i>Owner</i> shall be to the following email address:</p> <p style="text-align: center;">facilities_cap@wrdsb.ca</p> <p>.3 If an application for payment is received after 4:00 p.m. (EST) on the applicable <i>Proper Invoice Submission Date</i>, the application for payment will not be considered or reviewed by the <i>Owner</i> and <i>Consultant</i> until the next <i>Proper Invoice Submission Date</i>. Notwithstanding the foregoing, the <i>Owner</i> in its sole and absolute discretion may elect to accept an application for payment submitted after 4:00 p.m. on the applicable <i>Proper Invoice Submission Date</i>; however, such acceptance shall not be construed as a waiver of any of its rights or waive or release the <i>Contractor's</i> obligations to strictly comply with the requirements prescribed in this subparagraph 5.2.2.3.</p> <p>.4 No applications for payment shall be accepted by the <i>Owner</i> prior to the <i>Proper Invoice Submission Date</i>.</p> <p>.5 All applications for payment shall include all of the requirements for a <i>Proper Invoice</i> prescribed by the <i>Construction Act</i> and this <i>Contract</i> and be dated the last day of the applicable <i>Payment Period</i>;"</p>
SC29.3	5.2.3	<p><u>Delete</u> GC 5.2.3 and <u>replace</u> it with the following:</p> <p>"5.2.3 The amount claimed shall be for the value, proportionate to the amount of the <i>Contract</i>, of <i>Work</i> performed and <i>Products</i> delivered and incorporated into the <i>Work</i> as of the last date of the applicable <i>Payment Period</i>. Materials may also be deemed to be supplied to an improvement, for payment purposes, when, in the <i>Owner's</i> opinion, they are placed</p>

		and properly secured on the land on which the improvement is made, or placed upon land designated by the <i>Owner</i> or agent of the <i>Owner</i> , but placing the materials on the land so designated does not, of itself, make that land subject to a lien. No amount claimed shall include products delivered and incorporated into the work, unless the products are free and clear of all security interests, liens and other claims of third parties. No amount claimed shall include <i>Products</i> delivered to the <i>Place of the Work</i> unless the <i>Products</i> are free and clear of all security interests, liens, and other claims of third parties.”
SC29.4	5.2.4	After the word “ <i>Consultant</i> ” in GC 5.2.4 <u>add</u> the words “and the <i>Owner</i> ”
SC29.5	5.2.5	After the word “ <i>Consultant</i> ” in GC 5.2.5 <u>add</u> the words “or the <i>Owner</i> ”.
SC29.6	5.2.9	<u>Add</u> new 5.2.9 as follows: “5.2.9 The <i>Contractor</i> shall prepare and maintain current as-built drawings which shall consist of the <i>Drawings</i> and <i>Specifications</i> revised by the <i>Contractor</i> during the <i>Work</i> , showing changes to the <i>Drawings</i> and <i>Specifications</i> , which current as-built drawings shall be maintained by the <i>Contractor</i> and made available to the <i>Consultant</i> for review with each application for progress payment. The <i>Consultant</i> shall recommend to the <i>Owner</i> that the <i>Owner</i> retain a reasonable amount for the value of the as-built drawings not presented for review.”

GC 5.3 PAYMENT

SC30.1	5.3.1	<u>Delete</u> GC 5.3.1 in its entirety, including all subparagraphs thereunder, and <u>replace</u> it with the following: “5.3.1 After receipt by the <i>Owner</i> and the <i>Consultant</i> of an application for payment submitted by the <i>Contractor</i> in accordance with GC 5.2 - APPLICATIONS FOR PAYMENT: .1 the <i>Consultant</i> will either: (a) issue to the <i>Owner</i> with a copy to the <i>Contractor</i> , a progress payment certificate in the amount applied for by the <i>Contractor</i> in the <i>Proper Invoice</i> , or (b) issue to the <i>Owner</i> , with a copy to the <i>Contractor</i> , a certificate for payment for an amount determined by the <i>Consultant</i> to be properly due to the <i>Contractor</i> after applying any credits, withheld amounts, or other set-offs which the <i>Consultant</i> has determined that the <i>Owner</i> is entitled to notwithstanding any notice of dispute or disagreement that the <i>Contractor</i> may have served, along with the <i>Consultant’s</i> reasons why an amount other than what is claimed in the <i>Proper Invoice</i> is properly due to the <i>Contractor</i> , which finding the <i>Owner</i> may accept or amend prior to the <i>Owner</i> issuing a <i>Notice of Non-Payment</i> , if any, in accordance with GC 5.3.2; .2 the <i>Owner</i> shall make payment to the <i>Contractor</i> on account as provided in Article A-5 PAYMENT, (a) in the amount stated in the certificate for payment, or
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		<p>(b) in the amount stated in the certificate for payment less such amount stated in the <i>Owner's Notice of Non-Payment</i> issued pursuant to GC 5.3.3,</p> <p>on the 28th calendar day after receipt of a <i>Proper Invoice</i>, unless such 28th calendar day lands on a day that is other than a <i>Working Day</i>, in which case payment shall be made on the next <i>Working Day</i> after such 28th day."</p>
	<p>5.3.2 to 5.3.7</p>	<p><u>Add</u> new paragraphs 5.3.2, 5.3.3, 5.3.4, 5.3.4, 5.3.5, 5.3.6, and 5.3.7 as follows:</p> <p>5.3.2 All payments to the <i>Contractor</i> shall be processed using electronic funds transfer ("EFT") and deposited directly to the <i>Contractor's</i> bank account unless agreed to otherwise by the <i>Contractor</i> and the <i>Owner</i> in writing. Prior to the <i>Contractor</i> submitting its first application for payment, the <i>Owner</i> and the <i>Contractor</i> shall exchange such information as is necessary to facilitate <i>EFT</i> payments.</p> <p>5.3.3 In the event that the application for payment delivered by the <i>Contractor</i> pursuant to GC 5.2 - APPLICATIONS FOR PAYMENT does not include the requirements for a <i>Proper Invoice</i> or where the <i>Owner</i> disputes the amount claimed as payable in the <i>Proper Invoice</i>, then the <i>Owner</i> shall within 14 calendar days of receipt of the application for payment, issue a <i>Notice of Non-Payment</i> (Form 1.1).</p> <p>5.3.4 Where the <i>Owner</i> has delivered a <i>Notice of Non-Payment</i>, the <i>Owner</i> and the <i>Contractor</i> shall first engage in good faith negotiations to resolve the dispute. If within 5 calendar days following the issuance of a <i>Notice of Non-Payment</i>, despite good faith efforts by both parties and the assistance of the <i>Consultant</i>, the <i>Owner</i> and the <i>Contractor</i> cannot resolve the dispute, either party may commence an <i>Adjudication</i> in accordance with the procedures set out in the <i>Construction Act</i>. Any portion of the <i>Proper Invoice</i> which is not the subject of the <i>Notice of Non-Payment</i> shall be payable within the time period set out in GC 5.3.1.2.</p> <p>5.3.5 Provided that the <i>Owner</i> complies with its obligations under the <i>Construction Act</i>, and subject to any interim determination of an adjudicator in accordance with any <i>Adjudication</i>, and where applicable, a final determination made in accordance with the dispute resolution processes prescribed by this <i>Contract</i>, the <i>Owner</i> shall be entitled to claim in a <i>Notice of Non-Payment</i> a right to deduct from or, set off against, any payment of the <i>Contract Price</i>:</p> <ol style="list-style-type: none"> .1 any amount expended by the <i>Owner</i> in exercising the <i>Owner's</i> rights under this <i>Contract</i> to perform any of the <i>Contractor's</i> obligations that the <i>Contractor</i> has failed to perform; .2 any damages, costs or expenses (including, without limitation, reasonable legal fees and expenses) incurred by the <i>Owner</i> as a result of the failure of the <i>Contractor</i> to perform any of its obligations under the <i>Contract</i>; .3 any other amount owing from the <i>Contractor</i> to the <i>Owner</i> under this <i>Contract</i>. <p>5.3.6 The amounts disputed and described under the <i>Notice of Non-Payment</i> shall be held by the</p>

		<p><i>Owner</i> until all disputed amounts of the <i>Proper Invoice</i> have been resolved pursuant to PART 8 – DISPUTE RESOLUTION.</p> <p>5.3.7 The <i>Contractor</i> represents, warrants, and covenants to the <i>Owner</i> that it is familiar with its prompt payment and trust obligations under the <i>Construction Act</i> and will take all required steps and measures to ensure that it complies with the applicable prompt payment and trust provisions under the <i>Construction Act</i> including, without limitation, section 8.1 of the <i>Construction Act</i>. Evidence of the <i>Contractor's</i> compliance under this GC 5.3.7, including evidence demonstrating that all <i>EFTs</i> by the <i>Owner</i> to the <i>Contractor</i> are kept in a bank account in the <i>Contractor's</i> name will be made available to the <i>Owner</i> within 5 <i>Working Days</i> following receipt by the <i>Contractor</i> of a <i>Notice in Writing</i> making such request.”</p>
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GC 5.4

SUBSTANTIAL PERFORMANCE OF THE WORK- AND PAYMENT OF HOLDBACK

SC32.1	GC 5.4	<p><u>Delete</u> GC 5.4 – SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK in its entirety and <u>replace</u> it with the following:</p> <p>“GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK</p> <p>5.4.1 When the <i>Contractor</i> considers that <i>Substantial Performance of the Work</i> has been achieved, the <i>Contractor</i> shall prepare and submit to the <i>Consultant</i> and the <i>Owner</i> a comprehensive deficiency list of items to be completed or corrected, including any incomplete <i>Close-Out Documentation</i>, and apply for a review by the <i>Consultant</i> and the <i>Owner</i> to establish <i>Substantial Performance of the Work</i>. Failure to include an item on the list does not alter the responsibility of the <i>Contractor</i> to complete the <i>Contract</i>.</p> <p>5.4.2 Prior to, or as part of its written application for <i>Substantial Performance of the Work</i> the <i>Contractor</i> shall submit to the <i>Consultant</i> submit to the <i>Consultant</i> all closeout documentation required by the <i>Contract Documents</i>, including but not limited to, warranties, manuals, guarantees, as-built drawings, warranty cards and all other relevant literature from suppliers and manufacturers including, but not limited to, where applicable (the “Close-Out Documentation”):</p> <ol style="list-style-type: none"> .1 equipment, maintenance, and operations manuals; .2 equipment specifications, data sheets and brochures, parts lists and assembly drawings, performance curves and other related data; .3 line drawings, value charts and control sheets sequences with description of the sequence of operations; .4 warranty documents; .5 guarantees; .6 certificates; .7 service and maintenance reports; .8 <i>Specifications</i>; .9 <i>Shop Drawings</i>; .10 coordination drawings;
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		<p>.11 testing and balancing results and reports;</p> <p>.12 <i>Commissioning</i> and quality assurance documentation;</p> <p>.13 distribution system diagrams;</p> <p>.14 spare parts;</p> <p>.15 samples;</p> <p>.16 existing reports and correspondence from authorities having jurisdiction in the <i>Place of the Work</i>;</p> <p>.17 inspection certificates;</p> <p>.18 red-lined record drawings from the construction trailer in two copies and</p> <p>.19 other materials or documentation required to be submitted under the <i>Contract</i>.</p> <p>5.4.3 The <i>Consultant</i> will review the <i>Work</i> to verify the validity of the application and shall promptly, and in any event, no later than 30 calendar days after receipt of the <i>Contractor's</i> complete deficiency list and application:</p> <p>.1 prepare a final deficiency list incorporating all items to be completed or corrected, including any incomplete or unsubmitted <i>Close-Out Documentation</i>. Each item shall have an indicated value for correction or completion and the determination of the total value of such items shall be determined pursuant to GC 5.8 – DEFICIENCY HOLDBACK. The final deficiency list complete with values is to be included with the <i>Consultant's</i> draft verification and shall be reviewed with the <i>Owner</i> prior to the <i>Consultant</i> rendering a determination in accordance with GC 5.4.3.2</p> <p>.2 having completed the requirements set out in GC 5.4.3.1,</p> <p>(a) the <i>Consultant</i> shall advise the <i>Contractor</i> in writing that the <i>Work</i> or the designated portion of the <i>Work</i> is not substantially performed and give reasons why, or</p> <p>(b) the <i>Consultant</i> shall state the date of <i>Substantial Performance of the Work</i> in a certificate and issue a copy of that certificate to each the <i>Owner</i> and the <i>Contractor</i>.</p> <p>5.4.4 Following the issuance of the certificate of <i>Substantial Performance of the Work</i> referenced in subparagraph 5.4.3.2(b):</p> <p>.1 The <i>Contractor</i> shall publish, in a construction trade newspaper in the area of the location of the <i>Work</i>, a copy of the certificate of <i>Substantial Performance of the Work</i> referred to in GC 5.4.2.2(b) within seven (7) calendar days of receiving a copy of the certificate signed by the <i>Consultant</i>, and the <i>Contractor</i> shall provide suitable evidence of the publication to the <i>Consultant</i> and the <i>Owner</i>. If the <i>Contractor</i> fails to publish such notice, the <i>Owner</i> shall be at liberty to publish said certificate and back-charge the <i>Contractor</i> its reasonable costs for doing so;</p> <p>.2 The <i>Contractor</i> shall complete the <i>Work</i> within forty (40) calendar days of the date certified as the date of <i>Substantial Performance of the Work</i>;</p> <p>.3 Notwithstanding any other provisions of the <i>Contract</i>, no payments will be processed between <i>Substantial Performance of the Work</i> and <i>Ready-for-Takeover</i>;</p> <p>.4 The <i>Owner</i> reserves the right to contract out any or all unfinished <i>Work</i> if it has not been completed within forty (40) days of <i>Substantial Performance of the Work</i> using,</p>
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		<p>without limitation, the funds retained in accordance with GC 5.8 - DEFICIENCY HOLDBACK, without prejudice to any other right or remedy and without affecting the warranty period. The cost to the <i>Owner</i> of completing the <i>Work</i> including <i>Owner</i> and <i>Consultant</i> wages and materials shall be deducted from the <i>Contract Price</i>.</p> <p>5.4.5 After publication of the certificate of the <i>Substantial Performance of the Work</i>, and provided that the <i>Contractor</i> has completed performance of the <i>Work</i> within the 40 calendar days following certification of <i>Substantial Performance of the Work</i>, the <i>Contractor</i> may submit an application for payment of the outstanding <i>Construction Act</i> holdback amount, which application for payment shall:</p> <ul style="list-style-type: none"> .1 include all of the requirements listed in EXHIBIT "1" - PROJECT SPECIFIC REQUIREMENTS FOR A PROPER INVOICE, as applicable to the application for payment of the holdback amount; and .2 include a statement that the <i>Contractor</i> has not received any written notices of lien or any claims for liens from any <i>Subcontractor</i> or <i>Supplier</i>. <p>5.4.6 The <i>Construction Act</i> holdback amount shall become due and payable the day immediately following the expiration of the holdback period prescribed by the <i>Construction Act</i> (in most cases being the 61st calendar day following the publication of the certificate of <i>Substantial Performance of the Work</i> referred to in GC 5.4.4.1), subject to the occurrence of any of the following:</p> <ul style="list-style-type: none"> .1 the preservation of a lien in respect of the <i>Project</i> that has not been satisfied, discharged or otherwise provided for in accordance with the <i>Construction Act</i>; .2 receipt by the <i>Owner</i> of a written notice of lien that has not been satisfied, discharged or otherwise provided for in accordance with the <i>Construction Act</i>; or .3 prior to the expiry of 40 calendar days following the publication of the certificate of <i>Substantial Performance of the Work</i>, the <i>Owner</i> publishes a <i>Notice of Non-Payment</i> of holdback in accordance with the <i>Construction Act</i> (Form 6), setting out the amount of holdback that will not be paid, which may include non-payment to secure the correction of deficiencies and/or the completion of the <i>Work</i>. <p>5.4.7 Notwithstanding the <i>Owner's</i> obligation to make payment of the holdback amount in accordance with GC 5.4.6, the processing of such payment remains subject to the <i>Owner's</i> internal <i>EFT</i> timing limitations. The <i>Owner</i> covenants, and the <i>Contractor</i> agrees, that payment of the holdback shall be made by <i>EFT</i> at the first opportunity during the <i>Owner's</i> normal processing of <i>EFTs</i> upon the holdback becoming due in accordance with GC 5.4.6..</p>
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GC 5.5 FINAL PAYMENT

SC35.1	GC 5.5	<u>Delete</u> GC 5.5 in its entirety, including all subparagraphs thereunder and <u>replace</u> it with the following:
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		<p>"5.5.1 When <i>Ready-for-Takeover</i> has been achieved in accordance with GC 12.1 – READY-FOR-TAKEOVER and the <i>Contractor</i> considers the <i>Work</i> is complete, and after the <i>Contractor</i>, the <i>Owner</i>, and the <i>Consultant</i> have attended a <i>Pre-Invoice Submission Meeting</i> analogous to the requirement in GC 5.2.1 (the "<i>Final Pre-Invoice Submission Meeting</i>"), the <i>Contractor</i> may submit an application for final payment to the <i>Owner</i> and to the <i>Consultant</i>, which application for payment shall:</p> <ul style="list-style-type: none">.1 include all of the requirements set out in GC 5.2.2, including without limitation those requirements listed in APPENDIX "1" - PROJECT SPECIFIC REQUIREMENTS FOR A PROPER INVOICE that are specific to an application for final payment; and.2 if applicable, (a) a certificate from the <i>Consultant</i> or written confirmation from the <i>Owner</i> that the deficiencies or incomplete <i>Work</i> waived by the <i>Owner</i> pursuant to GC 12.1.2 have been fully rectified as of the date of the <i>Contractor's</i> application for final payment, and/or (b) written confirmation, signed by the <i>Owner</i> and the <i>Contractor</i>, that the <i>Contract Price</i> has been reduced by a specified amount in exchange for the <i>Owner</i> releasing the <i>Contractor</i> of its obligation to rectify the certain outstanding deficiencies and/or incomplete <i>Work</i> waived by the <i>Owner</i> pursuant to GC 12.1.2, as detailed in such written confirmation. <p>5.5.2 No later than 5 calendar days prior to the <i>Final Pre-Invoice Submission Meeting</i>, the <i>Contractor</i> will, if not already provided, submit to the <i>Consultant</i> all <i>Close-Out Documentation</i>.</p> <p>5.5.3 Delivery of all <i>Close-Out Documentation</i> is a requirement for the <i>Proper Invoice</i> for final payment.</p> <p>5.5.4 After receipt by the <i>Owner</i> and the <i>Consultant</i> of an application for payment submitted by the <i>Contractor</i> that is a <i>Proper Invoice</i> and by no later than 10 calendar days after the receipt of the <i>Proper Invoice</i>:</p> <ul style="list-style-type: none">.1 the <i>Consultant</i> will either:<ul style="list-style-type: none">(a) issue to the <i>Owner</i> with a copy to the <i>Contractor</i>, a progress payment certificate in the amount applied for by the <i>Contractor</i> in the <i>Proper Invoice</i>, or(b) deliver a finding to the <i>Owner</i> with reasons why an amount other than what is claimed in the <i>Proper Invoice</i> is properly due to the <i>Contractor</i>, which finding the <i>Owner</i> may accept or amend prior to issuing a <i>Notice of Non-Payment</i> (Form 1.1), if any, in accordance with GC 5.5.2;.2 the <i>Owner</i> shall make payment to the <i>Contractor</i> on account as provided in Article A-5 PAYMENT,<ul style="list-style-type: none">(a) in the amount stated in the certificate for payment, or(b) in the amount stated in the certificate for payment less such amount stated in the <i>Owner's Notice of Non-Payment</i> issued pursuant to GC 5.5.5,
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		<p>on the 28th calendar day after receipt of a <i>Proper Invoice</i>, unless such 28th calendar day lands on a day that is other than a <i>Working Day</i>, in which case payment shall be made on the next <i>Working Day</i> after such 28th day.</p>
	5.5.5	<p>In the event that the application for final payment delivered by the <i>Contractor</i> does not include the requirements of GC 5.5.1 (including the requirements for a <i>Proper Invoice</i>) and GC 5.5.2 or where the <i>Owner</i> disputes the amount claimed as payable in the <i>Proper Invoice</i>, then the <i>Owner</i> shall within 14 calendar days of receipt of the application for payment, issue a <i>Notice of Non-Payment</i>. Where the <i>Owner</i> has delivered a <i>Notice of Non-Payment</i>, as specified under this GC 5.5.5, the <i>Owner</i> and the <i>Contractor</i> shall first engage in good faith negotiations to resolve the dispute. If within 5 calendar days following the issuance of a <i>Notice of Non-Payment</i>, despite good faith efforts by both parties with the assistance of the <i>Consultant</i>, the <i>Owner</i> and the <i>Contractor</i> cannot resolve the dispute, either party may commence an <i>Adjudication</i> in accordance with the procedures set out in the <i>Construction Act</i>. Any portion of the <i>Proper Invoice</i> which is not the subject of the <i>Notice of Non-Payment</i> shall be payable within the time period set out in GC 5.5.4.2.</p>
	5.5.6	<p>Subject to the provisions of the <i>Construction Act</i> and any other rights conferred on the <i>Owner</i> at law or under this <i>Contract</i> to withhold payment or back charge or set-off against payment, the <i>Owner</i> shall pay the amount payable under a <i>Proper Invoice</i> for final payment in accordance with the <i>Construction Act</i>.</p>
	5.5.7	<p>When the <i>Consultant</i> issues a certificate of completion in accordance with GC 5.5.4.1, the <i>Consultant</i> shall also issue a certificate for release of any holdback for finishing work amount. In accordance with the <i>Construction Act</i>, the <i>Owner</i> may retain any amounts which are required by law to satisfy any liens against the <i>Work</i>, in respect of any third party claims made to the <i>Owner</i> in respect of the <i>Contract</i> or the <i>Work</i>, and in respect of any claims the <i>Owner</i> may have against the <i>Contractor</i>. Subject to the foregoing, the <i>Owner</i> shall release the holdback in accordance with the <i>Construction Act</i>."</p>

GC 5.6 DEFERRED WORK

SC33.1	5.6.1	<p><u>Delete</u> paragraph 5.6.1 and <u>replace</u> with the following:</p> <p>"5.6.1 If because of conditions reasonably beyond the control of the <i>Contractor</i>, there are items of work that cannot be performed, payment in full for that portion of the <i>Work</i> which has been performed as certified by the <i>Consultant</i> shall not be withheld or delayed by the <i>Owner</i> on account thereof, but the <i>Owner</i> may withhold, subject to its requirement to issue a <i>Notice of Non-Payment</i> under the <i>Construction Act</i>, until the remaining portion of the <i>Work</i> is finished, only such an amount that the <i>Consultant</i> determines is sufficient and reasonable to cover the cost of performing such remaining work. The remaining work shall be valued as deficient work as defined in GC 5.8.1."</p>
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***NEW* GC 5.8**

DEFICIENCY HOLDBACK

SC34.1	5.8.1	<p><u>Add</u> new GC 5.8 – DEFICIENCY HOLDBACK as follows:</p>
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		<p>"GC 5.8 DEFICIENCY HOLDBACK</p> <p>5.8.1 Notwithstanding any provisions contained in the <i>Contract Documents</i> concerning certification and release of monies to the <i>Contractor</i>, the <i>Owner</i> reserves the right to retain a <i>Deficiency Holdback</i>, In addition to the Construction Act holdback. The <i>Deficiency Holdback</i> in the value of 2% shall be applied against the total Contract value and shall be applied to each progress payment. The <i>Deficiency Holdback</i> shall be payable to the Contractor upon the confirmation of completion of all deficiencies and defects in work by the Consultant and the Owner.</p> <p>5.8.2 In performing the calculation under GC 5.8.1,</p> <p>.1 no individual deficiency will be valued at less than five hundred dollars (\$500.00); and</p> <p>.2 for any <i>Close-Out Documentation</i> not submitted in advance of or as part of the <i>Contractor's</i> application for <i>Substantial Performance of the Work</i>, an amount shall be retained by the <i>Owner</i> as part of the deficiency holdback that is equal to the estimated time and material costs to retain a third-party to re-create the applicable <i>Close-Out Documentation</i>, as determined by the <i>Consultant</i>, until such time as the applicable <i>Close-Out Documentation</i> is submitted and approved.</p> <p>5.8.3 The deficiency holdback shall be due and payable to the <i>Contractor</i> on the 61st day following completion of all of the deficiencies listed by the <i>Consultant</i> and confirmed to be corrected, there being no claims for lien registered against the title to the <i>Place of the Work</i> issued in accordance with the <i>Construction Act</i>, and less any amounts disputed under an <i>Owner's Notice of Non-Payment</i> (Form 1.1)."</p>
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PART 6 CHANGES IN THE WORK

GC 6.1 OWNER'S RIGHT TO MAKE CHANGES

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

		<p>precluded from making any claim for a change in the <i>Contract Price</i> as a result of such changes.</p> <p>6.1.4 Labour costs shall be actual, prevailing rates at the <i>Place of the Work</i> paid to workers, plus statutory charges on labour including WSIB, unemployment insurance, Canada pension, vacation pay, hospitalization and medical insurance. The <i>Contractor</i> shall provide these rates, when requested by the <i>Consultant</i>, for review and/or agreement.</p> <p>6.1.5 Quotations for changes to the <i>Work</i> shall only include <i>Direct Costs</i> and be accompanied by itemized breakdowns together with detailed, substantiating quotations or cost vouchers from <i>Subcontractors</i> and <i>Suppliers</i>, submitted in a format acceptable to the <i>Consultant</i> and shall include any <i>Direct Costs</i> associated with extensions in <i>Contract Time</i>.</p> <p>6.1.6 When both additions and deletions covering related <i>Work</i> or substitutions are involved in a change to the <i>Work</i>, payment, including <i>Overhead</i> and profit, shall be calculated on the basis of the net difference, if any, with respect to that change in the <i>Work</i>.</p> <p>6.1.7 Changes to the contract shall be quoted to permit the work to be executed within the <i>Contract Time</i> unless approved by the <i>Consultant</i> and the <i>Owner</i>.</p> <p>6.1.8 No extension to the <i>Contract Time</i> shall be granted for changes in the <i>Work</i> unless the <i>Contractor</i> can clearly demonstrate that such changes significantly alter the overall construction schedule submitted at the commencement of the <i>Work</i>. Extensions of <i>Contract Time</i> and all associated costs, if approved, shall be included in the relevant <i>Change Order</i>.</p> <p>6.1.9 When a change in the <i>Work</i> is proposed or required, the <i>Contractor</i> shall within 10 calendar days submit to the <i>Consultant</i> for review a claim for a change in <i>Contract Price</i> and/or <i>Contract Time</i>. Should 10 calendar days be insufficient to prepare the submission, the <i>Contractor</i> shall within 5 calendar days, advise the <i>Consultant</i> in writing of the proposed date of submission of the claim. Claims submitted after the dates prescribed herein will not be considered."</p>

GC 6.2 CHANGE ORDER

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

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

GC 6.3 CHANGE DIRECTIVE

SC39.1	6.3.6.1	<p><u>Amend</u> paragraph 6.3.6.1 by deleting the final period and adding the following:</p> <p>“.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.</p>
	6.3.6.2	<p><u>Delete</u> paragraph 6.3.6.2 and <u>replace</u> it with the following:</p> <p>“.2 If a change in the <i>Work</i> results in a net decrease in the <i>Contract Price</i>, the amount of the credit shall be the net cost, without deduction for <i>Overhead</i> or profit.”</p>
	6.3.7.1(4)	<p><u>Delete</u> GC 6.3.7.1(4).</p>
	6.3.7.7	<p>Amend GC 6.3.7.7 by <u>deleting</u> the words “described in paragraph 6.3.7.1” and <u>replacing</u> them with “approved by the <i>Owner</i> in writing and in advance of any such expenses being incurred;”</p>

	6.3.7.9	Amend GC 6.3.7.9 by <u>adding</u> the following to the end of the paragraph: “...when specifically requested by the <i>Owner</i> or as directed by the <i>Consultant</i> ;”.
	6.3.7.10	Amend GC 6.3.7.10 by <u>adding</u> the following to the end of the paragraph: “, provided that such amounts are not caused by negligent acts, omissions, or default of the <i>Contractor</i> or <i>Subcontractor</i> ;”.
	6.3.7.13	<u>Delete</u> GC 6.3.7.13.
	6.3.7.15	<u>Delete</u> GC 6.3.7.15.
	6.3.7.17	<u>Delete</u> GC 6.3.7.17 in its entirety including all subparagraphs.
	6.3.11	<u>Delete</u> GC 6.3.11 and <u>replace</u> it with the following: “6.3.11 The value of the <i>Work</i> performed as a result of a <i>Change Directive</i> shall not be eligible to be included in progress payments until the amount, including the method for determining the amount, of such <i>Change Directive</i> has been determined.”

GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

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

		<u>amend</u> the existing second sentence of paragraph 6.4.2 in the second line, following the word “materially” by <u>adding</u> the words “or were concealed from discovery notwithstanding the conduct of the investigation described in paragraph 6.4.1,”.
	6.4.3	<u>Delete</u> paragraph 6.4.3 in its entirety and <u>substitute</u> the following: “6.4.3 If the <i>Consultant</i> makes a finding pursuant to paragraph 6.4.2 that no change in the <i>Contract Price</i> or the <i>Contract Time</i> is justified, the <i>Consultant</i> shall report in writing the reasons for this finding to the <i>Owner</i> and the <i>Contractor</i> .”
	6.4.5	<u>Add</u> new paragraph 6.4.5 as follows: “6.4.5 No claims for additional compensation or for an extension of <i>Contract Time</i> shall be allowed if the <i>Contractor</i> fails to give <i>Notice in Writing</i> to the <i>Owner</i> or <i>Consultant</i> , as required by paragraph 6.4.2.”

GC 6.5 DELAYS

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

		<p>default pursuant to PART 7 – DEFAULT NOTICE, this paragraph 6.5.3 shall not excuse a party from its obligation to cure the default(s). For greater certainty, the defaulting party, to the extent possible, must continue to address and cure the default notwithstanding an event of <i>Force Majeure</i>.”</p>
	6.5.4	<p><u>Delete</u> paragraph 6.5.4 in its entirety and <u>replace</u> it with the following:</p> <p>“6.5.4 No extension or compensation shall be made for delay or impact on the <i>Work</i> unless notice in writing of a claim is given to the <i>Consultant</i> not later than ten (10) <i>Working Days</i> after the commencement of the delays or impact on the <i>Work</i>, provided however, that, in the case of a continuing cause of delay or impact on the <i>Work</i>, only one notice of claim shall be necessary.”</p>
	6.5.6 to 6.5.8	<p><u>Add</u> new paragraphs 6.5.6, 6.5.7 and 6.5.8 as follows:</p> <p>“6.5.6 If the <i>Contractor</i> is delayed in the performance of the <i>Work</i> by an act or omission of the <i>Contractor</i> or anyone directly or indirectly employed or engaged by the <i>Contractor</i>, or by any cause within the <i>Contractor’s</i> control, then (i) firstly, at its expense, and to the extent possible, the <i>Contractor</i> shall accelerate the work and/or provide overtime work to recover time lost by a delay arising under this paragraph 6.5.6, and (ii) secondly, where it is not possible for the <i>Contractor</i> to recover the time lost by implementing acceleration measures and/or overtime work, the <i>Contract Time</i> may be extended for such reasonable time as the <i>Owner</i> may decide in consultation with the <i>Consultant</i> and the <i>Contractor</i>. The <i>Owner</i> shall be reimbursed by the <i>Contractor</i> for all reasonable costs incurred by the <i>Owner</i> as the result of such delay, including, but not limited to, <i>Owner’s</i> staff costs, the cost of all additional services required by the <i>Owner</i> from the <i>Consultant</i> or any sub-consultants, project managers, or others employed or engaged by the <i>Owner</i>, and in particular, the costs of the <i>Consultant’s</i> services during the period between the date of <i>Substantial Performance of the Work</i> stated in Article A-1 herein, as the same may be extended through the provision of these General Conditions, and any later or actual date of <i>Substantial Performance of the Work</i> achieved by the <i>Contractor</i>.</p> <p>6.5.7 Without limiting the obligations of the <i>Contractor</i> described in GC 3.2 – CONSTRUCTION BY OWNER OR OTHER CONTRACTORS or GC 9.4 – CONSTRUCTION SAFETY, the <i>Owner</i> or <i>Consultant</i> may, by <i>Notice in Writing</i>, direct the <i>Contractor</i> to stop the <i>Work</i> where the <i>Owner</i> or <i>Consultant</i> determines that there is an imminent risk to the safety of persons or property at the <i>Place of the Work</i>. In the event that the <i>Contractor</i> receives such notice, it shall immediately stop the <i>Work</i> and secure the site. The <i>Contractor</i> shall not be entitled to an extension of the <i>Contract Time</i> or to an increase in the <i>Contract Price</i> unless the resulting delay, if any, would entitle the <i>Contractor</i> to an extension of the <i>Contact Time</i> or the reimbursement of the <i>Contractor’s</i> costs as provided in paragraphs 6.5.1, 6.5.2 or 6.5.3.</p> <p>6.5.8 No claim for delay shall be made by the <i>Contractor</i> and the <i>Contract Time</i> shall not be extended due to climatic conditions or arising from the <i>Contractor’s</i> efforts to maintain the <i>Construction Schedule</i>.”</p>

PART 7 DEFAULT NOTICE

GC 7.1

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

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

		<p>7.1.8 In the case of either a termination of the <i>Contract</i> or a suspension of the <i>Work</i> under GC 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, OR TERMINATE THE CONTRACT or GC 7.2 - CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the <i>Contractor</i> shall use its best commercial efforts to mitigate the financial consequences to the <i>Owner</i> arising out of the termination or suspension, as the case may be.</p> <p>7.1.9 Upon the resumption of the <i>Work</i> following a suspension under GC 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, OR TERMINATE THE CONTRACT or GC 7.2 - CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the <i>Contractor</i> will endeavour to minimize the delay and financial consequences arising out of the suspension.</p> <p>7.1.10 The <i>Contractor's</i> obligations under the <i>Contract</i> as to quality, correction, and warranty of the <i>Work</i> performed by the <i>Contractor</i> up to the time of termination or suspension shall continue after such termination of the <i>Contract</i> or suspension of the <i>Work</i>."</p>
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GC 7.2

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

SC44.1	7.2.2	<p><u>Delete</u> paragraph 7.2.2 and <u>replace</u> it with the following:</p> <p>"7.2.2 If the <i>Work</i> is suspended or otherwise delayed for a period of 40 consecutive <i>Working Days</i> or more under a stop work order issued by a court or other public authority on account of a breach, violation, contravention, or a failure to abide by any laws, ordinances, rules, regulations, or codes directly by the <i>Owner</i>, the <i>Owner's</i> other contractor(s), or the <i>Consultant</i>, and relating to the <i>Work</i> or the <i>Place of the Work</i>, the <i>Contractor</i> may, without prejudice to any other right or remedy the <i>Contractor</i> may have, terminate the <i>Contract</i> by giving the <i>Owner</i> Notice in <i>Writing</i> to that effect."</p>
SC44.2	7.2.3.1	<u>Delete</u> subparagraph 7.2.3.1 in its entirety.
	7.2.3.2	<u>Delete</u> subparagraph 7.2.3.2 in its entirety.
	7.2.3.4	In subparagraph 7.2.3.4, <u>delete</u> the words "except for GC 5.1 - FINANCING INFORMATION REQUIRED OF THE OWNER".
	7.2.5	<p><u>Delete</u> paragraph 7.2.5 and <u>replace</u> it with the following:</p> <p>"7.2.5 If the default cannot be corrected within the 5 <i>Working Days</i> specified in paragraph 7.2.4, the <i>Owner</i> shall be deemed to have cured the default if it:</p> <ul style="list-style-type: none"> .1 commences correction of the default within the specified time; .2 provides the <i>Contractor</i> with an acceptable schedule for such correction; and, .3 completes the correction in accordance with such schedule."

7.2.6 to 7.2.9	<p><u>Add</u> new paragraphs 7.2.6, 7.2.7, 7.2.8 and 7.2.9 as follows:</p> <p>“7.2.6 If the <i>Contractor</i> terminates the <i>Contract</i> under the conditions described in GC 7.2 – CONTRACTOR’S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the <i>Contractor</i> shall be entitled to be paid for all <i>Work</i> performed to the date of termination, as determined by the <i>Consultant</i>. The <i>Contractor</i> shall also be entitled to recover the direct costs associated with termination, including the costs of demobilization and losses sustained on <i>Products</i> and <i>Construction Equipment</i>. The <i>Contractor</i> shall not be entitled to any recovery for any special, indirect or consequential losses, including loss of profit.</p> <p>7.2.7 The <i>Contractor</i> shall not be entitled to give notice of the <i>Owner’s</i> default or terminate the <i>Contract</i> in the event the <i>Owner</i> withholds certificates or payment or both in accordance with the <i>Contract</i> because of:</p> <p>.1 the <i>Contractor’s</i> failure to pay all legitimate claims promptly, or</p> <p>.2 the failure of the <i>Contractor</i> to discharge construction liens which are registered against the title to the <i>Place of the Work</i>.</p> <p>7.2.8 The <i>Contractor’s</i> obligations under the <i>Contract</i> as to quality, correction and warranty of the <i>Work</i> performed by the <i>Contractor</i> up to the effective date of termination shall continue in force and shall survive termination of this <i>Contract</i> by the <i>Contractor</i>.</p> <p>7.2.9 If the <i>Contractor</i> suspends the <i>Work</i> or terminates the <i>Contract</i> as provided for in GC 7.2 – CONTRACTOR’S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the <i>Contractor</i> shall ensure the site and the <i>Work</i> are left in a safe, secure condition as required by authorities having jurisdiction at the <i>Place of the Work</i> and the <i>Contract Documents</i>.”</p>
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PART 8 DISPUTE RESOLUTION

GC 8.1 AUTHORITY OF THE CONSULTANT

SC45.1	<p>8.1.3 <u>Delete</u> paragraph 8.1.3 in its entirety and <u>substitute</u> as follows:</p> <p>“8.1.3 If a dispute is not resolved promptly, the <i>Consultant</i> will give such instruction as in the <i>Consultant’s</i> opinion are necessary for the proper performance of the <i>Work</i> and to prevent delays pending settlement of the dispute. The parties shall act immediately according to such instructions, it being understood that by doing so neither party will jeopardize any claim the party may have.”</p>
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GC 8.2 ADJUDICATION

SC45.2	<p>8.2.2 to 8.2.7 <u>Add</u> new GC 8.2.2, 8.2.3, 8.2.4, 8.2.5, 8.2.6, and 8.2.7 as follows:</p> <p>“8.2.2 Save and except where the <i>Contractor</i> has given an undertaking, in accordance with the <i>Act</i>, to refer a dispute to <i>Adjudication</i>, prior to delivering a notice of <i>Adjudication</i> in a form prescribed by the <i>Act</i>, the parties agree to first address all disputes with at least one in-person meeting with the <i>Owner’s</i> representative, the <i>Consultant’s</i> representative, and the <i>Contractor’s</i> representative. The parties agree that such steps will be taken to resolve any disputes in a timely and cost-effective manner.</p>
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		<p>8.2.3 Notwithstanding any other provisions in PART 8 DISPUTE RESOLUTION, the parties shall engage in <i>Adjudication</i> proceedings as required by, and in accordance with, the <i>Construction Act</i>.</p> <p>8.2.4 The following procedures shall apply to any <i>Adjudication</i> the parties engage in under the <i>Construction Act</i>:</p> <ol style="list-style-type: none">.1 any hearings shall be held at a venue within the jurisdiction of the <i>Place of the Work</i> or such other venue as the parties may agree and which is acceptable to the adjudicator;.2 the <i>Adjudication</i> shall be conducted in English;.3 each party may be represented by counsel throughout an <i>Adjudication</i>;.4 there shall not be any oral communications with respect to issues in dispute that are the subject of an <i>Adjudication</i> between a party and the adjudicator unless it is made in the presence of both parties or their legal representatives; and.5 a copy of all written communications between the adjudicator and a party shall be given to the other party at the same time. <p>8.2.5 Any documents or information disclosed by the parties during an <i>Adjudication</i> are confidential and the parties shall not use such documents or information for any purpose other than the <i>Adjudication</i> in which they are disclosed and shall not disclose such documents and information to any third party, unless otherwise required by law, save and except the for the adjudicator.</p> <p>8.2.6 If the <i>Contractor</i> fails to comply with any of the notice requirements set out in the <i>Contract</i>, including the time limits set out in any of the following:</p> <ol style="list-style-type: none">.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 <p>in respect of any claim or dispute, the <i>Contractor</i> shall have no entitlement whatsoever (including to an increase in the <i>Contract Price</i>, or an extension of <i>Contract Time</i>) in the context of an <i>Adjudication</i> under the <i>Construction Act</i> and waives the right to make any such claims or disputes in an <i>Adjudication</i>. This GC 8.2.6 shall operate conclusively as an estoppel and bar in the event such claims or disputes are brought in an <i>Adjudication</i> and the <i>Owner</i> may rely on this GC 8.2.6 as a complete defence to any such claims or disputes.</p> <p>8.2.7 The parties hereby acknowledge and agree,</p> <ol style="list-style-type: none">.1 that counterclaims, claims of set-off or the exercise or use of other contractual rights that permit the <i>Owner</i> to withhold, deduct or retain from monies otherwise owed to the <i>Contractor</i> under the <i>Contract</i> may be referred to, and included as part of, <i>Adjudications</i> under the <i>Construction Act</i>;.2 that disputes related to the termination or abandonment of the <i>Contract</i>, as well as any disputes that arise or are advanced following the termination or
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		<p>abandonment of the <i>Contract</i>, shall not be referred to <i>Adjudication</i> under the <i>Construction Act</i>;</p> <p>.3 that notice(s) of <i>Adjudication</i>, with respect to any dispute or claim relating to the <i>Project</i>, shall not be given, and no <i>Adjudication</i> shall be commenced following <i>Contract</i> completion, <i>Contract</i> abandonment, or termination of the <i>Contract</i>;</p> <p>.4 that any <i>Adjudication</i> between the <i>Contractor</i> and a <i>Subcontractor</i> or a supplier that relates to an <i>Adjudication</i> between the <i>Owner</i> and the <i>Contractor</i> shall be joined together to be adjudicated by a single adjudicator, provided that the adjudicator agrees to do so, and the <i>Contractor</i> shall include a provision in each of its contracts that contain an equivalent obligation to this GC 8.2.7.4; and</p> <p>.5 that, other than where the <i>Contractor</i> is obliged to commence an <i>Adjudication</i> pursuant to an undertaking under the <i>Construction Act</i>, neither the <i>Owner</i> nor the <i>Contractor</i> shall commence an <i>Adjudication</i> during the <i>Restricted Period</i>.</p> <p>8.2.8 The parties acknowledge and agree that no <i>Adjudication</i>, arbitration, action, suit or other proceeding may be brought by the <i>Contractor</i> against the <i>Owner</i> in respect of a claim for an increase to the <i>Contract Price</i> as set out in GC 6.6, before the <i>Consultant</i> has issued its findings in respect of same, pursuant to GC 6.6.5. For greater clarity and without limiting the foregoing, the amount applied for in each <i>Proper Invoice</i> shall not include any amounts pertaining to the <i>Contractor's</i> claim for an increase in <i>Contract Price</i> unless and until the <i>Consultant</i> has issued a written notice to the <i>Contractor</i> regarding the validity of such claim, as provided for in GC 6.6.5. However, nothing in this GC 8.2.8 shall prevent a <i>Contractor</i> from commencing an <i>Adjudication</i> where, pursuant to the <i>Construction Act</i>, the <i>Contractor</i> is required to give an undertaking to a <i>Subcontractor</i> to commence an <i>Adjudication</i> following delivery of a <i>Notice of Non-Payment</i>."</p>
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GC 8.3 NEGOTIATION, MEDIATION AND ARBITRATION

SC46.1	8.3.1	<u>Amend</u> paragraph 8.3.1 by changing part of the second line from "shall appoint a <i>Project Mediator</i> " to "may appoint a <i>Project Mediator</i> , except that such an appointment shall only be made if both the <i>Owner</i> and the <i>Contractor</i> agree."
	8.3.4	<u>Amend</u> paragraph 8.3.4 by changing part of the second line from "the parties shall request the <i>Project Mediator</i> " to "and subject to paragraph 8.3.1 the parties may request the <i>Project Mediator</i> ".
	8.3.6 to 8.3.9	<p><u>Delete</u> paragraphs 8.3.6, 8.3.7 and 8.3.8 in their entirety and <u>replace</u> them with the following new GCs 8.3.6, 8.3.7, 8.3.8, and 8.3.9:</p> <p>"8.3.6 The dispute may be finally resolved by arbitration under the Rules for Arbitration of Construction Disputes as provided in CCDC 40 in effect at the time of bid closing, provided that both the <i>Contractor</i> and the <i>Owner</i> agree. If the <i>Contractor</i> and the <i>Owner</i> agree to resolve the dispute by arbitration, the arbitration shall be conducted in the jurisdiction of the <i>Place of the Work</i>.</p> <p>8.3.7 Prior to delivering a notice of <i>Adjudication</i> in a form prescribed by the <i>Act</i>, the parties agree to first address all disputes by attending at least one meeting with the <i>Owner's</i> representative, the <i>Consultant's</i> representative, and the <i>Contractor's</i> representative, prior to commencing an <i>Adjudication</i>. The parties agree that such steps will be taken to resolve any disputes in a timely and cost effective manner. If a resolution to the dispute(s) is not made at such a meeting, any party who plans to commence an <i>Adjudication</i> shall provide the other party with 5 <i>Working Days' Notice in Writing</i> of its intention to issue a notice of <i>Adjudication</i>.</p>

		8.3.8 Other than where the <i>Contractor</i> is obliged to commence an <i>Adjudication</i> pursuant to an undertaking under the <i>Construction Act</i> , neither the <i>Owner</i> nor the <i>Contractor</i> shall commence an <i>Adjudication</i> during the <i>Restricted Period</i> .
		8.3.9 Where either party has delivered a notice of <i>Adjudication</i> in a form prescribed by the <i>Act</i> , the procedures and rules set out under the <i>Construction Act</i> and the regulations thereto shall govern the <i>Adjudication</i> ."

PART 9 PROTECTION OF PERSONS AND PROPERTY

GC 9.1 PROTECTION OF WORK AND PROPERTY

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

GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

SC48.1	9.2.1	Amend GC 9.2.1 by <u>inserting</u> the following to the end of the paragraph: "For the purposes of GC 9.2 – TOXIC AND HAZARDOUS SUBSTANCES, <i>Excess Soil</i> shall not be considered a 'toxic and hazardous substance'."
SC48.2	9.2.5.5	Add a new subparagraph 9.2.5.5 as follows: ".5 in addition to the steps described in subparagraph 9.2.5.3, take any further steps it deems necessary to mitigate or stabilize any conditions resulting from encountering toxic or hazardous substances or materials."

	9.2.6	<p><u>Amend</u> GC 9.2.6 by <u>adding</u> the following words after the word “responsible” in the second line:</p> <p>“or whether any toxic or hazardous substances or materials already at the <i>Place of the Work</i> (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the <i>Contractor</i> or anyone for whom the <i>Contractor</i> is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damages to the property of the <i>Owner</i> or others,”.</p>
	9.2.8	<p><u>Amend</u> GC 9.2.8 by <u>adding</u> the following words after the word “responsible” in the second line:</p> <p>“or whether any toxic or hazardous substances or materials already at the <i>Place of the Work</i> (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the <i>Contractor</i> or anyone for whom the <i>Contractor</i> is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damages to the property of the <i>Owner</i> or others,”.</p>
	9.2.10	<p><u>Add</u> new paragraph 9.2.10 as follows:</p> <p>“9.2.10 The <i>Contractor, Subcontractors and Suppliers</i> shall not bring on to the <i>Place of the Work</i> any toxic or hazardous substances and materials except as required in order to perform the <i>Work</i>. If such toxic or hazardous substances or materials are required, storage in quantities sufficient to allow work to proceed to the end of any current work week only shall be permitted. All such toxic and hazardous materials and substances shall be handled and disposed of only in accordance with all laws and regulations that are applicable at the <i>Place of the Work</i>.”</p>

GC 9.4 CONSTRUCTION SAFETY

SC49.1	9.4.1	<p><u>Delete</u> GC 9.4.1 in its entirety and <u>replace</u> it with the following:</p> <p>“9.4.1 The <i>Contractor</i> shall be solely responsible for construction safety at the <i>Place of the Work</i> and for compliance with the rules, regulations, and practices required by the <i>OHSA</i>, including, but not limited to those of the “constructor”, and shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the <i>Work</i>. The <i>Contractor’s</i> health and safety program documentation shall be made available for review by the <i>Owner</i> or <i>Consultant</i> immediately upon request. Without limiting the foregoing, the <i>Contractor</i> shall be solely responsible for construction safety in respect of the <i>Consultant, Subcontractors and Suppliers, the Owner’s</i> own forces, <i>Other Contractors</i>, and all persons attending the <i>Place of the Work</i> during the course of the <i>Project</i>.”</p>
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9.4.2	Amend GC 9.4.2 by <u>adding</u> the following words after “and the <i>Contractor</i> ”: “, <i>Subcontractors and Suppliers</i> ”.
9.4.3	Amend GC 9.4.3 by <u>adding</u> the following words after “and the <i>Contractor</i> ”: “, <i>Subcontractors and Suppliers</i> ”.
9.4.4	<u>Delete</u> GC 9.4.4 and replace it with the following: “9.4.4 The <i>Owner</i> undertakes to include in its contracts with other contractors and in its instructions to its own forces the requirement that the other contractor or its own forces, as the case may be, comply with the policies and procedures of and the directions and instructions from the <i>Contractor</i> with respect to occupational health and safety and related matters.”
9.4.5	<u>Delete</u> GC 9.4.5 in its entirety and <u>replace</u> it with the following: “9.4.5 Prior to the commencement of the <i>Work</i> , the <i>Contractor</i> shall submit to the <i>Owner</i> : .1 a current WSIB clearance certificate; .2 copies of the <i>Contractor’s</i> insurance policies having application to the <i>Project</i> or certificates of insurance, at the option of the <i>Owner</i> ; .3 documentation setting out the <i>Contractor’s</i> in-house safety programs; .4 a copy of the Notice of Project filed with the Ministry of Labour naming itself as “constructor” under the <i>OHS</i> A; and .5 copies of any documentation or notices to be filed or delivered to the authorities having jurisdiction for the regulation of occupational health and safety at the <i>Place of the Work</i> .”
9.4.6 to 9.4.12	<u>Add</u> new GC 9.4.6, 9.4.7, 9.4.8, 9.4.9, 9.4.10, 9.4.11, and 9.4.12 as follows: “9.4.6 The <i>Contractor</i> shall indemnify and save harmless the <i>Owner</i> , its agents, trustees, officers, directors, employees, consultants, successors, appointees, and assigns from and against the consequences of any and all safety infractions committed by the <i>Contractor</i> under <i>OHS</i> A and any other occupational health and safety legislation in force at the <i>Place of the Work</i> including the payment of legal fees and disbursements on a solicitor and client basis. Such indemnity shall apply to the extent to which the <i>Owner</i> is not covered by insurance. 9.4.7 If the <i>Owner</i> is of the reasonable opinion that the <i>Contractor</i> has not taken such precautions as are necessary to ensure compliance with the requirements of paragraph 9.4.1, the <i>Owner</i> may take any remedial measures which it deems necessary, including stopping the performance of all or any portion of the <i>Work</i> , and the <i>Owner</i> may use its employees, the <i>Contractor</i> , any <i>Subcontractor</i> or any other contractors to perform such remedial measures. 9.4.8 The <i>Contractor</i> shall file any notices or any similar document required pursuant to the <i>Contract</i> or the safety regulations in force at the <i>Place of the Work</i> . This duty of the

		<p><i>Contractor</i> will be considered to be included in the <i>Work</i> and no separate payment therefore will be made to the <i>Contractor</i>.</p>
	9.4.9	<p>Unless otherwise provided in the <i>Contract Documents</i>, the <i>Contractor</i> shall develop, maintain and supervise for the duration of the <i>Work</i> a comprehensive safety program that will effectively incorporate and implement all required safety precautions. The program shall, at a minimum, respond fully to the applicable safety regulations and general construction practices for the safety of persons or property, including, without limitation, any general safety rules and regulations of the <i>Owner</i> and any workers' compensation or occupational health and safety statutes or regulations in force at the <i>Place of the Work</i>.</p>
	9.4.10	<p>The <i>Contractor</i> shall provide a copy of the safety program described in GC 9.4.9 hereof to the <i>Consultant</i> for delivery to the <i>Owner</i> prior to the commencement of the <i>Work</i>, and shall, ensure, as far as it is reasonably practical to do so, that every employer and worker performing work in respect of the <i>Project</i> complies with such program.</p>
	9.4.11	<p>The <i>Contractor</i> shall arrange regular safety meetings, and shall supply and maintain, at its own expense, at its office or other well-known place at the job site, safety equipment necessary to protect the workers and general public against accident or injury as prescribed by the authorities having jurisdiction at the <i>Place of the Work</i>, including, without limitation, articles necessary for administering first-aid to any person and an emergency procedure for the immediate removal of any injured person to a hospital or a doctor's care.</p>
	9.4.12	<p>The <i>Contractor</i> shall promptly report in writing to the <i>Owner</i> and the <i>Consultant</i> all accidents of any sort arising out of or in connection with the performance of the <i>Work</i>, whether on or adjacent to the job site, giving full details and statement of witnesses. If death or serious injuries or damages are caused, the accident shall be promptly reported by the <i>Contractor</i> to the <i>Owner</i> and the <i>Consultant</i> by telephone or messenger in addition to any reporting required under the applicable safety regulations."."</p>

PART 10 GOVERNING REGULATIONS

GC 10.1 TAXES AND DUTIES

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

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GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

SC51.1	10.2.5	<p><u>Amend</u> paragraph 10.2.5 by <u>adding</u> the words “Subject to paragraph 3.4” at the beginning of the paragraph.</p> <p>-and-</p> <p><u>Add</u> the following to the end of the second sentence:</p> <p>“...and no further <i>Work</i> on the affected components of the <i>Contract</i> shall proceed until these directives have been obtained by the <i>Contractor</i> from the <i>Consultant</i>.”</p>
	10.2.6	<p><u>Amend</u> paragraph 10.2.6 by <u>adding</u> the following sentence to the end of the paragraph:</p> <p>“In the event the <i>Owner</i> suffers loss or damage as a result of the <i>Contractor’s</i> failure to comply with paragraph 10.2.5 and notwithstanding any limitations described in paragraph 12.1.1, the <i>Contractor</i> agrees to indemnify and to hold harmless the <i>Owner</i> and the <i>Consultant</i> from and against any claims, demands, losses, costs, damages, actions suits or proceedings resulting from such failure by the <i>Contractor</i>.”</p>
	10.2.7	<p><u>Amend</u> paragraph 10.2.7 by inserting the words “which changes were not, or could not have reasonably been known to the <i>Owner</i> or to the <i>Contractor</i>, as applicable, at the time of bid closing and which changes did not arise as a result of a public emergency or other <i>Force Majeure</i> event” to the second line, after the words “authorities having jurisdiction”.</p>
	10.2.8	<p><u>Add</u> new paragraph 10.2.8 as follows:</p> <p>“10.2.8 The <i>Contractor</i> shall furnish all certificates that are required or given by the appropriate governmental authorities as evidence that the <i>Work</i> as installed conforms with the laws and regulations of authorities having jurisdiction, including certificates of compliance for the <i>Owner’s</i> occupancy or partial occupancy. The certificates are to be final certificates giving complete clearance of the <i>Work</i>, in the event that such governmental authorities furnish such certificates.”</p>

GC 10.4 WORKERS’ COMPENSATION

SC52.1	10.4.1	<p><u>Delete</u> paragraph 10.4.1 and <u>replace</u> with the following:</p> <p>“10.4.1 Prior to commencing the <i>Work</i>, and with each and every application for payment thereafter, including the <i>Contractor’s</i> application for payment of the holdback amount following <i>Substantial Performance of the Work</i> and again with the <i>Contractor’s</i> application for final payment, the <i>Contractor</i> shall provide evidence of compliance with workers’ compensation legislation in force at the <i>Place of the Work</i>, including payments due thereunder.”</p>
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GC 11.1 INSURANCE

SC53.1	11.1	<p><u>Delete</u> entirety of GC 11.1 and <u>replace</u> with the following:</p> <p>“GC 11.1 INSURANCE</p>
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		<p>11.1.1 Without restricting the generality of GC 12 – INDEMNIFICATION, the <i>Contractor</i> shall provide, maintain, and pay for the insurance coverages specified in GC 11.1 – INSURANCE. Unless otherwise stipulated, the duration of each insurance policy shall be from the date of commencement of the <i>Work</i> until the expiration of the warranty periods set out in the <i>Contract Documents</i>. Prior to commencement of the <i>Work</i> and upon the placement, renewal, <u>amendment</u>, or extension of all or any part of the insurance, the <i>Contractor</i> shall promptly provide the <i>Owner</i> with confirmation of coverage and, if required, a certified true copy of the policies certified by an authorized representative of the insurer together with copies of any <u>amending</u> endorsements.</p> <p>.1 General Liability Insurance</p> <p>General liability insurance shall be in the name of the <i>Contractor</i>, with the <i>Owner</i> and the <i>Consultant</i> named as <u>Additional</u> insureds, with limits of not less than \$5,000,000.00 inclusive per occurrence for bodily injury, death, and damage to property, including loss of use thereof, for itself and each of its employees, <i>Subcontractors</i> and/or agents. The insurance coverage shall not be less than the insurance required by IBC Form 2100, or its equivalent <u>replacement</u>, provided that IBC Form 2100 shall contain the latest edition of the relevant CCDC endorsement form. To achieve the desired limit, umbrella, or excess liability insurance may be used. All liability coverage shall be maintained for completed operations hazards from the date of <i>Ready-for-Takeover</i>, as set out in the certificate of <i>Ready-for-Takeover</i>, on an ongoing basis for a period of 6 years following <i>Ready-for-Takeover</i>. Where the <i>Contractor</i> maintains a single, blanket policy, the <u>Addition</u> of the <i>Owner</i> and the <i>Consultant</i> is limited to liability arising out of the <i>Project</i> and all operations necessary or incidental thereto. The policy shall be endorsed to provide the <i>Owner</i> with not less than 30 days' notice, in writing, in advance of any cancellation and of change or <u>amendment</u> restricting coverage.</p> <p>.2 Automobile Liability Insurance</p> <p>Automobile liability insurance in respect of licensed vehicles shall limits of not less than \$2,000,000.00 inclusive per occurrence for bodily injury, death and damage to property, covering all licensed vehicles <i>owned</i> or leased by the <i>Contractor</i>, and endorsed to provide the <i>Owner</i> with not less than 30 days' notice, in writing, in advance of any cancellation, change or <u>amendment</u> restricting coverage. Where the policy has been issued pursuant to a government-operated automobile insurance system, the <i>Contractor</i> shall provide the <i>Owner</i> with confirmation of automobile insurance coverage for all automobiles registered in the name of the <i>Contractor</i>.</p> <p>.3 Aircraft and Watercraft Liability Insurance</p> <p>Intentional Deleted. Not Applicable</p> <p>.4 Property and Boiler and Machinery Insurance</p> <p>(1) Builder's Risk property insurance shall be in the name of the <i>Contractor</i> with the <i>Owner</i> and the <i>Consultant</i> named as <u>Additional</u> insureds. The policy shall insure against all risks of direct physical loss or damage to the property insured which shall include all property included in the <i>Work</i>, whether owned by the <i>Contractor</i> or the owner or owned by others, so long as the property forms part of the <i>Work</i>. The property insured also includes all materials and supplies necessary to complete the work, whether installed in the work temporarily or permanently, in storage on the project site, or in transit to the project site, as well as temporary buildings, scaffolding, falsework forms, hoardings,</p>
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		<p>excavation, site preparation and similar work. The insurance shall be for not less than the sum of the amount of the contract price and the full value of products that are specified to be provided by the owner for incorporation into the work, if applicable, with the deductible of \$10,000.00 payable by the contractor. The insurance shall include the foregoing and, otherwise, shall not be less than the insurance required by IBC Form 4042 or its equivalent <u>replacement</u> provided that the IBC Form 4042 shall include the latest <u>Addition</u> of the relevant CCDC endorsement form. The coverage shall be based on a completed value form and shall be maintained continuously until ten (10) days after the date of the final certificate of payment.</p> <p>(2) Boiler and machinery insurance shall be in the name of the <i>Contractor</i>, with the <i>Owner</i> and the <i>Consultant</i> named as <u>Additional</u> insureds, for not less than the <u>replacement</u> value of the boilers, pressure vessels and other insurable objects forming part of the <i>Work</i>. The insurance provided shall not be less than the insurance provided by the "Comprehensive Boiler and Machinery Form" and shall be maintained continuously from commencement of use or operation of the property insured and until 10 days after the date of the final certificate for payment.</p> <p>(3) The policies shall allow for partial or total use or occupancy of the <i>Work</i>.</p> <p>(4) The policies shall provide that, in the case of a loss or damage, payment shall be made to the <i>Owner</i> and the <i>Contractor</i> as their respective interests may appear. The <i>Contractor</i> shall act on behalf of the <i>Owner</i> for the purpose of adjusting the amount of such loss or damage payment with the insurers. When the extent of the loss or damage is determined, the <i>Contractor</i> shall proceed to restore the <i>Work</i>. Loss or damage shall not affect the rights and obligations of either party under the <i>Contract</i> except that the <i>Contractor</i> shall be entitled to such reasonable extension of the <i>Contract Time</i>, relative to the extent of the loss or damage, as determined by the <i>Owner</i>, in its sole discretion.</p> <p>(5) The <i>Contractor</i> shall be entitled to receive from the <i>Owner</i>, in <u>Addition</u> to the amount due under the <i>Contract</i>, the amount at which the <i>Owner's</i> interest in restoration of the <i>Work</i> has been appraised, such amount to be paid as the restoration of the <i>Work</i> proceeds and as provided in GC 5.2 – APPLICATIONS FOR PROGRESS PAYMENT and GC 5.3 – PROGRESS PAYMENT. In <u>Addition</u>, the <i>Contractor</i> shall be entitled to receive from the payments made by the insurer the amount of the <i>Contractor's</i> interest in the restoration of the <i>Work</i>.</p> <p>(6) In the case of loss or damage to the <i>Work</i> arising from the work of other contractors, or the <i>Owner's</i> own forces, the <i>Owner</i>, in accordance with the <i>Owner's</i> obligations under paragraph 3.2.2.4 of GC 3.2 – CONSTRUCTION BY OWNER OR OTHER CONTRACTORS, shall pay the <i>Contractor</i> the cost of restoring the <i>Work</i> as the restoration of the <i>Work</i> proceeds and as provided in GC 5.2 – APPLICATIONS FOR PROGRESS PAYMENT and GC 5.3 – PROGRESS PAYMENT.</p> <p>.5 Contractors' Equipment Insurance</p> <p>"All risks" contractors' equipment insurance covering construction machinery and equipment used by the <i>Contractor</i> for the performance of the <i>Work</i>, excluding boiler insurance, shall be in a form acceptable to the <i>Owner</i> and shall not allow subrogation</p>
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		<p>claims by the insurer against the <i>Owner</i>. The policies shall be endorsed to provide the <i>Owner</i> with not less than 30 days' notice, in writing, in advance of cancellation, change or <u>amendment</u> restricting coverage. Subject to satisfactory proof of financial capability by the <i>Contractor</i> for self-insurance of his equipment, the <i>Owner</i> agrees to waive the equipment insurance requirement.</p> <p>11.1.2 The <i>Contractor</i> shall be responsible for deductible amounts under the policies except where such amounts may be excluded from the <i>Contractor's</i> responsibility by the terms of GC 9.1 - PROTECTION OF WORK AND PROPERTY and GC 9.2 - DAMAGES AND MUTUAL RESPONSIBILITY.</p> <p>11.1.3 Where the full insurable value of the <i>Work</i> is substantially less than the <i>Contract Price</i>, the <i>Owner</i> may reduce the amount of insurance required to waive the course of construction insurance requirement.</p> <p>11.1.4 If the <i>Contractor</i> fails to provide or maintain insurance as required by the <i>Contract Documents</i>, then the <i>Owner</i> shall have the right to provide and maintain such insurance and provide evidence of same to the <i>Contractor</i>. The <i>Contractor</i> shall pay the costs thereof to the <i>Owner</i> on demand, or the <i>Owner</i> may deduct the amount that is due or may become due to the <i>Contractor</i>.</p> <p>11.1.5 All required insurance policies shall be with insurers licensed to underwrite insurance in the jurisdiction of the <i>Place of the Work</i>."</p>
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***NEW* GC 11.2 CONTRACT SECURITY**

SC52.1	GC 11.2	<p><u>Add</u> new GC 11.2 – CONTRACT SECURITY as follows:</p> <p>"GC 11.2 CONTRACT SECURITY</p> <p>11.2.1 The <i>Contractor</i> shall, prior to the execution of the <i>Contract</i>, furnish a performance bond and labour and material payment bond which meets the requirements under paragraph 11.2.2.</p> <p>11.2.2 The performance bond and labour and material payment bond shall:</p> <ol style="list-style-type: none"> .1 be issued by a duly licensed surety company, which has been approved by the <i>Owner</i> and is permitted under the <i>Construction Act</i>, .2 be issued by an insurer licensed under the <i>Insurance Act</i> (Ontario) and authorized to transact a business of suretyship in the Province of Ontario; .3 shall be in the form prescribed by the <i>Construction Act</i>; .4 have a coverage limit of at least 50 per cent of the <i>Contract Price</i>, or such other percentage of the <i>Contract Price</i> as stated in the <i>Contract Documents</i>; .5 extends protection to <i>Subcontractors</i>, <i>Suppliers</i>, and any other persons supplying labour or materials to the <i>Project</i>; and .6 shall be maintained in good standing until the fulfillment of the <i>Contract</i>, including all warranty and maintenance periods set out in the <i>Contract Documents</i>.. <p>11.2.3 It is the intention of the parties that the performance bond shall be applicable to all of the <i>Contractor's</i> obligations in the <i>Contract Document</i> and, wherever a performance bond is provided with language which conflicts with this intention, it shall be deemed to be</p>
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		<p>amended to comply. The <i>Contractor</i> represents and warrants to the <i>Owner</i> that it has provided its surety with a copy of the <i>Contract Documents</i> prior to the issuance of such bonds.</p> <p>11.2.4 Without limiting the foregoing in any way, the bonds shall indemnify and hold harmless the <i>Owner</i> for and against costs and expenses (including legal and <i>Consultant</i> services and court costs) arising out of or as a consequence of any default of the <i>Contractor</i> under this <i>Contract</i>.</p> <p>11.2.4 The <i>Contractor</i> shall be responsible for notifying the surety company of any changes made to the <i>Contract</i> during the course of construction.</p> <p>11.2.5 The premiums for bonds required by the <i>Contract Documents</i> shall be included in the <i>Contract Price</i>.</p> <p>11.2.6 Should the <i>Owner</i> require additional bonds by the <i>Contractor</i> or any of his <i>Subcontractors</i>, after the receipt of bids for the <i>Work</i>, the <i>Contract Price</i> shall be increased by all direct costs attributable to providing such bonds. The <i>Contractor</i> shall promptly provide the <i>Owner</i>, through the <i>Consultant</i>, with any such bonds that may be required.”</p>
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PART 12 OWNER TAKEOVER

GC 12.1 READY-FOR-TAKEOVER

SC55.1	12.1.1	<p><u>Delete</u> GC 12.1.1 in its entirety and <u>replace</u> it with the following:</p> <p>“12.1.1 <i>Ready-for-Takeover</i> shall be achieved when all of the following has occurred, as verified and approved by the <i>Owner</i>:</p> <ol style="list-style-type: none"> .1 <i>Substantial Performance of the Work</i> has been achieved, as certified by the <i>Consultant</i>; .2 a permit for occupancy of the <i>Place of the Work</i> has been obtained from the authorities having jurisdiction; .3 the <i>Work</i> to be performed under the <i>Contract</i> has satisfied the requirements for deemed completion in accordance with Section 2(3) of the <i>Construction Act</i>, .4 final cleaning and waste removal, as required by the <i>Contract Documents</i>; .5 the <i>Contractor</i> has delivered to the <i>Consultant</i> and the <i>Owner</i> all inspection certificates from authorities having jurisdiction with respect to any component of the <i>Work</i> which has been completed; .6 subject only to GC 12.1.2, the entire <i>Work</i> has been completed to the requirements of the <i>Contract Documents</i>, including completion of all items on the punch list prepared at the time of <i>Substantial Performance of the Work</i> and the <i>Work</i> is being used for its intended purpose, and is so certified by the <i>Consultant</i>; .7 subject only to GC 12.1.2, the <i>Contractor</i> has submitted to the <i>Owner</i> and the <i>Consultant</i> in a collated and organized matter, all <i>Close-Out Documentation</i> and any other materials or documentation required by the <i>Contract Documents</i>;
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		<p>.8 subject only to GC 12.1.2, all <i>Products</i>, systems and components of the <i>Project</i> have been commissioned and certified for operation and accepted by the <i>Owner</i> and <i>Consultant</i>, and</p> <p>9 subject only to GC 12.1.2, the <i>Contractor</i> has submitted to the <i>Owner</i> and the <i>Consultant</i> full and complete as-built drawings and <i>Specifications</i> revised by the <i>Contractor</i> to reflect the as-built state of the <i>Work</i>, clearly showing changes to the <i>Drawings</i> and <i>Specifications</i> from the original <i>Contract Documents</i>, all of which have been approved by the <i>Owner</i> acting reasonably.”</p>
SC55.2	12.1.2	<p><u>Delete</u> GC 12.1.2 in its entirety and <u>replace</u> it with the following:</p> <p>“12.1.2 The <i>Owner</i> may, in its sole, absolute, and unfettered discretion, waive compliance with a requirement, or a part thereof, for achieving <i>Ready-for-Takeover</i> set out in GC 12.1.1.6 to 12.1.1.9 (inclusive). Where the <i>Owner</i> exercises the discretion afforded under this GC 12.1.2, the <i>Contractor</i> shall be required to comply with GC 5.5.1.2 as part of its application for final payment and the <i>Owner</i> and the <i>Contractor</i>, in consultation with the <i>Consultant</i>, shall establish a reasonable date for completing the <i>Work</i>.”</p>
SC55.3	12.1.3	<p><u>Delete</u> GC 12.1.3 in its entirety and <u>replace</u> it with the following:</p> <p>“12.1.3 When the <i>Contractor</i> considers the <i>Work Ready-for-Takeover</i>, it shall submit a written application to the <i>Owner</i> and the <i>Consultant</i> for review.”</p>
SC55.4	12.1.4	In GC 12.1.4, <u>delete</u> the words “list and” from the second line.
SC55.5	12.1.5	<p><u>Delete</u> GC 12.1.5 in its entirety and <u>replace</u> it with the following:</p> <p>“12.1.5 Following the confirmation of the date of <i>Ready-for-Takeover</i> by the <i>Consultant</i> and as confirmed by the <i>Owner</i>, the <i>Contractor</i> may submit a final application for payment in accordance with GC 5.5 – FINAL PAYMENT.”</p>
SC55.6	12.1.6	<u>Delete</u> GC 12.1.6 in its entirety.

GC 12.2 EARLY OCCUPANCY

SC56.1	GC 12.2	<p><u>Delete</u> GC 12.2 – EARLY OCCUPANCY BY THE OWNER in its entirety, including all subparagraphs thereunder and <u>replace</u> it with the following:</p> <p>“12.2.1 The <i>Owner</i> reserves the right to take possession of and use for any intended purpose any portion or all of the undelivered portion of the <i>Project</i> even though the <i>Work</i> may not have reached Substantial Performance of the <i>Work</i>. Where the <i>Work</i> extends beyond the <i>Contract Time</i>, progress and completion of the <i>Work</i> shall not unduly interfere with the delivery of scheduled school programs. The taking of possession or use of any such portion of the <i>Project</i> shall not be deemed to be the <i>Owner’s</i> acknowledgement or acceptance of the <i>Work</i> or <i>Project</i> nor shall it relieve the <i>Contractor</i> of any of its obligations under the <i>Contract</i>.</p> <p>12.2.2 Whether the <i>Project</i> contemplates <i>Work</i> by way of renovations in buildings which will be in use or be occupied during the course of the <i>Work</i> or where the <i>Project</i> involves <i>Work</i> that is adjacent to a structure which is in use or is occupied, the <i>Contractor</i>, without in</p>
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		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.”
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GC 12.3 WARRANTY

SC57.1	12.3.1	<u>Delete</u> from the first line of paragraph 12.3.1 the words “one year” and <u>replace</u> it with the words “two years”
	12.3.2	<u>Delete</u> from the first line of paragraph 12.3.2 the word “The” and <u>replace</u> it with the words “Subject to GC 1.1.3, the...”
	12.3.7 to 12.3.12	<p><u>Add</u> new paragraphs 12.3.7 to 12.3.12 as follows:</p> <p>“12.3.7 Where required by the <i>Contract Documents</i>, the <i>Contractor</i> shall provide a maintenance bond as security for the performance of the <i>Contractor’s</i> obligations as set out in GC 12.3 WARRANTY.</p> <p>12.3.8 The <i>Contractor</i> shall provide fully and properly completed and signed copies of all warranties and guarantees required by the <i>Contract Documents</i>, containing:</p> <ol style="list-style-type: none"> .1 the proper name of the <i>Owner</i>; .2 the proper name and address of the <i>Project</i>; .3 the date the warranty commences, which shall be at the “<i>Ready-for-Takeover</i>” unless otherwise agreed upon by the <i>Consultant</i> in writing. .4 a clear definition of what is being warranted and/or guaranteed as required by the <i>Contract Documents</i>; and .5 the signature and seal (if required by the governing law of the <i>Contract</i>) of the company issuing the warranty, countersigned by the <i>Contractor</i>. <p>12.3.9 Should any <i>Work</i> need to be repaired or replaced during the time period for which it is covered by the specified warranty, a new warranty shall be provided under the same conditions and for the same period as specified herein before. The new warranty shall commence at the completion of the repair or replacement.</p> <p>12.3.10 The <i>Contractor</i> shall ensure that its <i>Subcontractors</i> are bound to the requirements of GC 12.3 – WARRANTY for the <i>Subcontractor’s</i> portion of the <i>Work</i>.</p> <p>12.3.11 The <i>Contractor</i> shall ensure that all warranties, guarantees or other obligations for <i>Work</i>, services or <i>Products</i> performed or supplied by any <i>Subcontractor</i>, <i>Supplier</i> or other person in connection with the <i>Work</i> are obtained and available for the direct benefit of the <i>Owner</i>. In the alternative, the <i>Contractor</i> shall assign to the <i>Owner</i> all warranties, guarantees or other obligations for <i>Work</i>, services or <i>Products</i> performed or supplied by any <i>Subcontractor</i>, <i>Supplier</i> or other person in connection with the <i>Work</i> and such assignment shall be with the consent of the assigning party, where required by law, or by the terms of that party’s contract. Such assignment shall be in addition to, and shall in no way limit, the warranty rights of the <i>Owner</i> under the <i>Contract Documents</i>.</p>

		<p>12.3.12 The <i>Contractor</i> shall commence or correct any deficiency within 2 <i>Working Days</i> after receiving a <i>Notice in Writing</i> from the <i>Owner</i> or the <i>Consultant</i>, and shall complete the <i>Work</i> as expeditiously as possible, except in the case where the deficiency prevents maintaining security or where basic systems essential to the ongoing business of the <i>Owner</i> and/or its tenants cannot be maintained operational as designed. In those circumstances all necessary corrections and/or installations of temporary replacements shall be carried out immediately as an emergency service. Should the <i>Contractor</i> fail to provide this emergency service within 8 hours of a request being made during the normal business hours of the <i>Contractor</i>, the <i>Owner</i> is authorized, notwithstanding GC 3.1, to carry out all necessary repairs or replacements at the <i>Contractor's</i> expense.”</p>
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PART 13 INDEMNIFICATION AND WAIVER

GC 13.1 INDEMNIFICATION

SC58.1	GC 13.1	<p><u>Delete</u> GC 13.1 – INDEMNIFICATION in its entirety and <u>replace</u> it with the following:</p> <p>“13.1.1 The <i>Contractor</i> shall indemnify and hold harmless the <i>Owner</i>, its parent, subsidiaries and affiliates, their respective partners, trustees, officers, directors, agents and employees and the <i>Consultant</i> from and against any and all claims, liabilities, expenses, demands, losses, damages, actions, costs, suits, or proceedings (hereinafter called “claims”), whether in respect of claims suffered by the <i>Owner</i> or in respect of claims by third parties, that directly or indirectly arise out of, or are attributable to, the acts or omissions of the <i>Contractor</i>, its employees, agents, <i>Subcontractors</i>, <i>Suppliers</i> or any other persons for whom it is in law responsible (including, without limitation, claims that directly or indirectly arise out of, or are attributable to, loss of use or damage to the <i>Work</i>, the <i>Owner's</i> property or equipment, the <i>Contractor's</i> property or equipment or equipment or property adjacent to the <i>Place of the Work</i> or death or injury to the <i>Contractor's</i> personnel).</p> <p>13.1.2 The <i>Owner</i> shall indemnify and hold the <i>Contractor</i>, its agents and employees harmless from and against claims, demands, losses, costs, damages, actions, suits or proceedings arising out of the <i>Contractor's</i> performance of the <i>Contract</i> which are attributable to a lack of or defect in title or an alleged lack of or defect in title to the <i>Place of the Work</i>.</p> <p>13.1.3 The provisions of GC 13.1 - INDEMNIFICATION shall survive the termination of the <i>Contract</i>, howsoever caused and no payment or partial payment, no issuance of a final certificate of payment and no occupancy in whole or in part of the <i>Work</i> shall constitute a waiver or release of any of the provisions of GC 13.1</p> <p>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.”</p>
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GC 13.2 WAIVER OF CLAIMS

	13.2.1	In paragraph 13.2.1 in the third line after the word "limitation" <u>add</u> the words "claims for delay pursuant to GC 6.5 DELAYS" -and- <u>add</u> the words "(collectively "Claims")" after "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	<u>Delete</u> subparagraph 13.2.1.3 in its entirety.
	13.2.1.4	In paragraph 13.2.1.4 change the word "claims" to "Claims".
	13.2.2.1	In paragraph 13.2.2.1 <u>delete</u> the words "in paragraphs 13.2.1.2 and 13.2.1.3" and <u>replace</u> them with "in paragraph 13.2.1.2" -and- change the word "claims" to "Claims" in both instances and change the word "claim" to "Claim".
	13.2.3	<u>Delete</u> paragraph 13.2.3 in its entirety.
	13.2.4	<u>Delete</u> paragraph 13.2.4 in its entirety.
	13.2.5	<u>Delete</u> paragraph 13.2.5 in its entirety.
	13.2.6	In paragraph 13.2.6 change the word "claim" to "Claim" in all instances in the paragraph.
	13.2.8	In paragraph 13.2.8 change "The party" to "The Contractor" -and- change the word "claim" to "Claim" in all instances in the paragraph.
	13.2.9	In paragraph 13.2.9 <u>delete</u> the words "under paragraphs 13.2.1 or 13.2.3" and <u>replace</u> them with "under paragraph 13.2.1" -and- change both instances of the words "the party" to "the Contractor". Change the word "claim" to "Claim" in all instances in the paragraph.

***NEW* PART 14 OTHER PROVISIONS**

SC58.1	14.1	<p><u>Add</u> new PART 14 – OTHER PROVISIONS as follows:</p> <p>“PART 14 OTHER PROVISIONS</p> <p>GC 14.1 OWNERSHIP OF MATERIALS</p> <p>14.1.1 Unless otherwise specified, all materials existing at the <i>Place of the Work</i> at the time of execution of the <i>Contract</i> shall remain the property of the <i>Owner</i>. All <i>Work</i> and <i>Products</i> delivered to the <i>Place of the Work</i> by the <i>Contractor</i> shall be the property of the <i>Owner</i>. The <i>Contractor</i> shall remove all surplus or rejected materials as its property when notified in writing to do so by the <i>Consultant</i>.”</p>
	14.2	<p><u>Add</u> new GC 14.2 – CONSTRUCTION LIENS as follows:</p> <p>“GC 14.2 LIENS</p> <p>14.2.1 Notwithstanding any other provision in the <i>Contract</i>, the <i>Consultant</i> shall not be obligated to issue a certificate, and the <i>Owner</i> shall not be obligated to make payment, subject to the <i>Owner’s</i> requirement to issue a <i>Notice of Non-Payment</i> (Form 1.1) to the <i>Contractor</i>, if at the time such certificate or payment was otherwise due:</p> <ul style="list-style-type: none"> .1 a claim for lien has been registered against the <i>Project</i> lands by a <i>Subcontractor</i> or a <i>Supplier</i> that has not been vacated or discharged by the <i>Contractor</i> in accordance with the requirements of this <i>Contract</i>, or .2 if the <i>Owner</i> or a mortgagee of the <i>Project</i> lands has received a written notice of a lien that has not been resolved by the <i>Contractor</i> through the posting of security or otherwise. <p>14.2.2 In the event a construction lien arising from the performance of the <i>Work</i> is registered or preserved against the <i>Project</i> lands by a <i>Subcontractor</i> or a <i>Supplier</i>, or a written notice of a lien is given or a construction lien action is commenced against the <i>Owner</i> by a <i>Subcontractor</i> or a <i>Supplier</i>, then the <i>Contractor</i> shall, at its own expense:</p> <ul style="list-style-type: none"> .1 within 10 calendar days of registration of the construction lien, vacate or discharge the lien from title to the premises (i.e. the <i>Place of the Work</i>). If the lien is merely vacated, the <i>Contractor</i> shall, if requested, undertake the <i>Owner’s</i> defence of any

		<p>subsequent action commenced in respect of the lien, at the <i>Contractor's</i> sole expense;</p> <p>.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</p> <p>.3 satisfy all judgments and pay all costs arising from such construction liens and actions and fully indemnify the <i>Owner</i> against all costs and expenses arising from same, including legal costs on a full indemnity basis.</p> <p>14.2.3 In the event that the <i>Contractor</i> fails or refuses to comply with its obligations pursuant to paragraph 14.2.2, the <i>Owner</i> shall, at its option, be entitled to take all steps necessary to address any such construction liens including, without limitation and in addition to the <i>Owner's</i> rights under paragraph 13.2.4, the posting of security with the Ontario Superior Court of Justice to vacate the claim for lien from title to the <i>Project</i> lands, and in so doing will be entitled to a full indemnity from the <i>Contractor</i> for all legal fees, security, disbursements and other costs incurred and will be entitled to deduct same from amounts otherwise owing to the <i>Contractor</i>.</p> <p>14.2.4 In the event that any <i>Subcontractor</i> or <i>Supplier</i> registers any claim for lien with respect to all or part of the <i>Place of Work</i>, the <i>Owner</i> shall have the right to withhold, in addition to the statutory holdback, the full amount of said claim for lien plus either: (a) \$250,000 if the claim for lien is in excess of \$1,000,000 or (b) 25% of the value of the claim for lien and to bring a motion to vacate the registration of said claim for lien and any associated certificate of action in respect of that lien, in accordance with Section 44 of the <i>Act</i>, by paying into court as security the amount withheld.</p> <p>14.2.5 Nothing in this GC 14.2 serves to preclude the <i>Contractor</i> from preserving and perfecting its lien in the event of non-payment by the <i>Owner</i>."</p>
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**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	Hardware – doors for heat pump enclosures	\$12,000
2	Building Automation System (BAS) Supply and Install full scope of Div. 25. This includes controllers, wiring, and programming to support a fully-functioning building automation system. Work must be completed by Energy Controls Inc. Note that control valves and dampers will be supply-only under the scope of this allowance. Install of control valve and dampers will be performed by Div. 23 (not in scope of this allowance)	\$185,000
Total of All Allowances:		\$197,000

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

<p>Section A Indicate Precautions Taken</p> <p><input type="checkbox"/> Available sprinklers, hose streams, and extinguishers available and in service</p> <p>Within 35' or 11m of hot work</p> <p><input type="checkbox"/> Flammable liquid, dust, lint and oily deposits removed</p> <p><input type="checkbox"/> Explosive atmosphere in area eliminated</p> <p><input type="checkbox"/> Floors swept clean</p> <p><input type="checkbox"/> All wall and floor openings covered</p> <p><input type="checkbox"/> Combustible floors covered with fire resistant sheets</p> <p><input type="checkbox"/> Protect or shut down ducts that might carry sparks/smoke</p> <p>Hot work on walls, ceiling or roofs</p> <p><input type="checkbox"/> Construction is noncombustible and without combustible covering or insulation</p> <p><input type="checkbox"/> Combustible materials on other side of walls, ceilings or roofs moved away</p> <p><input type="checkbox"/> Combustible structure wetted down</p> <p>Hot work on enclosed equipment</p> <p><input type="checkbox"/> Enclosed equipment cleaned of all combustible material</p> <p><input type="checkbox"/> Containers purged of flammable liquid/vapour</p> <p><input type="checkbox"/> Pressurized vessels, piping & equipment removed from service, isolated & vented</p> <p>Fire watch/hot work and monitoring</p> <p><input type="checkbox"/> Fire watch will be provided <u>during</u> and for <u>1 hour</u> after work including break</p> <p><input type="checkbox"/> Fire watch is trained and supplied with suitable extinguishers</p> <p><input type="checkbox"/> Fire watch is trained in the use of sounding fire alarm</p> <p><input type="checkbox"/> Fire watch conducted in adjoining areas, above and below the space where appropriate</p> <p><input type="checkbox"/> Monitor hot work area for an additional <u>2 hours</u> after fire watch</p> <p><input type="checkbox"/> Other precautions taken (please detail):</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>Section B Authorization Granted</p> <p>Board Supervisor/Manager/Proj. Coordinator: _____</p> <p style="text-align: center;">Print Name Signature</p> <p>Permit Valid from / to: (max 7 days) _____</p> <p style="text-align: center;">From This Date To This Date</p> <p style="text-align: center;">(Maximum 7 days or until end of hot work whichever is sooner)</p> <hr/> <p>Section C Contractor and Location Affected</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Dates: (max 7 days)</th> <th style="width: 30%;">Name of Contractor (including hot work)</th> <th style="width: 20%;">Name & signature of Individual assigned to fire watch</th> <th style="width: 20%;">Name & signature of Individual assigned to fire monitoring</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table> <p>School: _____</p> <p>Room/Area: _____</p> <p>Nature of Job: _____</p> <p>I verify the above location has been examined <u>each day</u>, the precautions listed in Section A have been taken <u>each day</u>, and permission is authorized for this work.</p> <p>I further acknowledge that if activity is during <u>school operational hours</u>, that appropriate <u>notification</u> has been given to <u>school</u> administration.</p> <p>Hot Works Contractor: _____</p> <p style="text-align: center;">Signature</p> <p>School Administrator notified: _____</p> <p style="text-align: center;">Print Name</p> <p style="text-align: center;">In Case of Emergency call: 911 - Then call: 519-570-0003 Ext. 4123</p>	Dates: (max 7 days)	Name of Contractor (including hot work)	Name & signature of Individual assigned to fire watch	Name & signature of Individual assigned to fire monitoring																																
Dates: (max 7 days)	Name of Contractor (including hot work)	Name & signature of Individual assigned to fire watch	Name & signature of Individual assigned to fire monitoring																																		

Refer to WRDSB Administration Procedure 4200 Hot Work/Fire Watch (Copies Available on Request)

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 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 an Environmental Consultant, the contractor is to expedite the air clearance sampling with the lab of their choice and carry these costs.
- .3 Forward Air Clearance results to:
 - .1 Principal / Vice-principal,
 - .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

Appendix 01 35 34B– Lead Report– NOT APPLICABLE

01 42 00 – References

1.0 GENERAL

1.1. SECTION INCLUDES

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

1.2. RELATED SECTIONS

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

1.3. REFERENCES

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

1.4. STANDARDS

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

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

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

END OF SECTION

01 45 00 – Quality Control

1.0 GENERAL

1.1. RELATED SECTIONS

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

1.2. REFERENCES

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

1.3. INSPECTION BY AUTHORITY

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

1.4. REVIEW BY CONSULTANT

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

1.5. INDEPENDENT INSPECTION AGENCIES

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

1.6. ACCESS TO WORK

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

1.7. CONTRACTOR RESPONSIBILITIES

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

1.8. DUTIES & AUTHORITY OF TESTING AGENCY

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

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

1.9. REJECTED WORK

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

1.10. TESTING OF EXCAVATION & BACKFILL

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

1.11. CONCRETE STRENGTH TESTS

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

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

1.12. INSPECTION OF STRUCTURAL STEEL

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

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

1.13. INSPECTION OF METAL DECK

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

1.14. INSPECTION AND TESTING OF PAVING

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

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

1.15. BUILDING THERMOGRAPHIC SCAN

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

1.16. TESTS AND MIX DESIGNS

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

1.17. MOCK-UP

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

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

1.18. EQUIPMENT AND SYSTEMS

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

END OF SECTION

01 51 00 – Temporary Utilities

1.0 GENERAL

1.1. RELATED SECTIONS

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

1.2. INSTALLATION AND REMOVAL

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

1.3. DEWATERING

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

1.4. WATER SUPPLY

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

1.5. TEMPORARY HEATING AND VENTILATION

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

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

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

1.6. TEMPORARY POWER AND LIGHT

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

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

1.7. TEMPORARY COMMUNICATION FACILITIES

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

END OF SECTION

01 53 00 – Temporary Construction Facilities

1.0 GENERAL

1.1. RELATED SECTIONS

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

1.2. INSTALLATION AND REMOVAL

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

1.3. PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

1.4. PROTECTION OF SURROUNDING WORK

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

1.5. ROOF AND STRUCTURE PROTECTION

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

1.6. WORK SITE ENCLOSURE & SAFETY BARRIERS

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

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

1.7. TREE PROTECTION

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

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

1.8. GUARD RAILS AND BARRIERS

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

1.9. WEATHER ENCLOSURES

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

1.10. DUST TIGHT BARRIERS

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

1.11. SCAFFOLDING

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

1.12. SHORING, BRACING, PILING

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

1.13. HOISTING

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

1.14. OVERHEAD LIFTING

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

1.15. ELEVATORS/LIFTS

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

1.16. USE OF THE WORK

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

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

1.17. CONSTRUCTION PARKING

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

1.18. ACCESS TO SITE

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

1.19. SECURITY

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

1.20. OFFICES

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

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

1.21. EQUIPMENT, TOOL AND MATERIALS STORAGE

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

1.22. SANITARY FACILITIES

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

END OF SECTION

01 54 00 – Materials and Equipment

1.0 GENERAL

1.1. RELATED SECTIONS

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

1.2. PRODUCT AND MATERIAL QUALITY

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

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

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

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

1.4. WORKMANSHIP

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

1.5. MANUFACTURER'S INSTRUCTIONS

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

1.6. TOOLS OF THE TRADE

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

1.7. EXISTING EQUIPMENT

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

END OF SECTION

01 61 00 – Product Requirements

1.0 GENERAL

1.1. RELATED SECTIONS

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

1.2. TERMINOLOGY

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

1.3. PRODUCT QUALITY

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

1.4. AVAILABILITY

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

1.5. STORAGE AND PROTECTION

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

1.6. TRANSPORTATION AND HANDLING

- .1 Transport and handle Products in accordance with manufacturer's written instructions.
- .2 Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

- .3 Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.
- .4 Suitably pack, crate and protect products during transportation to site to preserve their quality and fitness for the purpose intended.
- .5 Store products in original, undamaged condition with manufacturer's labels and seals intact until they are being incorporated into completed work.
- .6 Protect materials from damage by extreme temperatures or exposure to the weather.

1.7. EXISTING UTILITIES

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

1.8. MANUFACTURER'S WRITTEN INSTRUCTIONS

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

1.9. QUALITY OF WORK

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

- .4 Products, materials, systems and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the applicable manufacturer's printed directions.
- .5 Where specified requirements are in conflict with manufacturer's written directions, follow manufacturer's directions. Where specified requirements are more stringent than manufacturer's directions, comply with specified requirements.

1.10. COORDINATION

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

1.11. CONCEALMENT

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

1.12. REMEDIAL WORK

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

1.13. LOCATION OF FIXTURES

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

1.14. FASTENINGS - EQUIPMENT

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

1.15. PROTECTION OF WORK IN PROGRESS

- .1 Prevent overloading of any part of the Project.
- .2 Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated, without written approval of the Consultant.

END OF SECTION

01 70 00 – Examination and Preparation

1.0 GENERAL

1.1. RELATED SECTIONS

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

1.2. REFERENCES

- .1 Owner's identification of existing survey control points and property limits.

1.3. SUBMITTALS

- .1 Submit name and address of Surveyor to Consultant.
- .2 On request of Consultant, submit documentation to verify accuracy of field engineering work.
- .3 Submit certificate signed by surveyor certifying that elevations and locations of completed Work conforms with Contract Documents.

1.4. QUALIFICATIONS OF SURVEYOR

- .1 Qualified registered land surveyor, licensed to practice in the Place of the Work.

1.5. SURVEY REFERENCE POINTS

- .1 Existing base horizontal and vertical control points are designated on Drawings.
- .2 Locate, confirm and protect control points prior to starting site Work. Preserve permanent reference points during construction.
- .3 Make no changes or relocations without prior written notice to the Consultant.
- .4 Report to Consultant when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .5 Require the surveyor to replace control points in accordance with original survey control.

1.6. SURVEY REQUIREMENTS

- .1 Establish existing and new permanent bench marks on site, referenced to established benchmarks by survey control points.
- .2 Record locations, with horizontal and vertical data in Project Record Documents.
- .3 Establish lines and levels, locate and lay out, by instrumentation.
- .4 Establish pipe invert elevations.

- .5 Stake batter boards
- .6 Establish foundation and floor elevations.
- .7 Establish lines and levels for mechanical and electrical work.

1.7. SUBSURFACE CONDITIONS

- .1 Promptly notify Consultant in writing if discovered surface or subsurface conditions at Place of Work differ materially from those indicated in Contract Documents.
- .2 Advise the Consultant of a reasonable assumption of probable conditions when determined.
- .3 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work.

1.8. EXAMINATION

- .1 The Contractor is expected to be totally familiar with site conditions and shall assume full responsibility for the cost involved in repairing any damage to the building, site and services, city property, adjacent buildings, etc., during general construction, regardless of the extent of the damage.
- .2 Inspect existing conditions, including elements or adjacent Work subject to irregularities, damage, movement, including Work during cutting and patching.
- .3 The Contractor shall provide all equipment necessary to make a full and detailed site evaluation. This shall include but not be limited to ladders, flashlights and hand tools.
- .4 The Contractor expressly agrees that conditions above existing suspended acoustic ceilings, but below fixed structure, unless obscured by an additional ceiling above, shall be considered exposed conditions for the purposes of making findings under the provisions of the Contract. There shall be no claims for extra costs for extra Work in these areas.
- .5 After uncovering, inspect conditions affecting performance of the Work.
- .6 Beginning of cutting or patching means acceptance of existing conditions.

1.9. PREPARATION

- .1 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of the project from damage.
- .2 Provide protection from elements for areas which may be exposed by uncovering work; maintain excavations free of water.

1.10. EXISTING SERVICES

- .1 Before commencing work, establish location and extent of service lines in the area of Work and notify the Consultant of findings.
- .2 Remove abandoned service lines running through existing and new structures. Cap or seal lines at cut-off points as directed by the Consultant.

1.11. LOCATION OF EQUIPMENT AND FIXTURES

- .1 Inform Consultant of conflicting installations, install as directed.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Consultant of impending installation and obtain approval for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by Consultant.

1.12. SURVEY RECORD

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.
- .3 Record locations of maintained, re-routed and abandoned service lines.

END OF SECTION

SECTION 01 73 30 – EXECUTION AND CUTTING AND PATCHING

1.0 GENERAL

1.1. RELATED SECTIONS

- .4 Section 01 32 00 - Construction Progress Documentation: Submittals and scheduling.
- .5 Section 01 61 00 - Product Requirements.
- .6 Section 01 70 00 – Examination and Preparation
- .7 Individual Product Specification Sections:
 - .1 Cutting and patching incidental to work of the section.
 - .2 Advance notification to other sections of openings required in Work of those sections.

1.2. SUBMITTALS

- .8 Submit written request in advance of cutting or alteration which affects:
 - .1 Structural integrity of any element of Project.
 - .2 Integrity of weather exposed or moisture resistant element.
 - .3 Efficiency, maintenance, or safety of any operational element.
 - .4 Visual qualities of sight exposed elements.
 - .5 Work of Owner or separate contractor.
- .9 Include in request:
 - .1 Identification of Project.
 - .2 Location and description of affected Work.
 - .3 Necessity for cutting or alteration.
 - .4 Description of proposed Work and Products to be used.
 - .5 Alternatives to cutting and patching.
 - .6 Effect on work of Owner or separate contractor.
 - .7 Written permission of affected separate contractor.
 - .8 Date and time work will be executed.

1.3. TOLERANCES

- .10 Monitor fabrication and installation tolerance control of Products to produce acceptable Work.
- .11 Do not permit tolerances to accumulate beyond effective or practical limits.
- .12 Comply with manufacturers' tolerances. In case of conflict between manufacturers' tolerances and Contract Documents, request clarification from the Consultant before proceeding.

- .13 Adjust Products to appropriate dimensions; position and confirm tolerance acceptability, before permanently securing Products in place.

2.0 PRODUCTS

2.1. MATERIALS

- .1 Primary Products: Those required for original installation.
- .2 Product Substitution: For any proposed change in materials, submit a request for substitution described in Section 01 33 00.

3.0 EXECUTION

3.1. EXAMINATION

- .1 Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering existing Work, assess conditions affecting performance of work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.

3.2. PREPARATION

- .1 Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of the Project from damage.
- .2 Provide protection from elements for areas which may be exposed by uncovering work.
- .3 Maintain excavations free of water.

3.3. CUTTING

- .1 Execute cutting and fitting as needed to complete the Work. Prior to any cutting and or coring of concrete floors the contractor shall confirm the area is free of services or rebar. Notify the Consultant of any interferences.
- .2 Uncover work to install improperly sequenced work.
- .3 Remove and replace defective or non-conforming work.
- .4 Remove samples of installed work for testing for Hazardous materials.
- .5 Provide openings in the Work for penetration of mechanical and electrical work.
- .6 Employ experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- .7 Cut rigid materials using a masonry saw or core drill. Pneumatic tools are not allowed without prior approval.

- .8 Do all cutting, patching, and making good, to leave a finished condition and to make the several parts of the work come together properly. Coordinate work to keep cutting and patching to a minimum.
- .9 Make cuts with clean, true, smooth edges. Fit unit to tolerance established by test standard practice for applicable work. Make patches invisible in the final assembly.
- .10 Cutting shall be done in a manner to keep patching to minimum. Obtain Consultant's approval of method to be used to conceal new mechanical and electrical services before beginning cutting. Chasing of concrete surfaces is not permitted.
- .11 Cutting or coring of any structural concrete is to be reviewed and approved by the Consultant.
- .12 Do not endanger any work by cutting, digging or otherwise altering, and do not cut nor alter any load bearing element without written authorization by Consultant. Provide bracing, shoring and temporary supports as required to keep construction safely supported at all times
- .13 Any cost caused by omission or ill-timed work shall be borne by the party responsible thereof.
- .14 Regardless of which Section of work is responsible for any portion of cutting and patching, in each case tradesmen qualified in work being cut and patched shall be employed to ensure it is correctly done.

3.4. PATCHING

- .1 Execute patching to complement adjacent Work.
- .2 Fit Products together to integrate with other Work.
- .3 Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- .4 Employ original installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.
- .5 Restore work with new Products in accordance with requirements of Contract Documents.
- .6 Fit work with adequate support to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .7 At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with firestop material.
- .8 Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to the nearest intersection or natural break. For an assembly, refinish the entire unit.
- .9 Complete and tightly fit all construction to pipes, ducts and conduits which pass through construction to completely prevent the passage of air.

- .10 Patching and making good shall be done by trade specialists in material to be treated, and shall be made undetectable in finished work when viewed from a distance of 1.5m under normal lighting.

END OF SECTION

01 74 00 – Cleaning and Waste Management

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 Common Work by All Trades
- .2 This section describes requirements applicable to all Sections within Divisions 02 to 49.
- .3 Conduct cleaning and disposal operations to comply with local ordinances and environmental protection legislation.
- .4 Store volatile wastes in covered metal containers, and remove them from premises at the end of each working day.
- .5 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

2.0 PRODUCTS

2.1. CLEANING PRODUCTS

- .1 Cleaning Agents and Materials: Low VOC content wherever possible. The Consultant and the Board shall be notified prior to use of any exception.

3.0 EXECUTION

3.1. CLEANING DURING CONSTRUCTION

- .1 Maintain the Work in tidy condition, free from accumulation of waste products and debris, other than that caused by the Owner or other Contractors.
- .2 Remove waste material and debris from the work areas and deposit in a waste container at the end of each working day.
- .3 Vacuum clean interior areas prior to the start of finishing work. Maintain areas free of dust and other contaminants during finishing operations.
- .4 Individual Subcontractors are responsible for the daily clean-up and removal of debris related to, or generated by, their own work. The overall responsibility for project cleanliness rests with the Contractor.
- .5 The Contractor shall be responsible for snow removal within the construction area.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Wherever possible recycle materials

- .8 Containers:
 - .1 Provide adequate number and sizes of on-site garbage and recycling containers within designated work site as required for collection of waste materials and debris on a daily basis.
 - .2 Provide additional waste containers when the extent of work warrants.
 - .3 Provide and use clearly marked, separate bins for recycling.
- .9 Dispose of waste materials and debris at registered waste disposal and recycling facility.
- .10 Remove oily rags, waste and other hazardous substances from premises at close of each day, or more often when required.
- .11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

3.2. WASTE MANAGEMENT

- .1 Audit, separate and dispose of construction waste generated by new construction or by demolition of existing structures in whole or in part, in accordance with Ontario Regulations 102/94 and 103/94 made under the Environmental Protection Act.
- .2 Containers:
 - .1 Provide adequate number and sizes of on-site garbage and recycling containers within designated work site as required for collection of waste materials and debris on a daily basis.
 - .2 Provide additional waste containers when the extent of work warrants.
 - .3 Provide and use clearly marked, separate bins for recycling.
- .3 Fires, and burning of rubbish or waste on site is strictly prohibited.
- .4 Burying of rubbish or waste materials on site is strictly prohibited.
- .5 Disposal of waste or volatile materials such as mineral spirits, oil, gasoline or paint thinner into ground, waterways, or sewer systems is prohibited.
- .6 Empty waste containers on a regular basis to prevent contamination of site and adjacent properties by wind-blown dust or debris

3.3. PREPARATION FOR FINAL CLEANING

- .1 Prior to final cleaning the General Contractor shall:
 - .1 remove all surplus products, tools, construction machinery and equipment not required for the performance of remaining work, and thereafter remove any remaining materials, equipment, waste and debris,
 - .2 replace all filters installed on any equipment in operation in the area of work,

- .3 remove all paint spots or overspray from all affected surfaces, and

3.4. FINAL CLEANING PRIOR TO ACCEPTANCE: INTERIOR

- .1 Prior to applying for Substantial Performance of the Work, or, prior to Owner occupancy of the building or portion of the building affected by the Work, whichever comes first, conduct full and complete final cleaning operations for the areas to be occupied.
- .2 Final cleaning operations shall be performed by an experienced professional cleaning company, possessing equipment and personnel sufficient to perform full building cleaning operations. Contractors "broom cleaning" is not acceptable as a "Final Clean". The cleaning contractor shall:
 - .1 clean interiors of all millwork and surfaces of any furniture and equipment present,
 - .2 use only cleaning materials recommended by the manufacturer of the surface to be cleaned,
 - .3 remove all stains, spots, scuff marks, dirt, dust, remaining labels, adhesives or other surface imperfections,
 - .4 clean and polish all glass and mirrors and remove remaining manufacturer's and safety "X" labels,
 - .5 clean and polish all finished metal surfaces such as enamelled or stainless steel, chrome, aluminum, brass, and bronze,
 - .6 clean and polish all vitreous surfaces such as plumbing fixtures, ceramic tile, porcelain enamel, or other such materials,
 - .7 clean all ceramic tile surfaces in accordance with the manufacturer's instructions,
 - .8 vacuum, clean and dust behind grilles, louvres and screens,
 - .9 steam clean all unprotected carpets immediately prior occupancy by Owner, and
 - .10 clean all equipment and fixtures to a sanitary condition.
- .3 For any areas to be occupied after the owner's initial occupancy, provide full cleaning operations as outlined above prior to turning over to owner,
- .4 The Board's supplies and equipment must not be used for any cleaning operations including, but not limited to: garbage cans, mops, brooms, rags, ladders, chemicals etc.

3.5. FINAL CLEANING PRIOR TO ACCEPTANCE: EXTERIOR

- .1 For areas affected by construction final exterior cleaning operations shall be performed by the General Contractor or competent Subcontractor. Contractor's "broom cleaning" only is not acceptable.
- .2 Final exterior cleaning shall include:
 - .1 broom clean and wash exterior walkways, steps, and surfaces; rake clean other surfaces of grounds,
 - .2 remove dirt and other disfiguration from exterior surfaces,
 - .3 sweep and wash clean paved areas,
 - .4 replace filters of mechanical equipment for all equipment that was in use during construction,
 - .5 clean all roofs, gutters, downspouts, areaways, drywells, and drainage systems,
 - .6 remove debris and surplus materials from crawl areas and other accessible concealed spaces.
 - .7 remove overspray

END OF SECTION

01 78 10 – Closeout Submittals and Requirements

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 Section 01 78 10 – WRDSB Warranty Card, Appendix 00 41 13A

1.2. TAKE-OVER PROCEDURES

- .1 Take over procedures will be in strict accordance with the requirements as set out in this Section.

1.3. SUBSTANTIAL PERFORMANCE

- .1 Prior to requesting a Substantial Performance deficiency inspection submit 2 hard copies, 1 digital copy of the Operating and Maintenance Manuals for Consultants approval.
- .2 Application for Substantial Performance must include.
 - .1 One (1) electronic copy of inspection and acceptance certificates required from regulatory agencies, including but not limited to.
 - .1 Certificates of Approval of the Work by the local Building Department.
 - .2 Electrical Inspection Certificate of Inspection.
 - .3 Fire Alarm Verification Certificate.
- .3 Advise Consultant in writing, when the project has been substantially completed. If Consultant agrees this stage has been reached, the Consultant shall prepare a complete list of deficiencies and submit copies of this list to Contractor and the Board.

1.4. COMMENCEMENT OF LIEN PERIODS

- .1 The date of publication of the Certificate of Substantial Performance of the Work, provided to the contractor by the Consultant, shall be the date for commencement of the lien period.

1.5. TOTAL PERFORMANCE

- .1 Prior to requesting a final inspection submit written certificate that the following have been performed:
 - .1 Work has been completed and inspected for compliance with Contract Documents and is ready for final inspection
 - .2 Defects have been corrected and deficiencies have been completed.

- .3 Equipment and systems have been tested and are fully operational. Submit two copies of the balancing reports
- .4 Certificates required by the contractor have been submitted.
- .5 Operation of systems have been demonstrated to Owner's personnel.
- .6 Submit Record drawings.
- .7 Submit maintenance materials.
- .8 Provide certified site survey
- .2 When items noted above are completed, request final inspection of Work by consultant, and building inspector. If Work is deemed incomplete by Consultant, complete outstanding items and request re-inspection.

1.6. PAYMENT OF SUBSTANTIAL PERFORMANCE HOLDBACK

- .1 Prior to the release of lien holdback provide one copy of the following by the Contractor and each subcontractor:
 - .1 Statutory Declaration or Declaration of Last supply
 - .2 Workplace Safety and Insurance Board "Certificate of Clearance".
- .2 The Contractor shall submit an application for payment of the holdback amount.
- .3 After the receipt of an application for payment which will include a Statutory Declaration and WSIB Clearance from the, the Consultant will issue a certificate for payment of the holdback amount.

1.7. FINAL PAYMENT

- .1 When the Contractor considers final deficiencies and defects have been corrected and it appears requirements of Contract have been completed, make application for final payment.
- .2 When the Consultant finds the Contractor's application for final payment valid, the Consultant will issue a final certificate of payment
- .3 The Board reserves the right to charge the Contractor for school access card(s) that have not been returned.
- .4 The cost to reprogram or replace the card(s) access system is estimated at \$50.00 (fifty dollars) for each card issued, \$30.00 (thirty dollars) for each keybox key, plus \$35.00 (thirty five dollars) administration fee.

1.8. CLOSEOUT SUBMITTALS

- .1 Prepare instructions and data using personnel experienced in maintenance and operation of described products and submit them to the Consultant for review.
- .2 Copy will be returned to the contractor with the Consultant's comments.

- .3 Revise content of documents as required prior to final submission.
- .4 Two (2) weeks prior to Substantial Performance of the Work, submit to the Consultant, the final copies of operating and maintenance manuals.
- .5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
- .6 If requested, furnish evidence as to type, source and quality of products provided.
- .7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .8 Pay costs of transportation.

1.9. OPERATION AND MAINTENANCE MANUAL FORMAT

- .1 Provide two copies of operating and maintenance data, prepared on 215 X 280mm sheets in printed or typewritten form, contained in 3-ring binders with soft vinyl covers for materials and equipment which require special maintenance or operating procedures.
- .2 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder at the front of each volume.
- .3 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .4 Arrange content by the divisions of the specifications under Section numbers and sequence of Table of Contents.
- .5 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .6 Include the following in each manual:
 - .1 Complete list of subcontractors and suppliers, their addresses and telephone numbers. Provide 24 hour emergency telephone numbers for such subcontractors as Plumbing, Electrical, Sprinklers, Fire System, Heating, etc.
 - .2 Specified warranties for contractor, each subcontractor and supplier.
 - .3 WRDSB Project Asset and Warranty Card, Appendix 00 41 13A
 - .4 Copy of finish hardware list, complete with all amendments and revisions and lock manufacturer's descriptive and service literature.
 - .5 Schedule of paints and coatings. Include sufficient explanation to fully identify each surface with the applicable paint or coating used. Enclose a copy of the colour schedule.
 - .6 Maintenance instructions for finished surfaces.
 - .7 Brochures, cuts of equipment and fixtures.

- .8 Operating and maintenance instructions for equipment.
- .9 Submit copies of letters from manufacturers of equipment and systems indicating their technical representatives have inspected and tested systems and are satisfied with methods of installation, connection and operations. These letters shall state names of persons present at testing, methods used and list of functions performed.
- .10 Submit one complete set of reviewed shop drawings of architectural, structural, mechanical and electrical items, folded to 215 x 280mm size, contained in heavy duty manila envelopes, numbered and labelled. Follow specification format with no more than one Section per envelope, hard copy and PDF.
- .11 Relevant certificates issued by authorities having jurisdiction
- .12 Computer disc or flash drive with all the above documentation in PDF format

1.10. RECORDING ACTUAL SITE CONDITIONS

- .1 Record information on a set of black line opaque drawings, and within the Project Manual.
- .2 Annotate with coloured felt tip marking pens, maintaining separate colours for each major system, for recording changed information.
- .3 Record information concurrently with construction progress. Do not conceal Work of the Project until required information is accurately recorded.
- .4 Contract drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 References to related shop drawings and modifications.
- .5 Specifications: legibly mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.

- .6 Other Documents: Maintain warranties, test reports and samples required by individual specifications sections.

1.11. RECORD (AS-BUILT) DOCUMENTS AND SAMPLES

- .1 Store AS-BUILT documents and samples in the field office apart from documents used for construction. Provide files, racks, and secure storage.
- .2 Label AS-BUILT documents and file in accordance with section number listings in List of Contents of the Project Manual. Label each document AS-BUILT DOCUMENTS in neat, large, printed letters.
- .3 Maintain AS-BUILT documents in clean, dry and legible condition. Do not use as-built documents for construction purposes.
- .4 Keep as-built documents and samples available for inspection by the Consultant.

1.12. RECORD DRAWINGS

- .1 Prior to Substantial Performance of the Work, update the marked up information from the AS-BUILT documents to a master set of drawing.
- .2 Submit one set of completed AS-BUILT documents to the Consultant for review.
- .3 Documents will be returned to the contractor with the Consultant's comments.
- .4 Revise content of documents as required prior to final submission.
- .5 After the review is completed resubmit to the Consultant for Consultant to produce electronic record drawings for the owner to use.

1.13. SPARE PARTS

- .1 Provide spare parts, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in the Maintenance Manual.
- .4 Obtain receipt for delivered products and submit prior to final payment.

1.14. REPLACEMENT (MAINTENANCE) MATERIALS

- .1 Deliver to site, unload and store where directed, replacement (maintenance) materials as required elsewhere in these Specifications. Obtain a signed receipt from the Owner's Representative for delivered materials and include a copy of receipt in Operation and Maintenance manuals.
- .2 Package materials so they are protected from damage and loss of essential properties.
- .3 Label packaged materials for proper identification of contents.

1.15. SPECIAL TOOLS

- .1 Provide special tools, in quantities specified in the individual specification section.
- .2 Provide items with tags identifying their associated function and equipment.
- .3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual

1.16. FINAL SITE SURVEY

- .1 Submit final site survey certificate in accordance with Section 01 70 00, certifying that elevations and locations of completed Work are in conformance Contract Documents.

1.17. WARRANTIES AND BONDS

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .3 Except for items put into use with Owner's permission, leave the date of beginning of time of warranty until the Date of Substantial Performance is determined. The date of Substantial Performance of the Work shall be the date for commencement of the warranty period.
- .4 Verify that documents are in proper form, contain full information, and are notarized.
- .5 Co-execute submittals when required.
- .6 Retain warranties and bonds until time specified for submittals.

END OF SECTION

01 78 40 – Maintenance Requirements

1.0 GENERAL

1.1. SECTION INCLUDES

- .1 Equipment and systems.
- .2 Materials and finishes.
- .3 Spare parts
- .4 Maintenance manuals.
- .5 Special tools.
- .6 Storage, handling and protection.
- .7 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.2. RELATED SECTIONS

- .1 Section 01 45 00 - Quality Control.
- .2 Section 01 78 40 – Maintenance Requirements.
- .3 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3. EQUIPMENT AND SYSTEMS

- .1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for troubleshooting; 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 SUBMITTAL PROCEDURES

.1 Refer to 01 33 00 for submittal procedures.

1.2 SHOP DRAWINGS SCHEDULE

SHOP DRAWINGS SCHEDULE				
SPECIFICATION SECTION	EQUIPMENT	DUE DATE	DATE SUBMITTED	REVIEWED
23 05 00 Common Work Results for HVAC	Interference Drawings			
	Access Doors			
	Vibration Isolation			
	Expansion Fittings			
	Hangers and Supports			
	TAB Instrument Certification			
23 07 00 HVAC Insulation	Insulation			
	Technical Data			
	Covering Technical Data			
	PVC Finishing Covering Colour Selections			
	Material Safety Data Sheets for Sealants and Coatings			
23 20 00 HVAC Piping and Pumps	Valves			
	Strainers			
	Thermometers			
	Pressure Gauges			
	Expansion Tanks			
	Air Eliminators			
	Pumps			
23 25 00 HVAC Water Treatment	Condensate Pump Sets			
	Materials Safety Data Sheets for Water Treatment Chemicals			
	Flushing Procedures			
23 30 00 HVAC Air Distribution	Cleaning Procedures			
	Material Safety Data			

SHOP DRAWINGS SCHEDULE				
SPECIFICATION SECTION	EQUIPMENT	DUE DATE	DATE SUBMITTED	REVIEWED
	Sheets for Sealants			
	GRD (grilles, registers, and diffusers)			
	Flexible Ductwork			
23 40 00 HVAC Air Cleaning Devices	Filters			
23 80 00 Decentralized HVAC Equipment	Water-source Heat Pumps			
	Condensate Pumps			

1.3 CLOSEOUT SUBMITTAL SCHEDULE

- .1 Refer to specification Section 01 78 39 for project record document requirements.

CLOSEOUT SUBMITTAL SCHEDULE		
SUBMITTAL	DATE SUBMITTED	REVIEWED
Balancing Report		
O&M Manual		
Record Drawings		

END OF SECTION

1 GENERAL

1.1 SUBMITTAL PROCEDURES

.1 Refer to 01 33 00 for submittal procedures.

1.2 SHOP DRAWINGS SCHEDULE

Electrical				
SPECIFICATION SECTION	EQUIPMENT	DUE DATE	DATE SUBMITTED	REVIEWED
26 05 19 Wire and Cable	Building Wires			
	Armoured Cable			
	Aluminum Sheathed Cable			
	Tech Cable			
	Non-Metallic Sheathed Cable			
	Mineral Insulated Cables			
	Fire Alarm Cables			
	Low Voltage Wiring			
26 05 33 Raceway and Boxes For Electrical Systems	Conduit, Connectors and Fittings			
	Rigid metal Conduit			
	E.M.T			
	Flexible Conduit			

Electrical				
SPECIFICATION SECTION	EQUIPMENT	DUE DATE	DATE SUBMITTED	REVIEWED
	Rigid P.V.C			
	Outlet Boxes			
	Rigid Metal Expansion Joint			
	Rigid P.V.C Expansion joint			
26 05 39 Underfloor Raceways For Electrical Systems	Underfloor Ducts			
	Services Fittings			
26 05 73 Coordination Study	Coordination Study			
26 05 76 Arch-Flash	Arc-Flash Study			
26 09 00 Instrumentation and Control For Electrical Systems	Modular Relay Panel			
	Switches			
	Relay Panel			
	Relays			
	PLC Control Panel			
	Meters			
	Transmitter			
	HMI			

Electrical				
SPECIFICATION SECTION	EQUIPMENT	DUE DATE	DATE SUBMITTED	REVIEWED
	Sensors			
	Valves			
	PC/Software			
	Analyzer			
26 09 01 Low Voltage Lighting Control System	Control Panel			
	Dimming/ Relay			
	System Software			
	Sensors/Wiring Devices			
	Training/Commissioning			
26 09 23 Occupancy Sensors	Sensors			
26 10 00 medium-Voltage Electrical Distribution	Primary Service Components			
	Primary Service Switchgears			
	Padmount Medium Voltage Transformer			
	Primary Service Substation			

Electrical				
SPECIFICATION SECTION	EQUIPMENT	DUE DATE	DATE SUBMITTED	REVIEWED
26 20 00 Low Voltage Electrical Equipment	Indoor Ventilation metal Enclosed Unit SubStation			
	Primary Main Switch Cubicle			
	Dry Type Power Transformer Cubicle			
	Secondary Main/metering/Distribution Cubicle			
	Air Circuit Breaker			
	Meter Cabinets			
	26 22 00 Low-Voltage Transformers	Dry Type Transformers		
Super Isolation Transformers				
Electrostatic Shielded Transformers				
Control Transformers				
26 24 19 Motor Control Centres	Motor Control Centre			
	Variable Speed Drives			
	Motor Starters			

Electrical				
SPECIFICATION SECTION	EQUIPMENT	DUE DATE	DATE SUBMITTED	REVIEWED
	Control Indicating Devices			
	Remote Control Stations			
26 25 00 Enclosed Bus Assemblies	Duct Housing			
	BusDuct			
	Bus plugs			
26 27 00 Low voltage Distribution Equipment	Pre-tendered Equipment			
	Switchboard			
	Switchboard Main Disconnecting device			
	Switchboard Customer Meter Centre			
	Switchboard Circuit Breakers			
	Distribution Panels			
	Variable Speed Drives			
	Circuit Breaker Panelboards			
	Disconnect Switches			
	Motor Starters			

Electrical				
SPECIFICATION SECTION	EQUIPMENT	DUE DATE	DATE SUBMITTED	REVIEWED
	Contactors			
	Relays			
	Fuses			
26 27 26 Wiring Device	Wiring Devices			
	Individual Light Dimmers			
	Interval Timers			
	Occupancy Sensors			
	Cover Plates			
	Photocells			
	Floor Boxes			
26 32 00 Packaged Generator Assemblies	Engine-Generator Set			
	Engine Cooling System			
	Engine Exhaust System			
	Engine Full System			
	Alternator			
	Engine-Generator Control			

Electrical				
SPECIFICATION SECTION	EQUIPMENT	DUE DATE	DATE SUBMITTED	REVIEWED
	Auxiliary Equipment			
	Automatic Transfer Switch			
26 33 53 Static Uninterruptable Power Systems	Performance Specifications			
	Electrical Specifications			
	Mechanical Specifications			
	Major Components Description			
26 36 00 Transfer Switches	Automatic Transfer Switch			
24 43 00 Transient Voltage Suppression	Surge Suppressors			
26 50 00 Lighting	General Fixtures			
	T8 Lamp Ballasts			
	Dimming Ballasts			
	Compact Fluorescent Ballast			
	HID Ballast			
	Lamps			
	Lenses			

Electrical				
SPECIFICATION SECTION	EQUIPMENT	DUE DATE	DATE SUBMITTED	REVIEWED
	Lighting Track			
	Accessory Products			
	Source Quality Control			
	LED Fixtures And Drives			
	Fibre Optic Lighting System			
26 52 00 Emergency Lighting	System Component Number and Dimensions			
	System Operating Characteristics and Functions			
	Rough-in Details			
	Wiring Schematics			
26 60 00 Miscellaneous Equipment And Appliances	Battery Clocks			
	Service Poles			
	Electric Heating Units			
	Floor Boxes			
	Heat Tracing			

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the Instructions to Bidders, the General Conditions of the Contract, the Supplementary Conditions and the General Requirements of Division 1.
- .2 Report in writing to the General Contractor any defects of surfaces or work prepared by other Sections which affect the quality or dimensions of the Work. Commencement of work implies acceptance of existing conditions and work by others.

1.2 SECTION INCLUDES

- .1 Rough Carpentry, including:
 - .1 Wood nailers and blocking.
 - .2 Wood strapping on interior and exterior walls.
 - .3 Wood furring.
 - .4 Hardware for anchoring rough carpentry to masonry, concrete, steel, etc.
 - .5 Plywood backboards for electrical equipment.

1.3 RELATED SECTIONS

- .1 Section 06 20 00 – Finish Carpentry.

1.4 REFERENCES

- .1 CSA B111-1974 (R2003): Wire Nails, Spikes and Staples.
- .2 CSA O80 Series-97 (R2002): Wood Preservation.
- .3 CAN/CSA-O86-01: Engineering Design in Wood.
- .4 CSA O121-M1978 (R2003): Douglas Fir Plywood
- .5 CSA O141-05: Softwood Lumber.
- .6 CSA O151-04: Canadian Softwood Plywood.
- .7 CSA O437 Series-93 (R2001): Waferboard and Strandboard.
- .8 National Lumber Grades Authority: Standard Grading Rules for Canadian Lumber.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 61 00.
- .2 Store Products under waterproof cover both in transit and at the Place of the Work in such a manner as to prevent damage to other materials, to any existing building or property or to the Work.

- .3 Co-ordinate delivery schedule of Products with Suppliers.

2 PRODUCTS

2.1 MATERIALS

- .1 Lumber: well seasoned stock, free from shakes, splits, dry rot, mildew or other defects which would impair strength and durability; SPF species, NLGA No. 2 and Better Grade Mix; S-Dry; sizes as indicated on Drawings.
- .2 Blocking: shall be non-wood material, structural sound and suitable to installation of new windows. Mold and moisture resistant, waterproof material such as acrylic or nylon
- .3 Plywood Sheathing: DFP to CSA 0121, Grade "C" veneer; laminated using waterproof glue; thicknesses as indicated on Drawings; exterior grade for exterior applications.
- .4 Nails: to CSA B111, Type 304 or 316 stainless steel, common wire type for general use and spiral type for structural connections.
- .5 Anchors: toggle bolt type for anchorage to hollow masonry, expansion shield and lag bolt type for anchorage to solid masonry or concrete, or bolts or ballistic fasteners for anchorages to steel.
- .6 Mineral Fibre Wool Insulation: by Roxul or Fibrex.

2.2 SHOP-TREATMENT OF WOOD

- .1 Wood Preservative - Pressure Treatment: to CSA O80; using alkaline copper quaternary (ACQ) preservative.
- .2 Wood Preservative - Surface Application: to CSA O80, brush-applied.

3 EXECUTION

3.1 CO-OPERATION WITH OTHER TRADES

- .1 Give sufficient notice to Section 09 90 00 so that untreated or unprimed carpentry items or material can be primed immediately upon delivery to the Place of the Work.
- .2 Supply fastenings with installation locations and necessary templates to other trades to which wood is to be secured.

3.2 SITE-APPLIED WOOD PRESERVATIVE

- .1 Treat wood nailers, blocking, wood sills, etc. in contact with concrete or masonry with green Pentox to ensure full protection against rot and decay.
- .2 Apply two coats of preservative to new surfaces when treated lumber is cut or sawn for fabrication or drilled and countersunk for bolts etc.
- .3 Treat all wood curbs and blocking for roof ventilators, Electrical and Mechanical equipment on the roof.

3.3 INSTALLATION

- .1 Erect wood framing members level and plumb. Place horizontal members laid flat, crown side up. Construct framing members full length without splices.

- .2 Install plywood to two-span continuous.
- .3 Provide wood blocking required for attachment of fitments and equipment by other Sections.
- .4 Provide 19 mm thick plywood backer board on wood blocking for mounting electrical equipment where indicated on Drawings.
- .5 Form corners by lapping side members alternately.
- .6 Coordinate work with installation of decking and support of decking at openings.
- .7 Provide mineral fibre wool insulation where required at curbs, parapets then in locations as shown on the architectural drawings and details.
- .8 Fastenings to solid masonry or concrete surfaces shall be with expansion shields and lag screws, unless otherwise specified, and to steel with bolts and nuts. Wood or inorganic fibre plugs shall not be permitted. Powder activated fasteners and staples shall not be used unless permitted by the <CP>.
- .9 Accurately fit all work to sit level and true and securely fastened.

3.4 FIELD QUALITY CONTROL

- .1 Defective materials or quality of work whenever found at any time prior to final acceptance of the work, shall be rejected.
- .2 Inspection will not relieve this Contractor of responsibility but is a precaution against oversight or errors.
- .3 Defective materials shall be removed and replaced by this Contractor at his own expense, and he shall be responsible for the cost of the work of other trades affected by this replacement.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the Instructions to Bidders, the General Conditions of the Contract, the Supplementary Conditions and the General Requirements of Division 1.
- .2 Report in writing to the General Contractor any defects of surfaces or work prepared by other Sections which affect the quality or dimensions of the Work. Commencement of work implies acceptance of existing conditions and work by others.

1.2 INTENT

- .1 Provide all articles, labour, materials, equipment, transportation, hoisting and incidentals noted, specified or required to complete the work of this Section.

1.3 SECTION INCLUDES

- .1 Finish Carpentry, including:
 - .1 Wood panelling and trim
 - .2 Accept delivery, store, and install the following:
 - (1) Hollow Metal Doors and Frames
 - (2) Finishing Hardware
 - (3) Interior Door Signs

1.4 RELATED SECTIONS

- .1 Section 06 10 00 – Rough Carpentry.
- .2 Section 08 11 00 - Metal Doors and Frames.
- .3 Section 08 70 00 – Hardware.
- .4 Section 09 90 00 – Painting and Coating.

1.5 REFERENCES

- .1 ANSI A208.1-99: Particleboard.
- .2 ANSI A208.2-2002: Medium Density Fiberboard.
- .3 ANSI / NEMA LD 3-2000: High Pressure Decorative Laminate.
- .4 Architectural Woodwork Manufacturers Association of Canada (AWMAC): Architectural Woodwork Quality Standards Illustrated.
- .5 CSA B111-1974 (R2003): Wire Nails, Spikes and Staples.
- .6 CSA O80 Series-97 (R2002): Wood Preservation.
- .7 CSA O115-M1982: Hardwood and Decorative Plywood.

- .8 CSA O121-M1978: Douglas Fir Plywood
- .9 CSA O141-05: Softwood Lumber.
- .10 CSA O151-04: Canadian Softwood Plywood.
- .11 CAN/CGSB-11.3-M87: Hardboard.
- .12 National Lumber Grades Authority: Standard Grading Rules for Canadian Lumber.

1.6 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Samples: as follows:
 - .1 Duplicate 300 x 300 mm (12" x 12") size, illustrating full panel sheet, edge trim, joint trim, and applied finish.
 - .2 Duplicate 300 mm (12") long, illustrating wood trim.

1.7 QUALITY ASSURANCE

- .1 Installer: company specializing in custom carpentry work with three years documented experience.
- .2 Perform finish carpentry to AWMAC Quality Standards, Custom grade.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 61 00.
- .2 Store Products under waterproof cover both in transit and at the Place of the Work in such a manner as to prevent damage to other materials, to any existing building or property or to the Work.
- .3 Co-ordinate delivery schedule of Products with Suppliers.

2 PRODUCTS

2.1 MATERIALS

- .1 Hardwood Plywood: to CSA O115-M, AWMAC Custom Grade, Architectural SEL TFappearance, lumber core material; of clear grain capable of receiving opaque finish.

2.2 ACCESSORIES

- .1 Contact Adhesives: water base type.
- .2 Wall Adhesive: solvent release, cartridge type, compatible with wall substrate, capable of achieving durable bond.
- .3 Nails: to CSA B111, size and type to suit application, plain finish.
- .4 Anchors: Toggle bolt type for anchorage to hollow masonry, expansion shield and lag bolt type for anchorage to solid masonry or concrete or bolts or ballistic fasteners for anchorage to steel.

- .5 Lumber for Shimming, Blocking, and Strapping: softwood lumber, as specified in Section 06 10 00.

2.3 SHOP-TREATMENT OF WOOD

- .1 Wood Preservative - Pressure Treatment: to CSA O80; using alkaline copper quaternary (ACQ) preservative.
- .2 Wood Preservative - Surface Application: to CSA O80, brush-applied.

3 EXECUTION

3.1 CO-OPERATION WITH OTHER TRADES

- .1 Give sufficient notice to Section 09 90 00 so that untreated or unprimed carpentry items or material can be primed immediately upon delivery to the Place of the Work.
- .2 Supply fastenings with installation locations and necessary templates to other trades to which wood is to be secured.

3.2 SITE-APPLIED WOOD PRESERVATIVE

- .1 Treat all wood nailers, blocking, wood sills, etc. in contact with concrete or masonry with surface applied wood preservative to ensure full protection against rot and decay.
- .2 Apply two coats of preservative to new surfaces when treated lumber is cut or sawn for fabrication or drilled and countersunk for bolts etc.

3.3 INSTALLATION

- .1 Install Products to AWMAC Custom Grade.
- .2 Set and secure materials and components in place, plumb and level.
- .3 Install components and trim with nails, screws, or bolts with blind fasteners at 400 mm OC; or wall adhesive by gun application as required by specific installation requirements.
- .4 Machine sand all exposed surfaces of finished woodwork to an even smooth surface ready for finishing; fit all joints and mitres accurately with nail heads set and ready for finishing.
- .5 Back out flat members of trim to prevent warping.
- .6 Hand sand all finished materials, after erection to remove roughness, machine marks or other blemishes.
- .7 Set exposed fasteners.
- .8 Apply wood filler in exposed fastener indentations.
- .9 Site Finishing: refer to Section 09 90 00.

3.4 MISCELLANEOUS INSTALLATIONS

- .1 Install finishing hardware, interior door signage and washroom accessories as specified in Section 08 70 00.

- .2 Install metal doors and frames as specified in Section 08 11 00.

3.5 FINISHING HARDWARE

- .1 Finishing hardware shall be supplied by the Hardware Supplier under the work of Section 08 70 00 and installed by this Contractor.
- .2 Mortise and neatly fit finishing hardware. Cut mortises straight and sharp without ragged edges and size accurately to accommodate the hardware. Where mortising and application have not been done in a first class workmanlike manner such work shall be replaced.
- .3 Install hardware in accordance with the manufacturer's recommendations.
- .4 Examine and adjust as required all doors and other moveable parts prior to completion of the building.
- .5 Hang doors 1½ pairs of butts, unless otherwise shown in the hardware list to be provided under Section 08 70 00. Neatly and accurately fit all finishing hardware.

3.6 HOLLOW METAL DOORS

- .1 Installation of hollow metal doors supplied under Section 08 11 00 shall be carried out by workmen skilled in this trade and done in strict accordance with the manufacturer's direction to produce a first class installation.
- .2 Hang doors so that they will operate freely, without tension or free swing.

3.7 HOLLOW METAL DOOR FRAMES

- .1 Set hollow metal frames, supplied under Section 08 11 00, plumb, square, level and at correct elevation. Brace solidly in position while being installed.
- .2 Provide a temporary horizontal wood spreader at the mid height of the door opening to ensure the frame remains plumb and true until surrounding partitions are complete.

3.8 FIELD QUALITY CONTROL

- .1 Defective materials or quality of work whenever found at any time prior to final acceptance of the work, shall be rejected. Inspection will not relieve this Contractor of responsibility but is a precaution against oversight or errors. Defective materials shall be removed and replaced by this Contractor at his own expense, and he shall be responsible for the cost of the work of other trades affected by this replacement.

3.9 CLEANING

- .1 Remove Kraft paper protective coating.
- .2 Visually inspect each installed item, wash, and polish thoroughly all surfaces and remove debris from work site and dispose.

3.10 PROTECTION

- .1 Protect exposed and finished woodwork after installation until Substantial Performance of the Work.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with Instructions to Bidders, the General Conditions of the Contract as amended by the Supplementary Conditions including all Sections outlined in Division 00 – Procurement and Contracting Requirements and Division 01 - General Requirements.
- .2 Report in writing to the Contractor any defects of surfaces or work prepared by other Sections which affect the quality or dimensions of the Work. Commencement of work implies acceptance of existing conditions and work by others.

1.2 SUMMARY

- .1 Section Includes: Provide all labour, materials, equipment, and services necessary for the complete and proper installation of the insulation Work throughout project except where specified by other including but not limited to:
 - .1 Rigid Insulation
 - .2 Semi-rigid Insulation
 - .3 Batt Insulation
 - .4 Loose Insulation
 - .5 Related accessories for installation
- .2 Related Sections The following description of work is included for reference only and shall not be presumed complete:
 - .1 Section 07 27 00 – Air Barrier Membrane
 - .2 Section 07 84 00 – Firestopping
 - .3 Section 07 92 00 – Joint Sealants
 - .4 Section 09 21 16 – Gypsum Board Assemblies
 - .5 Mechanical and Electrical Divisions

1.3 REFERENCES

- .1 Abbreviations and Acronyms:
 - .1 LTTR: Long Term Thermal Resistance.
 - .2 NRCC: National Research Council of Canada; www.nrc-cnrc.gc.ca
 - .3 OBC: Ontario Building Code.
 - .4 ULC: Underwriters Laboratories of Canada; www.ulc.ca
- .2 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section.

- .1 American (ASTM):
 - .1 ASTM C165 – Standard Test Method for Measuring Compressive Properties of Thermal Insulations
 - .2 ASTM C1303/C1303M – Standard Test Method for Predicting Long-Term Thermal Resistance of Closed Cell Foam Insulation
 - .3 ASTM C1338 – Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
 - .4 ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics
 - .5 ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials
 - .6 ASTM E96/E96M – Standard Test Methods for Water Vapor Transmission of Materials
 - .7 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
- .2 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-51.34 – Vapour Barrier, Polyethylene Sheet for Use in Building Construction
 - .2 CGSB 71-GP-24M - Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation
- .3 Underwriters Laboratory of Canada (ULC):
 - .1 CAN/ULC-S102 – Test Method of Surface Burning Characteristics of Building Materials and Assemblies
 - .2 CAN/ULC-S114 – Standard Method of Test for Determination of Non-Combustibility in Building Materials
 - .3 CAN/ULC-S701 – Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering
 - .4 CAN/ULC-S702 – Standard for Mineral Fibre Thermal Insulation for Buildings
 - .5 CAN/ULC-S704 – Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced
 - .6 CAN/ULC-S710.1 – Standard for Thermal Insulation - Bead Applied One-Component Polyurethane Air Sealant Foam, Part 1: Material Specification
 - .7 CAN/ULC-S710.2 – Standard for Thermal Insulation - Bead Applied One-Component Polyurethane Air Sealant Foam, Part 2: Application
 - .8 CAN/ULC-S711.1 – Standard for Thermal Insulation - Bead Applied Two-Component Polyurethane Air Sealant Foam, Part 1: Material Specification
 - .9 CAN/ULC-S711.2 – Standard for Thermal Insulation - Bead Applied Two-Component Polyurethane Air Sealant Foam, Part 2: Application
 - .10 CAN/ULC-S770 – Standard Test Method for Determination of Long-Term Thermal Resistance of Closed Cell Thermal Insulating Foams
- .4 Provincial and Federal Building Codes as applicable.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordination under this Section shall be in accordance with General Conditions and Division 01.
 - .2 Coordinate with other work having a direct bearing on the Work of this Section.
 - .3 Coordinate installation of insulation with completion of other work requiring interface with insulation.

1.5 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittal Procedures.
- .2 Product Data:
 - .1 Include product characteristics and limitations. Identify dissolving solvents, fuels and potential destructive compounds. Include WHMIS safety data sheets for reference on Site.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Manufacturer's:
 - .1 Manufacturer shall have experience having successfully manufactured and supplied products required for the Work of this Section for other projects of similar size and complexity.
 - .2 Installer's:
 - .1 A manufacturer-approved firm with experience in installation of specified products in successful use on similar projects, employing workers trained by manufacturer, including a full-time on-site supervisor with experience installing similar work.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and acceptance requirements:
 - .1 Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- .2 Storage and handling procedures:
 - .1 Handle and store materials in a clean, dry area in accordance with manufacturer's written instructions in a weather protected environment, clear of ground and moisture, within temperature ranges recommended by materials manufacturer.
 - .2 Store materials in manner to prevent damage to other materials, to any existing building or property, and to the Work.
 - .3 Store Products to avoid disruption in the progress of the Work.
 - .4 Store materials in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

1.8 PROJECT CONDITIONS

- .1 Ambient Conditions:
 - .1 Maintain ambient and substrate temperatures during application and curing of adhesive at temperature limits established by the manufacturer of adhesive

.2 Existing Conditions:

- .1 Ensure substrate is ready to receive insulation system. Proceed with installation only when the substrate construction and preparation work is complete.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

- .1 CertainTeed Corporation; www.certainteed.com
.2 Dow Chemical Canada Inc.; www.dow.com
.3 Johns Manville.; www.jm.com
.4 Rockwool International.; www.rockwool.com
.5 Thermafiber Inc.; www.thermafiber.ca

- .2 Single source responsibility: Obtain each type of insulation from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

- .1 Rigid and Semi-Rigid Stone Wool Board Insulation:

- .1 Stone wool rigid or semi-rigid board insulation a minimum nominal density of 64 kg/m³ (4 pcf). Ensure deformation of rigid board does not exceed 10% when tested at 1.2 kPa (25 psf) in accordance with CAN/ULC-S702, Type 1 and ASTM C165.
.2 Thickness as indicated on Drawings.
.3 LTR shall be minimum RSI (R) value or 0.704 (4.0) per 25mm (1").
.4 Products:
.1 "CurtainRock" by Rockwool International A/S.
.2 "FireSpan 40" by Thermafiber.
.3 "JM CladStone" by Johns Manville

- .2 Batt Insulation:

- .1 Insulation to CAN/ULC S702 Type 1; preformed glass fibre batt min 20 % recycled content; friction fit, conforming to the following:
.1 Thermal Resistance: minimum RSI of 2.1 per 100 mm.
.2 Batt Size: 400 mm x 1220 mm & 610 mm x 1220 mm to suit framing
.3 Facing: Unfaced.
.4 Flame/Smoke Properties: 10 / 10 in accordance with ASTM E84.
.5 Thicknesses as shown on Drawings.

.2 Products:

- .1 "EcoTouch Pink" by Owens Corning
- .2 Equivalents by listed manufacturers

.3 Foam in Place Polyurethane Foam Insulation:

- .1 One-component foam, slow rise, Compressive Strength: 34 kPa (5 psi), Shear Strength: 83 kPa (12 psi); Closed Cell ULC classified sealant for insulating, sealing, bonding, filling, preventing air infiltration. Ensure 1 component foams meet CAN/ULC-S102 flame spread requirements for caulks and sealants, flame Spread 25, cure in place within 24 hours to densities between 16.02 to 32.04 kg/m³ (1.0 to 2.0 lb/cu ft) and carry R-value of 0.03 w/m•k (4 to 5 per inch). Cured foam can be trimmed, sanded and/or painted.

2.3 ACCESSORIES

.1 Insulation Adhesives:

- .1 As recommended by insulation manufacturer.

.2 For polystyrene rigid insulation: Polymer modified liquid applied membrane, compatible with insulation, type manufactured for the attachment of insulation. Acceptable product: 230-21 by Henry Company Canada.

.3 Mechanical Fasteners:

- .1 Insulation Clips: Impale type, perforated 50 mm x 50 mm (2" x 2") cold rolled steel adhesive back, spindle of length to suit insulation plus 25 mm (1") with speed washers. Acceptable Product: "Self-Stick Insul-Anchors" by Continental Studwelding Ltd.; www.constud.ca.

.4 Strip Impalement Clips: 25 mm (1") wide strip of "Insul Hold Clips" by Insul Hold Canada Ltd., fabricated from galvanized sheet in rolls with punch out insulation securement arrows.

.5 Nails: Galvanized steel, length 25 mm (1") longer than insulation thickness.

.6 Staples: Galvanized wire, 13 mm (1/2") minimum.

3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions:

- .1 Examine all work of other Sections upon which the Work of this Section depends.
- .2 Report in writing to the Contractor any defects of surfaces or work prepared by other Sections which affect the quality or dimensions of the Work of this Section.
- .3 Do not proceed with Work of this Section until all unsatisfactory conditions have been rectified and site conditions are ready to receive work.
- .4 Commencement of work implies acceptance of existing conditions and work by others.

3.2 INSTALLATION

- .1 Install materials in accordance with manufacturer's written instructions.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces as indicated on Drawings.
- .3 Fit insulation tight to electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other projections or openings.
- .4 Install attachment at rate as required to prevent displacement of insulation during and after construction operations.
- .5 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation panels free from ripped backs or chipped or broken edges. Ensure integrity and continuity of insulation at juncture with different types of materials and seal in acceptable manner. Stagger joints in row.
- .6 Ensure continuity of insulation at juncture with different materials and seal with compatible materials acceptable to the manufacturer.
- .7 Do not cover insulation and air/vapour barrier installed under this Section or other Sections until it has been reviewed by Project Manager.
- .8 Below grade insulation:
 - .1 Horizontal surfaces: Loose lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation boards.
 - .2 Vertical surfaces: Adhere insulation boards on surfaces, set in manufacturer recommended adhesive. Apply adhesive at rate as per manufacturer's written instructions. Butter edges of boards and fit tightly to form continuous seal.

3.3 FIELD QUALITY CONTROL

- .1 Non-Conforming Work:
 - .1 Defective materials or quality of work whenever found at any time prior to final acceptance of the work shall be rejected regardless of previous inspection. Inspection will not relieve responsibility but is a precaution against oversight and error.
 - .2 Remove and replace defective materials and work of other trades affected by this replacement, at no additional cost to the Owner.

3.4 CLEANING

- .1 Clean work area daily in accordance with Section 01 74 00.
- .2 Remove all excess materials from site as Work proceeds and at completion.
- .3 On completion of the Work remove all tools, containers, surplus materials, equipment, waste, etc., and leave Site neat, clean and tidy satisfactory to the Owner.
- .4 Clean and make good surfaces soiled or otherwise damaged as a result of Work of this Section at no additional cost to the Owner. Leave surfaces clean and ready for subsequent Work.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the Instructions to Bidders, the General Conditions of the Contract, the Supplementary Conditions and the General Requirements of Division 1.
- .2 Report in writing to the General Contractor any defects of surfaces or work prepared by other Sections which affect the quality or dimensions of the Work. Commencement of work implies acceptance of existing conditions and work by others.

1.2 SECTION INCLUDES

- .1 Joint Sealants.

1.3 RELATED SECTIONS

- .1 Section 08 11 00 – Metal Doors and Frames: sealants used in conjunction with hollow metal frames.
- .2 Section 09 21 16 - Gypsum Board Assemblies: acoustical sealants.
- .3 Section 09 51 00 - Acoustical Ceilings: sealants used in conjunction with suspended metal ceiling systems.

1.4 REFERENCES

- .1 ASTM C920-05: Standard Specification for Elastomeric Joint Sealants.
- .2 CAN/CGSB-19.13-M87: Sealing Compound, One Component, Elastomeric, Chemical Curing.
- .3 CAN/CGSB-19.17-M90: One Component Acrylic Emulsion Base Sealing Compound.
- .4 CAN/CGSB-19.22-M89: Mildew Resistant Sealing Compound for Tubs and Tiles.
- .5 CAN/CGSB-19.24-M90: Multicomponent, Chemical Curing Sealing Compound.

1.5 SYSTEM DESCRIPTION

- .1 Remove sealant from existing joints indicated and clean joints.
- .2 Seal all areas indicated on Drawings, in list following and where required to make building watertight and weathertight:
 - .1 Both sides of hollow metal frames.
 - .2 Interior and exterior of aluminum door frames.
 - .3 All pipes, grilles and equipment passing through walls.
 - .4 Joint where two different materials abut.
 - .5 Firestopping at all penetrations through fire rated walls and floor assemblies with ULC approved systems.

.6 Acoustical sealants.

1.6 SUBMITTALS

- .1 Submit Product data and samples as specified in Section 01 33 00.
- .2 Submit manufacturers' test data as per Owner's Requirements.

QUALITY ASSURANCE

- .3 Applicator: a recognized specialized applicator having skilled mechanics, thoroughly trained and competent in all phases of caulking work, and a member in good standing of the Caulking Contractor's Association of Ontario.

1.7 PRE-CONSTRUCTION MEETING

- .1 Conduct a pre-construction meeting as per Owner's Requirements.
- .2 Representatives of the Consultant, Contractor, applicator, and sealant manufacturer(s) are to be in attendance.
- .3 Confirm prior to application that correct Products and methods are being used in specific instances.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 61 00.
- .2 Deliver and store Products in undamaged and original containers, with labels intact and showing the manufacturer's name, brand, colour, etc.
- .3 Ensure at time of use that Products are still within recommended shelf life.
- .4 Maintain storage area at a temperature in accordance with manufacturer's recommendations.

1.9 ENVIRONMENTAL CONDITIONS

- .1 Do not install solvent curing sealants in enclosed building spaces.
- .2 Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.10 WARRANTY

- .1 Submit extended warranties in accordance with the General Conditions of the Contract.
- .2 Extended System Warranty: for a period of 2 years, including coverage against delamination, cracking, running, loss of adhesion and cohesion, blistering, peeling, colour change and staining.
- .3 Extended Manufacturer Warranty: for a period of 10 years, including coverage against failure of the sealant material to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, maintain stability, or not cure.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 Manufacturers of joint sealants having Products considered acceptable for use:
 - .1 Canadian General Electric.
 - .2 CSL Silicones Inc.
 - .3 Dow Corning.
 - .4 PRC Chemicals.
 - .5 Sika Canada Inc.
 - .6 Tremco Canada.
- .2 Substitution Procedures: refer to Owner's Requirements.

2.2 MATERIALS

- .1 Sealant A: 2-part, polysulphide; CAN/CGSB-19.24-M, Type 2, Class B
- .2 Sealant B: (non-sag, for non-glazing) 2-part, polysulphide; CAN/CGSB-19.24-M, Type 2, Class A
- .3 Sealant C: (non-sag, for glazing) 1-part, acrylic emulsion latex CAN/CGSB-19.17-M.
- .4 Sealant D: 1-part, chemical curing, silicone CAN/CGSB-19.22-M
- .5 Sealant E: 1-part, moisture curing, polyurethane CAN/CGSB-19.13-M
- .6 Sealing Around Piping, Ductwork, Conduit, Etc. Passing Through Fire Rated Walls & Floors
 - .1 Sealant: One-part silicone elastomer.
 - (1) Pensil 851 by General Electric Silicones.
 - (2) Fire stop No. 2000 by Dow Corning.
 - (3) Fyre - Sil by Tremco.
 - (4) Fire stop by Hilti
- .7 Sealing Around Multiple Cables & Conduits Passing Through Fire Rated Walls & Floors
 - .1 Sealant: Two-part silicone elastomer.
 - (1) Fire stop foam No. 2001 by Dow Corning.
- .8 Acoustical Sealant
 - .1 Sealant: Blend of synthetic rubbers.
 - .2 Use: Acoustical sealants around perimeter of partitions and electrical boxes, panels, etc. & openings in partition systems requiring acoustical treatment in locations where heat pumps are located

- .3 Non-hardening acoustical sealant by Tremco.
- .9 Thinners and Primers: type compatible with appropriate sealant and substrate as recommended by manufacturer.
- .10 Cleaning material: As recommended by manufacturer.
- .11 Joint backing material: preformed, compressible, resilient, non-staining foam compatible with primers, sealants, outside 30%, polyethylene, extruded closed cell foam, Shore "A" hardness 20, tensile strength 20-30 psi, such as PRC Backer Rod or equal. Outside 50%, polyethylene, extruded open cell foam, Shore "A" hardness 10, tensile strength 140-150 psi, such as PRC open cell.
- .12 Bond breaker: where joint configuration does not allow for proper depth/width ratio with the use of backer rod (see Section 3.2.5.) - a pressure sensitive plastic tape such as 3M #226 or #481 which will not bond to the sealant shall be placed at the back of the joint.
- .13 Sealant Colours: as selected by consultant from manufacturers' standard colour range.

3 EXECUTION

3.1 EXAMINATION

- .1 Report to the Consultant, in writing, defects of surfaces or work prepared by other trades and unsatisfactory site conditions.
- .2 Commencement of work implies total acceptance of surface and site conditions.
- .3 Thoroughly examine surfaces scheduled to receive sealants to ensure that they are dry, clean, level; free from cracks, ridges, dusting, scaling, carbonation, mortar droppings, parging, curing compounds, rust, grease, oil, paint or other foreign material likely to impair adhesion, performance or appearance.
- .4 Test substrate for adhesion and staining if any doubt exists.
- .5 Verify at the site that joints and surfaces have been provided as specified under the work of other sections; and that joint conditions will not adversely affect execution, performance or quality of completed work; and that they can put into acceptable condition by means of preparation specified in this section.
- .6 Ascertain that sealers and coatings applied to sealant substrates are compatible with sealant used and that full bond between the sealant and substrate is attained.
- .7 Request samples of the sealed or coated substrate from their fabricators for testing of compatibility and bond if necessary.
- .8 Verify that specified environmental conditions are ensured before commencing work.
- .9 Ensure that releasing agents, coating or other treatments have either not been applied to joint surfaces or that they are entirely removed.
- .10 Defective work resulting from application to unsatisfactory joint conditions will be considered the responsibility of those performing the work of this section.
- .11 Protect adjacent Products from damage, and make good any resulting damage in accordance with the Contract Documents.

3.2 PREPARATION

- .1 Remove dust, paint, loose mortar and other foreign matter and dry joint surfaces.
- .2 Remove dust, silt, scale and coating from ferrous metals by wire brush, grinding or sandblasting.
- .3 Remove oil, grease and other coating from non-ferrous metals.
- .4 Prepare concrete, masonry, glazed and vitreous surfaces as recommended by sealant manufacturer.
- .5 Examine joint sizes and modify to achieve proper width-to-depth ratio.
- .6 For joints wider than 50 mm (2"), contact sealant manufacturer's representative for recommendations.
- .7 Install backer rod or apply bond breaker tape to achieve correct joint configuration.
- .8 Where necessary to prevent staining, mask adjacent surfaces with tape prior to priming and application of sealant.
- .9 Prime sides of joint in accordance with manufacturer's directions, immediately prior to sealing.
- .10 Prior to application, test each sealant with proposed substrate for indications of staining or poor adhesion.
- .11 At locations where another surface will cover the sealed joint (e.g. cove base) ensure the sealant is finished flush with adjacent surfaces.

3.3 QUALITY OF WORK

- .1 Quality of work shall be in accordance with good practice and in strict compliance with the recommendations of the manufacturer of materials being used.
- .2 Check work area for adequate light and heat.
- .3 Carefully mask adjacent surfaces, materials and items not scheduled to receive sealant, taking care to see that masking remains intact until application is complete. Remove masking immediately upon completion of caulking.
- .4 Do not apply sealant to substrate until thoroughly cured and dried.

3.4 APPLICATION

- .1 Prime sides of joints before placing joint backing. Use bond breaker where joint backing not required.
- .2 Mix and apply sealant in strict accordance with manufacturer's directions and under supervision of manufacturer's field representative.
- .3 Sealants shall be of gun grade or knife grade consistency to suit joint condition.
- .4 Apply sealants in accordance with manufacturer's directions, using a gun with proper size nozzle. Use sufficient pressure to fill voids and joints solid, as indicated on Drawings.
- .5 Form surface of the sealant with full bead, smooth, free from ridges, wrinkles, sags, and embedded impurities. Neatly tool surface to a slight concave joint.

- .6 Clean adjacent surfaces immediately and leave work neat and clean. Remove excess and droppings using recommended cleaners as work progresses. Remove masking tape immediately after tooling of joints.
- .7 In masonry cavity construction with an air seal, vent sealed joints from cavity to beyond external face of wall.
- .8 Superficial pointing with the skin bead is not acceptable.
- .9 Provide test results of pull test performed by the manufacturer representative before completion of sealant work.
- .10 Promptly, as the work proceeds and upon completion, clean-up and remove from the Place of the Work masking tapes, rubbish and surplus material.

3.5 SCHEDULE

- .1 Sealant A E:
 - .1 Masonry to metal
 - .2 Masonry to masonry
 - .3 Masonry to stucco
 - .4 Masonry to wood
 - .5 Metal to metal
 - .6 Wood to stucco
- .2 Sealant B:
 - .1 Glass to all materials
- .3 Sealant C E:
 - .1 Gypsum board to gypsum board
 - .2 Gypsum board to wood
- .4 Sealant D:
 - .1 Plumbing fixtures to wall and floor surfaces

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the Instructions to Bidders, the General Conditions of the Contract, the Supplementary Conditions and the General Requirements of Division 1.
- .2 Report in writing to the General Contractor any defects of surfaces or work prepared by other Sections which affect the quality or dimensions of the Work. Commencement of work implies acceptance of existing conditions and work by others.

1.2 SECTION INCLUDES

- .1 Supply only of:
 - .1 Steel Frame Products including frames, transom frames (glazed or panelled), side light and window assemblies, fire labelled and non-labelled as indicated on drawings and door schedule.
 - .2 Steel doors, swing type, flush, glazed or louvred, fire labelled, with or without temperature rise ratings, and non-labelled as indicated on drawings and door schedule.
- .2 Provide:
 - .1 Steel frame products including frames, transom frames (glazed or panelled), sidelight and window assemblies, fire labelled and non-labelled as indicated on drawings and door schedule.

1.3 RELATED WORK NOT INCLUDED IN THIS SECTION

- .1 Section 06 20 00 – Finish Carpentry: Installation of frames, doors, surface mounted hardware and finishing hardware.
- .2 Section 07 92 00 – Joint Sealants: sealing joints between frames and other building components.
- .3 Section 08 70 00 – Hardware: Supply of finishing hardware.
- .4 Section 09 21 16 - Gypsum Board Assemblies: Gypsum board partitions.
- .5 Section 09 90 00 – Painting and Coating.

1.4 REFERENCES

- .1 ASTM A568/A568M-06a: Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
- .2 ASTM A653/A653M-03: Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .3 CAN/CGSB-1.181-99: Ready-Mixed Organic Zinc-Rich Coating.
- .4 CGSB 41-GP-19Ma: Rigid Vinyl Extrusions for Windows and Doors.
- .5 CAN/CSA-G40.21-04: Structural Quality Steel.
- .6 NFPA 80-1999: Fire Doors and Windows.

- .7 CAN4-S104-M80: Fire Tests of Door Assemblies.

1.5 REGULATORY REQUIREMENTS

- .1 Install fire labelled steel doors and frames products to NFPA 80.

1.6 SHOP DRAWINGS

- .1 Submit shop drawings as per 01 33 00.
- .2 Shop Drawings: indicating type of door, material, steel core thickness, mortises, reinforcements and glazed openings and details. Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and in door schedule.

1.7 QUALITY ASSURANCE

- .1 Supply material manufactured to standards of Canadian Steel Door and Frame Manufacturers Association (CSDFMA) "Canadian Metric Guide for Steel Doors and Frames" (Modular Construction).
- .2 Fire rated doors frames glazing stops and fire door hardware shall bear U.L.C. labels. Refer to architectural drawings for location of fire rated assemblies. All hollow metal work in fire separations and fire walls shall be in accordance with NFPA 80 and CAN4-S104.

1.8 REJECTIONS

- .1 Defective materials whenever found at any time prior to final acceptance of the work shall be rejected regardless of previous site review. Site review will not relieve Contractor from responsibility but is a precaution against oversight and error.
- .2 Remove and replace defective materials and work of other trades affected by this replacement at no additional cost to the Owner.

1.9 WARRANTY

- .1 Materials and quality of work shall be warranted by Manufacturer in accordance with the CSDFMA members standard warranty for steel doors and frames.

2 PRODUCTS

2.1 MATERIALS

- .1 Doors
 - .1 Acceptable Materials: All and only steel doors and frames product manufactured by CSDFMA members are eligible for use on this project.
 - .2 Minimum requirements for fire doors are that individual manufacturer's proprietary designs must be successfully tested to CAN4-S104-M.
 - .3 Fire Rated Doors assembly and fire rated glazing stops, material and construction approved by ULC.

- .4 Interior Door Faces: 1.2 mm (18 gauge) base thickness as Commercial grade steel to ASTM A568, Class 1, hot-dip galvanized to ASTM A653, ZF75 (A25) coating designation, known commercially as "Colourbond", "Satincoat" or "Galvanneal". Minimum base steel thickness shall be as per Table 1 / CSDFMA.
- .5 Cores for non-insulated interior doors: honeycomb structural core consisting of kraft paper having 20 mm (3/4") cell size to thickness indicated to ULC Guide 40U8.8.

.2 Frames

- .1 Frames: 1.6 mm (16 gauge) base thickness steel, zinc wipe coated steel for interior door frames and fully galvanized to Z275 (G90) for exterior door frames.
- .2 Frames shall be blanked, reinforced, drilled and tapped for mortised, templated hardware minimum steel thickness.
- .3 Mortised cutouts shall be protected with steel guard boxes minimum steel thickness 1.2 mm (18 Gauge).
- .4 Frames shall be reinforced, where required, for surface mounted hardware. Drilling and Hardware reinforcing minimum steel thickness 3.5 mm (10 Gauge), tapping is by others on site, at time of installation.
- .5 Provide for appropriate anchorage to floor and wall construction. Each wall anchor shall be located immediately above or below each hinge reinforcement on the hinge jamb and directly opposite on the strike jamb. For rebate opening heights up to and including 1520 mm (60") provide two anchors, and an additional anchor for each additional 760 mm (30") of height or fraction thereof, except as indicated below. Frames in previously placed concrete masonry or structural steel shall be provided with anchors located not more than 150 mm (6") from the top and bottom of each jamb, and intermediate anchors at 660 mm (26") on centre maximum. Minimum anchors steel thickness 1.6 mm (6 Gauge).
- .6 Each door opening shall be prepared for single grey or black stud neoprene door silencers, three for single door openings, and two for double door openings.
- .7 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
- .8 Fire labelled frame products shall be provided for those openings requiring fire protection ratings, as scheduled on the drawings. Such products shall be tested to <CAN4-S104-M> <ASTM E152> <NFPA 252> and listed by a nationally recognized agency having a factory inspection service and shall be constructed as detailed in Follow-Up Service Procedures / Factory Inspection Manuals issued by the listing agency to individual manufacturers.
- .9 Corrugated Steel Frame Tee Anchors: Thickness and design approved by ULC.
- .10 Glazing Stops in Fire Rated Frames: Commercial grade 1.5 mm (16 Gauge) sheet steel thickness and ULC approved design. All approved design.
- .11 Glazing Stops-Non-Fire Rated Doors and frames: Minimum 0.8 mm (20 gauge) base thickness sheet metal with zinc finish as per door, tamperproof on exterior doors, screw fixed on interior doors.
- .12 Reinforcing Channel: To CAN/CSA-G40.21, Type 300W.

.13 Primer: For touch up, rust inhibiting primer to CAN/CGSB-1.181.

2.2 DOOR GRILLES

- .1 Non-Rated Door Grille: 34.9 mm (1-3/8") deep Thinline High-Performance Air-Conditioning Louver, having a 58 percent free area; Model 1302 by Architectural Product Solutions; sizes as indicated on door schedule, refer to drawings.
 - Material: Material: 6063-T6 Alloy
 - Nominal Thickness (heads, sills, jambs, & mullions): 0.040" (1.02 mm)
 - Nominal Blade Thickness: 0.050" (1.27 mm)
 - Furnished With: Birdscreen: ½" (12.7mm) intercrimp aluminum mesh, 0.063" (1.60 mm) diameter wire removeable aluminum bird screen in an aluminum frame.

2.3 FABRICATION

- .1 Fabricate doors, panels, screens, and frames as detailed in accordance with Canadian Steel Door and Frame Manufacturers Association, "Specifications for Commercial Steel Doors and Frames", for insulated, hollow steel and honeycomb core construction, except where specified otherwise.
- .2 Fabricate fire rated doors and frames in accordance with details, approved shop drawings and ULC requirements at the time of printing.
- .3 Provide temperature rise doors where indicated in the door schedule, Doors shall have fire rated mineral cores as manufactured by RODIX or Georgian Pacific.
- .4 Stiffen interior doors with honeycomb core, laminated to face sheets under pressure. Insulate exterior doors, using manufacturer's recommended adhesive and pressure.
- .5 Fabricate interior doors and frames of wipe coat galvanized steel.
- .6 Fabricate interior steel frames in minimum thickness of 1.6 mm (16 gauge) thick sheet steel.
- .7 Fabricate exterior steel frames in minimum thickness of 1.6 mm (16 gauge) thick sheet steel. Fabricate exterior steel frames as thermally broken units where indicated.
- .8 Grind welded corners and joints to flat plane, fill with metallic paste filler and sand to uniform smooth finish.
- .9 Close tops of exterior doors with steel caps in minimum thickness 1.6 mm (16 gauge) so they are flush with face edges. Close top of interior doors with PVC caps.
- .10 Mortise, reinforce, drill, and tap doors and reinforcements to receive hardware using templates provided by finish hardware supplier.
- .11 Doors shall have edge seams mechanically interlocked, adhesive assisted. Seams may be unfilled and visible.
- .12 Make provision for glass where indicated and provide glazing stops.
- .13 Provide astragals for pairs of doors in accordance with ULC requirements.

- .14 Protect strike and hinge reinforcements using guard boxes welded to frames.
- .15 Weld in two channel spreaders per frame, to ensure proper frame alignment.
- .16 Provide for anchorage of frames to floors. Provide 1.6 mm (16 gauge) angle clips, with two holes for floor anchorage welded to frame.
- .17 Reinforce head of frames wider than 1200 mm (4' - 0").
- .18 Provide frames with manufacturer's proprietary anchorage system suitable to secure frame rigidly to wall assembly. Secure frames set into previously constructed concrete or masonry openings by countersunk expansion bolts at same centres as for adjustable Tee-anchors. Reinforce frame at fastening location to prevent indentation of frame by fastening device.
- .19 Construct rail and stile doors in same manner as flush doors.
- .20 Construct matching panels in same manner as doors.
- .21 Touch up galvanized doors and frames with primer where galvanized finish damaged during fabrication.
- .22 Chemically treat surfaces of plain steel doors and frames and apply one coat of primer.
- .23 Attach ULC labels to doors and frames requiring fire rating.
- .24 Install three bumpers on strike jamb for each single door and two bumpers at head for pairs of doors.

3 EXECUTION

3.1 INSTALLATION

- .1 This part does not apply to this Section. Doors and frames shall be installed by Section 06 20 00.
- .2 Install fire rated frames, doors and fire door hardware to NFPA 80.

3.2 ADJUSTING AND CLEANING

- .1 Adjust operable parts for correct function.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the Instructions to Bidders, the General Conditions of the Contract, the Supplementary Conditions and the General Requirements of Division 1.
- .2 Report in writing to the General Contractor any defects of surfaces or work prepared by other Sections which affect the quality or dimensions of the Work. Commencement of work implies acceptance of existing conditions and work by others.

1.2 SECTION INCLUDES

- .1 Provide the following hardware which is covered under the finishing hardware allowance - Section 01 21 00.
 - .1 Hollow Metal Doors Hardware:
 1. Hinges (29)
 2. Storeroom Lock (9)
 3. Kick stop (9)
 4. Overhead stop (7)

1.3 ALLOWANCES

- .1 The Contract Price includes a stipulated sum cash allowance as specified in Section 01 21 00.
- .2 Once the contract has been awarded, the Architectural Hardware Consultant and Supplier, under the finish hardware allowance, shall attend a hardware meeting with Waterloo Region District School Board's Project Manager and the Consultant to ensure products specified meet Waterloo Region District School Board requirements.
- .3 Cash Allowance: cover all items supplied and installed under this Section, to be selected by the Consultant at a later date.

1.4 RELATED SECTIONS

- .1 Section 06 20 00 – Finish Carpentry: Installation of hardware for hollow metal and wood doors and frames.

1.5 REFERENCES

- .1 Section 06 20 00 – Finish Carpentry: Installation of Hardware

1.6 SUBMITTALS

- .1 Hardware Schedule: Submit a hardware schedule showing a detailed list of finish hardware complete with a description, purpose and location of each hardware item.

- .2 Templates: Upon award of Contract, furnish promptly to the applicable trades, any patterns, templates, template information and manufacturer's literature required to the proper preparation for the application of hardware, in ample time to facilitate the progress of the work.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials undamaged, in original wrappings or containers with manufacturer's labels and seals intact.
- .2 Pack finishing hardware for each floor, etc., where possible, in the same carton complete with all screws, expansion shields and necessary fittings for fixing same.
- .3 Clearly label cartons and packages designating contents and locations for which each item is intended. Indicate on packing memos carton in which each item is packed.

1.8 REJECTIONS

- .1 Defective materials or quality of work whenever found at any time prior to final acceptance of the work shall be rejected regardless of previous inspection. Inspection will not relieve responsibility but is a precaution against oversight and error.
- .2 Remove and replace defective materials and work of other trades affected by this replacement, at no additional cost to the Owner.

1.9 EXTRA MATERIALS

- .1 At the completion of the Work, supply Owner with the following:
 - .1 Two (2) sets of manufacturer's instructions for door closers, locksets, door holders and panic hardware.

2 PRODUCTS

2.1 MATERIALS

- .1 Provide new materials in perfect condition, free from defects impairing durability or appearance. In every case hardware shall be of quality design and finish suitable for the purpose for which it is intended.
- .2 Fastenings
 - .1 Provide hardware complete with screws, bolts, expansion shields and other fastening devices as required for the satisfactory installation and operating of the hardware.
 - .2 Provide fastening devices of the same finish as the hardware which is to be fastened.
- .3 Keying
 - .1 Lay out the keying system for the building in consultation with the Consultant. Keying system shall include keying alike, keying differently, keying in groups, master keying and grand master keying locks as required.
 - .2 Keying chart and related explanatory data shall be prepared and submitted to the Consultant for his approval, and lock work shall not be commenced until written confirmation of keying arrangements is received from the Consultant.

2.2 SHOP FINISHES

- .1 Provide hardware of type and finish in accordance with, and equal in all respects to the samples of hardware and finishes approved by the Consultant.
- .2 Metal finishes shall be free from defects, clean and unstained, and of a uniform colour and finish for each type of finish required.

3 EXECUTION

3.1 ADJUSTING

- .1 The services of a competent mechanic shall be provided without additional cost to the Owner.
- .2 Mechanic: inspect the installation of all hardware furnished under this Section and supervise all adjustments (by the trades responsible for fixing) which are necessary to leave hardware in perfect working order.

3.2 DEMONSTRATION

- .1 Demonstrate proper care of hardware to Owner as per Owner's Requirements, including:
 - .1 Lubrication of locksets,
 - .2 Adjustments of door closers,
 - .3 Cleaning, and
 - .4 General maintenance.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions and the General Requirements of Division 01.

1.2 SUMMARY

- .1 Section includes: Provide all articles, labour, materials, equipment, transportation, hoisting, and incidentals noted, specified or required, to complete the work of this Section including but not limited to the following:
 - .1 Opaque film applied to interior glazing

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with Section 01 33 00.
- .2 Product Data:
 - .1 Submit manufacturer's Product data sheets for Products proposed for use in the Work of this Section. Include printed technical data, installation instructions and general recommendations for all materials and components. Include certification indicating compliance of materials with project requirements
- .3 Samples:
 - .1 Submit 3 - 200 mm x 200 mm (8" x 8") samples of each specified film type, pattern and colour.

1.5 CLOSEOUT SUBMITTALS

- .1 Submittals under this Section shall be in conformance with Section 01 77 00.
- .2 Operation and maintenance data:
 - .1 Submit maintenance and cleaning instructions for incorporation into operating and maintenance manuals.
 - .2 Instruct Owner's representative on proper care and maintenance for work of this section.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Manufacturer's:
 - .1 Manufacturer shall have a minimum of 5 years' experience having successfully supplied products required for the Work of this Section for other projects of similar size and complexity.
 - .2 Installer's:

- .1 Installer shall have a minimum of 5 years' continuous experience successfully completing projects similar in size and complexity as the Work of this Section.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Package materials and identify on attached labels the manufacturer, contents and material specification number.

1.8 PROJECT CONDITIONS

- .1 Conform to manufacturer's written documented temperatures, relative humidity, and substrate moisture content and temperature for application of materials of this section.

1.9 EXTENDED WARRANTY

- .1 Warrant work of this section in accordance with the Contract and extend for a period of 2 years. In addition provide:
 - .1 Film manufacturer's standard product warranty against defects in materials including cracking, crazing, delaminating, bubbling, peeling or discolouring.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:
 - .1 3M Commercial Solutions
 - .2 Requests for substitutions shall be made in conformance with Section 01 33 00 – Submittal Procedures.
 - .3 Substitution Limitations:
 - .1 Comparable Products from manufacturers not listed herein may be accepted provided they meet requirements of this Specification.
 - .4 Single source responsibility: Obtain each type of film from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

2.2 PERFORMANCE/DESIGN CRITERIA

- .1 Flammability: Surface burning characteristics when tested in accordance ASTM E 84, demonstrating film applied to glass rated Class A for Interior Use:
 - .1 Flame Spread Index: no greater than 25.
 - .2 Smoke Developed Index: no greater than 450.

2.3 MATERIALS

- .1 Material Properties:
 - .1 Glass and plastic finishes field-applied application to glass or plastic material as visual opaque, translucent or decorative film.

- .2 Film: Polyester.
- .3 Decorative Pattern: Printed.
- .4 Adhesive: Acrylic, Pressure Sensitive, Permanent.
- .5 Liner: Silicone-coated Polyester.
- .6 Thickness (Average): 3.2 mils (80 microns).
- .7 Fire Performance: Surface burning characteristics when tested in accordance with ASTM E84: Class A:
 - .1 Flame Spread: 25 maximum.
 - .2 Smoke Developed: 450 maximum.
- .8 Acceptable products:
 - .1 Frosted Film:3M Fasara – Luce; product code - SH2FGLU
 - .1 Ultraviolet Transmittance: 0.1 percent.
 - .2 Visible Light Transmittance: 34 percent.
 - .3 Visible Light Reflectance - Interior: 31 percent.
 - .4 Solar Heat Transmittance: 39 percent.
 - .5 Solar Heat Reflectance: 23 percent.
 - .6 Shading Coefficient at 90 Degrees (Normal Incidence): 0.59.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions:
 - .1 Examine all work of other Sections upon which the Work of this Section depends.
 - .2 Report in writing to the Consultant any defects of surfaces or work prepared by other Sections which affect the quality or dimensions of the Work of this Section.
 - .3 Do not proceed with Work of this Section until all unsatisfactory conditions have been rectified and site conditions are ready to receive work.
 - .4 Commencement of work implies acceptance of existing conditions and work by others.

3.2 PREPARATION

- .1 Surface Preparation:
 - .1 Window and window framing will be cleaned thoroughly with a neutral cleaning solution. Surface of glass shall be bladed with industrial razor to ensure the removal of any foreign contaminants in accordance with film manufacturer's instructions.
 - .2 Towelling or other absorbent material shall be placed on the window sill or sash to absorb moisture accumulation generated by the film application.

3.3 APPLICATION

- .1 Applied film; interior application:
 - .1 Apply film to indicated face of glazing units in accordance with film manufacturer's written instructions, applied plumb, true and level over clean glazing, without air bubbles, wrinkles, blisters, and other defects.
 - .2 After installation, applied film shall be flat with no obvious concentrations of moisture, free of creases, free of tears, with no moisture dimples when viewed under normal conditions.
 - .3 Film edges shall be cut neatly and square at a uniform distance of 1.5 mm (1/16") to 0.79 mm (1/32") from frame.

3.4 SITE QUALITY CONTROL

- .1 Conduct quality control in accordance with Section 01 45 00.
- .2 Non-Conforming Work:
 - .1 Defective materials or quality of work, whenever found, at any time prior to acceptance of the work, shall be rejected regardless of previous inspection. Inspection will not relieve responsibility, but is a precaution against oversight or errors.
 - .2 Remove and replace defective materials and work of other trades affected by this replacement, at no additional cost to the Owner.

3.5 CLEANING

- .1 Clean work area daily in accordance with Section 01 74 00.
- .2 Remove all excess materials from site as Work proceeds and at completion.
- .3 On completion of the Work remove all tools, containers, surplus materials, equipment, waste, etc., and leave Site neat, clean and tidy to the satisfaction of the Owner.
- .4 Clean film and glass surfaces so they are free of foreign matter using cleaners recommended by film manufacturer.
- .5 Clean and make good surfaces soiled or otherwise damaged as a result of Work of this Section at no additional cost to the Owner.
- .6 Leave surfaces clean and ready for subsequent Work.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the Instructions to Bidders, the General Conditions of the Contract, the Supplementary Conditions and the General Requirements of Division 1.
- .2 Report in writing to the General Contractor any defects of surfaces or work prepared by other Sections which affect the quality or dimensions of the Work. Commencement of work implies acceptance of existing conditions and work by others.

1.2 SECTION INCLUDES

- .1 Non-load-bearing steel stud partitions
- .2 Ceiling and bulkhead framing
- .3 Wall furring
- .4 All gypsum wallboard
- .5 Gypsum wallboard trims

1.3 RELATED SECTIONS

- .1 Section 06 10 00 - Rough Carpentry: Wood support systems.
- .2 Section 09 51 00 - Acoustical Ceilings.

1.4 REFERENCES

- .1 CAN/CGSB-71.25-M88: Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.
- .2 CAN/CSA-A82.27-M91: Gypsum Board.
- .3 CSA A82.31-M1980: Gypsum Board Application.
- .4 Gypsum Drywall Construction Handbook by Canadian Gypsum Company.
- .5 Manual of Gypsum Wallboard Construction by Gypsum Drywall Contractors International.

1.5 QUALITY ASSURANCE

- .1 Employ fully trained mechanics who are regularly employed in this field.

1.6 REJECTIONS

- .1 Defective materials or quality of work whenever found at any time prior to acceptance of the work shall be rejected regardless of previous inspection. Inspection will not relieve responsibility but is a precaution against oversight and error.
- .2 Remove and replace defective materials and work of other Trades affected by this replacement, at no additional cost to the Owner.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 61 00.
- .2 Deliver and store Products in a dry area under cover, in original wrappings, cartons or containers clearly marked as to type, colour and manufacturer.
- .3 Store gypsum board flat. Take care to avoid undue sagging damage to ends, edges, or surfaces. Avoid stacking unequal lengths together.
- .4 Store gypsum board so that it is not in contact with new concrete floors - use dunnage at 400 mm (16") OC to raise board piles.

1.8 PROJECT CONDITIONS

- .1 Co-operate in co-ordinating work of other Sections with work of this Section, in order that the work may proceed in an orderly and effective manner.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 Manufacturers of gypsum products having Products considered acceptable for use:
 - .1 CertainTeed.
 - .2 Canadian Gypsum Company.
 - .3 G-P Gypsum Company.
- .2 Manufacturers of metal studs, track, trim and accessories having Products considered acceptable for use:
 - .1 Bailey Metal Products.
 - .2 Canadian Gypsum Company.
 - .3 Chicago Metallic.
 - .4 Gordon Arch. Alum. Specialties.
 - .5 Pittcon Industries.
 - .6 Fire Trak Corp.

2.2 MATERIALS

- .1 Steel Studs: Minimum 0.55 mm (25 ga.) hot dipped or electro-galvanized sheet steel at 400 mm (16") OC, to ASTM C645; knockout pass-through holes at 460 mm (18") OC; Flanges minimum 30 mm (1¼") wide, edges bent back 90 degrees and doubled over; single length floor to ceiling.
- .2 Floor and Ceiling Track (standard application): Minimum 0.55 mm (25 ga.) hot dipped or electro-galvanized sheet steel at 400 mm (16") OC, to ASTM C645; Leg design minimum 25 mm (1") high; width to suit studs. Provide deflection track as required to suit deflection anticipated by structural conditions.

- .3 Ceiling Track (deflection application): Inner and outer deflection type tracks; minimum 0.91 mm (20 ga) x size to fit 92 mm (3 5/8") stud, and full galvanized G60 steel; by Bailey or approved equal. Refer to Standard Details.
- .4 Ceiling track (curved walls): Two 0.55 mm (25 ga.) continuous angles, crimped/cut to suit shape.
- .5 Ceiling Deflection Track and Firestop System: Fire Trak System by Fire Trak Corp., Kimball, MN (1-800-394-9875). System shall include 16 gauge galvanized steel ceiling runner profile (Shadowline, Cavity Shadowline, Reveal or Cavity Reveal) and Fire Trak Stud Clips.
- .6 Furring Channels: 19 mm, 22 mm (3/4", 7/8") - minimum .55 mm (25 gauge) G90 galvanized steel at 400 mm (16") OC.
- .7 Fasteners: Manufacturer's standard, suitable for application intended.
- .8 Tie Wire: 1.6 mm (16 gauge) galvanized soft annealed steel wire.
- .9 Hangers: 4.1 mm (No. 8) galvanized wire.
- .10 Carrying Channels: 39 mm x 19 mm - 1.6 mm (1 1/2" x 3/4" - 16 gauge) G90 galvanized steel channel, for bulkhead construction.
- .11 Ceiling Suspension Systems
 - .1 Rigid "X" drywall suspension system by CGC Inc. or approved equal.
 - .2 System shall be comprised of 30 mm x 24 mm (1 1/2" x 15/16") tee sections of 0.60 mm (24 gauge) steel and 73 mm x 22 mm (2" x 7/8") cross channels of 0.38 mm (26 gauge) hot dipped galvanized steel.
- .12 Furring Clips: Snap-on clips - 2.6 mm (12 gauge) wire.
- .13 Partition Attachment to T-bar: Use partition attachment clips PACS15 (standard edge) or PACR15 (Reveal Edge) by CGC Interiors.
 - .1 Securement Channel: 0.55 mm (25 gauge) galvanized steel - 50 mm x 25 mm (2" x 1") by Bailey or approved equal.
 - .2 Fasteners: Non-powder activated as recommended by manufacturer, suitable for wall composition by Rawl Tapcon or approved equal.
- .14 Gypsum Board: to CAN/CSA A82.27-M, as follows:
 - .1 Standard Board: 16 mm (5/8") tapered edge, straight cut ends.
 - .2 Fire Resistant Board (Type "X"): Minimum 16 mm (5/8") thick, tapered edges, straight cut ends, type X., identified for use in a ULC tested assembly.
 - .3 Cement Board: 12.7mm (1/2") thick water resistant tile backer board. Acceptable products include: WonderBoard by Custom Building Products, Durock Cement Board by CGC or PermaBase Brand by National Gypsum Company.
 - .4 Moisture Resistant Board: Square or tapered edge as applicable, straight cut ends, moisture resistant core, and water-resistant paper face.

- .5 Abuse-Resistant Board: 16 mm (5/8") Sheetrock Abuse-resistant gypsum panels; tapered edges; panel weight minimum 2500 lbs./MSF
- .6 Impact Resistant Board: 16 mm (5/8") high density core 40 bls. Hardness "Fiberbond" by Louisiana - Pacific (Phone: 1-800-411-2500 / 902-625-3070)

2.3 ACCESSORIES

- .1 Corner Bead, Bailey Tear off L Trim
- .2 Screws: Self-drilling, self-threading case hardened steel; length as recommended by board manufacturer for each application.
- .3 Adhesive: High strength, waterproof, compatible with materials; to CAN/CGSB-71.25-M.
- .4 Joint Filler: Casein, vinyl or latex base, slow setting, as recommended by board manufacturer.
- .5 Joint Tape: < 50 mm (2") wide perforated paper as recommended by board manufacturer.
- .6 Primer Sealer: Alkyd based material recommended by board manufacturer.
- .7 Texture Finish and Primer - Sealer: Water based spray finish recommended by board manufacturer.

3 EXECUTION

3.1 EXAMINATION

- .1 Thoroughly examine all surfaces scheduled to receive work of this Section to see that they are secure, rigid, true, and not liable to impair performance or appearance of this Trade's work.
- .2 Commencement of work implies total acceptance of surface and site conditions.

3.2 PREPARATION

- .1 Protect work of other trades from damage resulting from work of this trade.
- .2 Make good any resulting damage, to the satisfaction of the Consultant, at no additional cost.
- .3 Maintain uniform temperature in work area, adequate for work being performed, as recommended by materials manufacturer.
- .4 Keep temperature as uniform as possible with deflectors or screens.
- .5 Provide air circulation if humidity is excessive. Avoid high temperature with low humidity. Avoid force drying.
- .6 Allow concrete and masonry to dry thoroughly before installing gypsum board.
- .7 Protect installed materials from weather and dampness.
- .8 Replace any damaged work before further work proceeds.
- .9 Promptly, as the work proceeds and upon completion, clean-up and remove from the site all rubbish and surplus material resulting from work of this trade.

3.3 QUALITY OF WORK

- .1 Erect framing level, plumb and true; to a tolerance of 5 mm in 3 metres (1/4" in 10'), and square with adjoining work.

3.4 APPLICATION

- .1 Framing System
 - .1 Metal Stud Partitions
 - (1) Place studs vertically at 400 mm (16") centres and not more than 50 mm (2") from abutting walls, openings, and each side of corners. Install studs in tracks at floors and ceiling.
 - (2) Provide freedom for deflection under beams and structural slabs.
 - (3) Permanently attach studs for cornice height partition to top and bottom track.
 - (4) Full-height stud each side of opening.
 - (5) Erect track at head and/or sill of opening to accommodate intermediate studs above and/or below opening in same manner and spacing as wall studs. Screw fasten members together adjacent to openings.
 - .2 Deflection Head Allowance
 - (1) Allow for a maximum of 2" deflection under beams and structural slabs by utilizing outer and inner top tracks as per Standard Details in this Section.
 - .3 Fire Dampers in Fire Rated Partitions
 - (1) Frame openings for fire dampers required by the Mechanical Contractor. Provide a 13 mm (1/2") drywall filler piece inside the perimeter of opening before installation of the damper so as to maintain the partition fire rating.
 - .4 Ceiling Suspension System
 - (1) Hangers for suspended gypsum board ceilings shall support the grillage independent of walls, columns, pipes, ducts: erect plumb and securely anchor to the structural frame or imbed into concrete slabs.
 - (2) Install angle moulding at wall perimeter at a level above the finished ceiling line equal to the total thickness of wallboard to be used. Install only on walls perpendicular to cross channels.
 - (3) Hang main tees in parallel rows spaced 1220 mm (4'-0") apart and supported by hanger wires spaced 1220 mm (4'-0") apart at same level as angle moulding. Main tees in adjacent rows must have cross tee slots in perpendicular alignment.
 - (4) Install cross-channels by snap locking into position in perpendicular rows spaced 400 mm (16") apart and not less than 200 mm (8") from parallel walls. Fasten ends of cross-channels to angle moulding with screws or pop rivets.
 - (5) Fire rated assemblies shall have additional cross-channels within 200 mm (8") of all butt joints and openings for ducts or light fixtures. Allowable percentage of openings and additional wallboard enclosures shall conform to U.L.C. design criteria.
- .2 Wall Furring
 - .1 Attach furring channels to masonry or concrete surfaces at 400 mm (16") OC and not more than 100 mm (4") from corners and openings.

- .2 Wallboard Application: Always leave a 3 mm (1/8") to 6 mm (1/4") gap between wall board and floor.
- .3 Single Layer Board
 - .1 Screw-on Application
 - (1) Erect gypsum board horizontally or vertically on walls; across framing on ceilings; and secured to the framing with drywall screws at:
 - (2) Ceilings: 300 mm (12") OC
 - (3) Walls:
 - (a) 300 mm (12") OC along ends of board
 - (b) 200 mm (8") OC at perimeters of board
 - (c) 300 mm (12") OC through centre of board.
 - (4) Where it must be applied parallel, support or furring must be provided at maximum 400 mm (16") OC.
 - (5) Allow for 1/4" gap between bottom of gypsum board and top of floor.
 - (6) Ceiling board: 12.7 mm (1/2") minimum thickness.
 - .2 Adhesive Application
 - (1) Apply panel adhesive in 6 mm (1/4") beads to face of framing members or masonry substrate, using caulking gun. Avoid adhesive squeeze-out at joints.
 - (2) Erect gypsum board immediately, press firmly into place and drive supplementary screw fasteners at 600 mm (24") centres.
 - (3) Apply adhesive in well ventilated area. Avoid open flame.
 - .3 Screw-on Application
 - (1) Apply base layer horizontally and screw fasten. Apply face layer vertically and screw fasten in the same manner as base layer.
 - (2) Screw fastening spacing shall be at 300 mm, 600 mm (12", 24") centres.
 - (3) Locate joints over framing and secure with screws.
 - .4 Adhesive Application
 - (1) Adhere base layer to framing with 6 mm (1/4") adhesive beads.
 - (2) Laminate face layer to base layer, using Panel Adhesive (Joint Filler).
- .4 Tilebacker Board
 - .1 Fasten to framing with screws at 200 mm (8") centres where ceramic tile finish is called for on stud partitions.
 - .2 Apply 50 mm (2") glass fibre tape over joints and corners, embed with mortar or adhesive used to set tile.
- .5 Control Joints
 - .1 Gypsum board surfaces should be isolated with control joints or other stress relief where:
 - (1) partition or furring abuts a structural element or dissimilar wall or ceiling;
 - (2) ceiling abuts a structural element, dissimilar wall or partition or other vertical penetration;
 - (3) construction changes within the plane of the partition or ceiling;

- (4) partition or furring run exceeds 9 m (30');
 - (5) ceiling dimensions exceed 15 m (50') for drywall in either direction;
 - (6) exterior soffit dimensions exceed 9 m (30') in either direction;
 - (7) wings of "L", "U" and "T" -shaped ceiling areas are joined;
 - (8) expansion or control joints occur in the structural elements of the building.
- .2 Ceiling-height door frames may be used as control joints, as may less-than-ceiling-height door frames if control joints extend to ceiling from both corners.
 - .3 Leave a 13 mm (1/2") continuous opening between gypsum boards for insertion of surface-mounted joint.
 - .4 Interrupt wood floor and ceiling plates with a 13 mm (1/2") gap, wherever there is a control joint in the structure.
 - .5 Do not attach steel studs on one side of control joint.
 - .6 Provide separate supports for each control joint flange.
 - .7 Provide an adequate seal behind control joint where sound and/or fire ratings are prime considerations.
 - .8 Agree on exact locations of joints with the Consultant.
 - .9 Use drywall screws to fasten board to framing.
 - .10 Minimum fastener length to provide:
 - (1) 10 mm (3/8") minimum penetration into steel framing.
 - (2) 16 mm (5/8") minimum penetration into wood framing.
 - .11 Drive screws perpendicular to face of board with sufficient penetration of screw head to sink below the surface of board without breaking the paper face.
 - .12 Start securing board from the centre and work towards perimeter.
 - .13 Hold board firmly to framing while fastening.
 - .14 Do not set unlike edges together; always mate square to square or tapered to tapered edges.
 - .15 Install casing bead at junction with dissimilar materials.

3.5 FINISHING

- .1 Install corner bead and other metal trims as required to finish board.
- .2 Fill and tape joints and fill over fastenings. Sand lightly.
- .3 Where painted surfaces are required fill and tape all joints and nail holes in the conventional manner. Allow to dry thoroughly and then skim coat all board surfaces by mixing the joint compound slightly thinner than for joint taping. Lightly cover the entire board surface using a trowel or board knife. Immediately scrape the excess joint compound off to fill surface texture and variations. Allow the skim coat to dry completely then carefully sand away any ridges in preparation for painting.
- .4 Leave finished work smooth, plumb, and true ready for painting (vinyl wall covering) by others.

WRDSB – JACOB HESPELER SECONDARY SCHOOL
HEAT PUMP REPLACEMENT
WRDSB NO.: 24-7531-RFT
WF PROJECT NO.: 2021-0807-12
ISSUED FOR: BID & PERMIT

SECTION 09 21 16 (R0)
GYPSUM BOARD ASSEMBLIES

PAGE 8 of 8

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the Instructions to Bidders, the General Conditions of the Contract, the Supplementary Conditions, and the General Requirements of Division 1.
- .2 Report in writing to the General Contractor any defects of surfaces or work prepared by other Sections which affect the quality or dimensions of the Work. Commencement of work implies acceptance of existing conditions and work by others.

1.2 INTENT

- .1 Provide all articles, labour, materials, equipment, transportation, hoisting, and incidentals noted, specified, or required, to complete the work of this Section.

1.3 SECTION INCLUDES

- .1 Provide all acoustic tile and required accessories as indicated on the working drawings, room finish schedule, including but not limited to the following:
 - .1 Acoustic Tile
 - .2 "T" Grid Suspension System

1.4 RELATED SECTIONS

- .1 Section 09 21 16 - Gypsum Board Assemblies.
- .2 Mechanical and electrical Divisions: for Installation of Heat pumps, Grills, diffusers, lighting and additional requirements.

1.5 REFERENCES

- .1 ASTM C635-00: Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- .2 ASTM C636-04: Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- .3 ASTM E84-06: Standard Test Method for Surface Burning Characteristics of Building Materials.
- .4 ASTM E1264-98: Standard Classification for Acoustical Ceiling Products.

1.6 SAMPLES

- .1 Submit minimum 300 mm x 300 mm (1'-0" x 1'-0") samples of acoustic tile, as required for completion of the work for the Consultant's review before proceeding with the acoustic tile work.
- .2 Submit samples of acoustic products in type specified for approval by the Consultant.

1.7 CLOSE-OUT SUBMITTALS

- .1 Submit two copies of the manufacturer's maintenance directions for each type of acoustic panel or tile.

1.8 PERFORMANCE REQUIREMENTS

- .1 Design and install the ceiling system to support the weight of the light fixtures, maximum deflection of 1/360 of the span.
- .2 Submit a letter stating that the ceiling system is capable of supporting the light fixtures. This letter is required to obtain Ontario Hydro-Electric Commission approval.

1.9 REJECTIONS

- .1 Defective materials or quality of work whenever found at any time prior to acceptance of the work shall be rejected regardless of previous inspection. Inspection will not relieve responsibility, but is a precaution against oversight and error.
- .2 Remove and replace defective materials and work of other Trades affected by this replacement, at no additional cost to the Owner.

1.10 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 61 00.
- .2 Deliver acoustic tile and materials in undamaged and original containers and make certain that the storage area is dry.

1.11 EXTRA MATERIALS

- .1 Furnish the Owner with 2 percent extra materials of each type of ceiling tile to be used for future repair work.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 Armstrong World Industries Limited (Ceiling Tile and Suspension)
- .2 CGC Limited (Ceiling Tile and Suspension)
- .3 Bailey Metal Products (Suspension)

2.2 ACOUSTIC CEILING TILE TYPE 1

- .1 Suspension system: to ASTM C635; Prelude XL 15/16" by Armstrong, Colour: white.
- .2 Acoustical Panels: to ASTM E1264, Cortega 823 Fireguard by Armstrong (610mm x 1220mm x 16mm), Colour: white.

3 EXECUTION

3.1 EXAMINATIONS

- .1 Report to the Consultant, in writing, all defects of work prepared by other trades and on unsatisfactory site conditions.

- .2 Do not commence the work of this Division until this Contractor has thoroughly examined all areas to receive an acoustic tile installation and has ascertained the compatibility of the installation of his material with the other trades involved directly or indirectly with this work, and has found the areas in a condition suitable for the commencement.
- .3 Consult and co-operate with trades whose work precedes or follows his work to permit an orderly and effective procedure in the execution of the work of this section.
- .4 Commencement of the work of this Section implies total acceptance of all applicable conditions by the Acoustic Tile Contractor.
- .5 Waive the right to any after claims by failure to comply with the above procedure of examinations.

3.2 QUALITY OF WORK AND APPLICATION

- .1 Install the tile and suspension system to ASTM C636, and in accordance with the manufacturer's specifications.
- .2 Plumb and square finish work with adjoining work.
- .3 Lay the work out, in accordance with the Consultant's approved reflected ceiling plan, symmetrical within each area to obtain uniform borders of at least half the acoustic panel size.
- .4 Distribute variations in shades of finish from several cartons of panels uniformly over the ceiling area.
- .5 Erect the suspension system level with tolerance of 3 mm (1/8") in 3600 mm (12').
- .6 Exposed main tees shall be as long in length as practical to minimize joints. Joints shall be tight, square flush, and reinforced with splines. Distribute jointing over the ceiling area.
- .7 Use edge moulding or shadow moulding where ceiling abuts vertical surfaces as indicated on the drawings. Use corner moulding along external edges at ceiling steps.

3.3 CLEANING AND PROTECTION

- .1 Be responsible for protection of all materials and work of this trade from damage during period of construction.
- .2 Be responsible for the protection of the work of other Contractors (trades) from damage resulting from work of this trade. He shall make good any resulting damage, to the satisfaction of the Consultant, at his own expense.
- .3 Promptly, as the work proceeds and on completion, clean-up and remove from the premises all rubbish and surplus materials resulting from the foregoing work.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with Instructions to Bidders, the General Conditions of the Contract as amended by the Supplementary Conditions including all Sections outlined in Division 00 – Procurement and Contracting Requirements and Division 01 - General Requirements.
- .2 Report in writing to the General Contractor any defects of surfaces or work prepared by other Sections which affect the quality or dimensions of the Work. Commencement of work implies acceptance of existing conditions and work by others.

1.2 SECTION INCLUDES

- .1 Complete painting of all surfaces noted on drawings, on Room Finish Schedule and as follows:
 - .1 Interior:
 - .1 Gypsum surfaces
 - .2 Metal surfaces - prime painted and galvanized, including but not confined to hollow metal doors and frames, access panels, exposed piping, exposed structure.
 - .3 Masonry surfaces
 - .4 Concrete surfaces

1.3 RELATED SECTIONS

- .1 Section 07 92 00 – Joint Sealants.

1.4 REFERENCES

- .1 CAN/CGSB-1.57-2003: Interior Alkyd Semi-gloss Enamel.
- .2 CAN/CGSB-1.100-99: Interior Flat Latex Paint.
- .3 CAN/CGSB-1.119-2000: Interior Latex Primer-Sealer.
- .4 CAN/CGSB-1.175-97: Polyurethane Interior Coating.
- .5 CAN/CGSB-1.188-2004: Emulsion Filler for Masonry Block.
- .6 CAN/CGSB-1.195-99: Interior Latex Semi-gloss Paint
- .7 CAN/CGSB-1.209-2003: Interior Latex Low Gloss Paint.
- .8 Environmental Choice Program ECP 07.89: Water-borne Surface Coatings.
- .9 Environmental Choice Program ECP 02.89: Solvent-borne Paints.
- .10 Master Painters Institute: Architectural Painting Specification Manual.
- .11 Steel Structures Painting Council.
- .12 C.P.C.A. – Canadian Painting Contractors Association – Painting Manual.
- .13 G.G.S.B. – Standard for Paint.

1.5 SAMPLES

- .1 Submit brush-outs 150 mm x 150 mm of each paint application, labelled as to product and location.
- .2 Proceed with painting and staining mock-up only when colour and finish has been approved.

1.6 QUALITY ASSURANCE

- .1 Employ fully trained workmen who are regularly employed in this field.
- .2 Comply with VOC limits set out by Green Seal Organization for all non-alkyd and non-epoxy coatings/paints.

1.7 REJECTIONS

- .1 Defective materials or quality of work, whenever found, at any time prior to acceptance of the work, shall be rejected regardless of previous inspection. Inspection will not relieve responsibility but is a precaution against oversight or errors.
- .2 Remove and replace defective materials and work of others affected by this replacement, at no additional cost to the Owner.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 61 00.
- .2 Bring materials to the site in the original unopened containers labelled to indicate the name of the manufacturer, brand, colour and quality of the contents.
- .3 Store thinners, loose soaked rags and similar combustible materials in closed containers. Remove from site or store in an assigned area.
- .4 Store paint materials at temperatures recommended by manufacturer.

1.9 PROJECT CONDITIONS

- .1 Cooperate in coordinating the work of other Sections with the work of this Section, so that the work may proceed in an orderly and effective manner.
- .2 If requested, provide proof of purchase of all paint materials needed for the job.

1.10 ENVIRONMENTAL CONDITIONS

- .1 Maintain minimum interior temperature of 18 degrees C during application and drying of paint and maintain until handover to Owner.
- .2 Do not paint when ambient air and surface temperatures are less than 15 degrees C for 24 hours before or during painting application.
- .3 Test for moisture content in each location immediately before commencing application of paint. Do not apply paint on surfaces where moisture content exceeds 14%. Promptly notify Consultant if such conditions exist.

1.11 SCHEDULING

- .1 Unoccupied Areas: Cooperate with other trades to minimize touch-ups, but to ensure completion prior to installation of floor coverings and furniture.
- .2 Occupied Buildings: Schedule painting to prevent disruption to occupants. Painting shall be carried out as arranged/agreed with Owner.

1.12 EXTRA MATERIALS

- .1 Supply one (1) litre of each finish material in each colour used at the Place of the Work, properly labelled.

1.13 TEST AREA

- .1 A room or area in the building will be designated by the Architect as a test area to establish standard or workmanship, texture, gloss, and coverage.
- .2 Prior to any painting being started, request a meeting on Site between Architect, Contractor, Sub-contractor, to review conditions, surfaces, anticipated problems and to clarify quality of workmanship acceptable to Architect. Minutes are to be documented by the Contractor and distributed to all parties at the meeting.
- .3 Apply finishes to each type of surface within room with correct material, coats, colour, texture and degree of gloss in sample area and have same approved prior to providing Work of this Section. On concrete block walls complete one wall with block filler only, one wall with block filler and one finish coat, one wall with block filler and two finish coats.
- .4 Clearly mark area as the test area. Retain test area until after completion of Work. Test area to be minimum standard for the Work.
- .5 Failure to comply with the above will be cause for the Architect to request all Work previously painted to be repainted.

2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS AND PRODUCT

- .1 Paints, stains and varnish:
 - .1 General Paint
 - .2 Benjamin Moore
 - .3 Sherwin-Williams
 - .4 Zinsser
 - .5 Glidden
- .2 Water-based Epoxy:
 - .1 Sherwin-Williams B70W00211 Water-based Catalyzed Epoxy Extra White/Tint base
A/B60V00025-Water-based Catalyzed Epoxy Egg Shell or Semi-Gloss Hardener Part B

- .2 Glidden – 4420 - True Glaze Water born Epoxy / 4426 True Glaze Egg Shell or Semi-Gloss Converter
- .3 Latex Super Adherent Primer:
 - .1 General Paint 51-050 Premium Latex Plastic Primer
 - .2 Benjamin Moore #23-00 Freshstart Acrylic Primer Sealer
 - .3 Zinsser 1-2-3 Acrylic Primer Sealer
 - .4 Sherwin-Williams – B51WQ8850 – Adhesion Primer
 - .5 Glidden Latex Super Undercoat 94280
- .4 Interior Latex Block Filler:
 - .1 Glidden # 36250 Concrete Block Filler
 - .2 Sherwin-Williams B42W00046 Heavy Duty Block Filler
 - .3 General Paint 70-224 Premium Latex Block Filler
 - .4 Benjamin Moore #595-01 Latex Block Filler
- .5 Stain Suppressant Sealer/Primer Hi-Hide:
 - .1 General Paint, 60-200 X-Terminator 2 Later Sealer
 - .2 Zinsser BIN Primer, hi-hide (spot priming only)
 - .3 Sherwin-Williams B49WQ8820 Multipur LTX Primer
 - .4 Glidden Jammer 200
- .6 Rust Inhibiting Metal Primer:
 - .1 Sherwin-Williams B66-310 Pro-Cryl Universal Primer
 - .2 Devoe Coatings, Devflex 4020PF Direct to Metal Primer
- .7 Dry Fall:
 - .1 Benjamin Moore and Co. Ltd. #597-01 Sweep-Up Spray Latex Flat
 - .2 Glidden #10120 Spraymaster Latex Eggshell
 - .3 Sherwin-Williams B42W2 Waterborne Acrylic Dry Fall, Eggshell

2.2 MATERIALS

- .1 Colours shall be those selected by the Architect as per finish plan. All primers and undercoats may be tinted to no more than 25% of the intensity of the finish colour. Where deep/intense colours are specified, only colours from the nearest factory premixed colour selection shall be altered to match those specified. The application of Clear Base Deep Tints in either Primer or Finish is not acceptable.

- .2 All primer and paint must be delivered to the job site in manufacturer's original containers.
- .3 All materials used in this painting contract are to be applied according to product label directions and in accordance with information stated on the Products Data Specification sheet.
- .4 Unless otherwise indicated two coats of the specified finish paint are required.
- .5 Any work not conforming to the specification, or not meeting with the approval of the Architect, shall be removed, or corrected and or/repainted.

3 EXECUTION

3.1 INSPECTION

- .1 Verify that all surfaces and substrate conditions are ready to receive work, as per the instructions of the product manufacturer.
- .2 Minimum application temperatures for latex paints:
 - .1 Interior 7°C; Exterior 10°C.
- .3 Beginning of installation means acceptance of site conditions.

3.2 PREPARATION

- .1 The painting contractor shall be wholly responsible for the quality of his work, and is not to commence any part of it until surface is in proper condition.
- .2 If the painting contractor considers any surface unsuitable for proper finishing, he is to notify the Architect of this fact in writing. He is not to apply any material until corrective measures have been taken or they have instructed him to proceed.
- .3 All surfaces are to be clean, dry, and free from contaminates such as, but not limited to oil, grease, or dust. If for any reason the surface cannot be cleaned, this condition shall be reported to the Architect promptly.
- .4 If the painting contractor has been instructed by the Architect to begin painting under conditions and circumstances he believes could result in poor performance and early failure of the coatings, he shall request an order to proceed in writing. The first coat of primer or finish should be applied soon after surface has been cleaned properly to prevent contamination of the substrate.
- .5 All manufacturers' directions must be followed regarding surface and product preparation. Product failure due to non-compliance and any indicated corrective measures shall be the Contractor's responsibility. Surface irregularities and blemishes shall be repaired with materials which match strength, and texture of surrounding surfaces.
- .6 Walls and Ceilings: Preparation shall consist of a strong solution of tri-sodium phosphate and water, followed by a clear water rinse.

- .7 Metal surfaces: Such as but not limited to; hollow metal doors and frames, ducts, metal roof decks. Solvent wash to remove protective oil films consistent with SSPC -SP1. All surfaces must be free of grease, oil, mildew, dirt and shall be cleaned in accordance with SSPC-SP1 Solvent cleaning. This method employs the use of emulsifiers or solvents to remove surface contaminants such as oil, grease, soil, cutting compounds, etc. Thoroughly scrub entire surface with solvent. Replace cleaning rags frequently to avoid spreading the surface contaminants around. Repeat process at least once. Use clean rags for final cleaning. Use this cleaning standard as a first step prior to any abrasive blasting standards.
- .8 Wooden surfaces: All surfaces must be free of grease, oil, wax, and dust. Use solvents to remove surface contaminants. Thoroughly scrub entire surface with solvent using steel wool or Scotch Brite pads. Replace cleaning rags frequently to avoid spreading the surface contaminants around. Repeat the process at least once. Use clean rags for final cleaning.
- .9 Walls and Ceilings: Loose or flaking paint must be removed, and feather edge sanded to produce a smooth uniform surface. Any defects should be filled with an appropriate patching compound. Bare surfaces or patch compound must be primed with specified primer. High gloss painted surfaces must be dulled with sandpaper especially those that are high gloss alkyd or urethane. Surfaces to receive paint must be finished to a level 5 finish.
- .10 Metal Surfaces: Such as, but not limited to previously painted hollow metal doors and frames, ducts, metal roof decks. Remove loose mill scale, non-adherent rust, scaling paint, and other foreign matter consistent with SSPC-SP2 by employing the use of scrapers, sandpaper, wire brushes, or hand impact tools. Bare surfaces must be primed with specified primer. High gloss painted surfaces must be dulled with sandpaper especially those that are high gloss alkyd or urethane.
- .11 Wooden Surfaces: All surfaces shall be free of loose or failing paint or clear coatings. Sand using 100 grit sand paper with the grain or employ a paint scraper in a manner consistent with removing the coating only so as to not damage the surface of the wood. Paint stripper may be employed taking care not to contact and damage adjacent surfaces. Sand surface to a final smoothness with the grain using 220 grit sandpaper wipe surface with a clean tack cloth to remove sanding dust. Spot prime any bare wood areas with the appropriate primer or clear coating.
- .12 Prepare surfaces in accordance with covering manufacturer's instructions.

3.3 APPLICATION

- .1 Perform mandatory surface cleaning and preparation prior to commencing this section.
- .2 Application of primers and finishes shall be by brush, roller, spray, or a combination of those methods.
- .3 On each designated substrate, apply in compliance with this specification, only the approved products or product combinations.
- .4 Exterior Precast – Previously Painted:
 - .1 Exterior grade latex super adherent primer: one coat
 - .2 Exterior grade water based catalyzed epoxy semi-gloss: two coats
- .5 Concrete Block – Previously Painted:
 - .1 Latex super adherent primer: one coat
 - .2 Water based catalyzed epoxy semi-gloss: two coats

- .6 Drywall Board
 - .1 Latex super adherent primer: one coat
 - .2 Water based catalyzed epoxy egg-shell or semi-gloss: two coats
 - .3 Ceilings are to receive egg-shell finish
- .7 Hollow Metal Doors/Frames
 - .1 Sherwin-Williams Pro-Cryl Universal Primer: one coat
 - .2 Water based catalyzed epoxy semi-gloss: two coats
- .8 Woodwork to be Stained and Varnished
 - .1 1-coat wood stain
 - .2 2-coats varnish (satin)
- .9 Apply products in accordance with manufacturer's instructions.
- .10 Sand lightly between coats to achieve required finish.
- .11 Do not apply finishes to surfaces that are not dry.
- .12 Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surfaces.
- .13 Finishes and number of coats specified in the schedule are intended to cover surfaces perfectly. If they do not, apply further coats until perfect coverage and colour are achieved as required.
- .14 Dark colours will require multiple coats to full saturation and coverage. Acceptance will be confirmed by Consultant.
- .15 Any areas exhibiting incomplete or unsatisfactory coverage shall have the entire plane painted. Patching will not be acceptable.
- .16 Walls needing repainting, entire wall/plane shall be painted to the satisfaction of the Architect.
- .17 Primer and subsequent top coats are to be products from same manufacturer unless otherwise stated in this specification.
- .18 Concrete Block: Block filler is to be applied at the minimum rate of 80 sq ft per gallon (1.63 m² per litre), or as required by block texture to completely fill block. **Pinholes will not be accepted.** Apply more block filler if necessary to completely fill the block before applying finish coats. Note that lightweight block requires more block filler to fill than standard weight block does and adjust application rate as required.
- .19 Paint gas piping on exterior of building.
- .20 Paint all exposed piping within school.
- .21 Paint all exposed structural steel.

3.4 PROTECTION

- .1 Protection (drop sheets, tarps, plywood decking and masking) for surfaces not being painted under this Specification shall be supplied and kept in place during the project. It will be the Contractor's responsibility to repair any and or all damaged surfaces.
- .2 Wall mounted electrical fixture face plates, such as but not limited to; receptacles, switch boxes, cover plates, etc. are to be removed before painting and are to be replaced at completion of painting.
- .3 Upon completion of a room or area, it shall be left in a clean and orderly condition and all paint splatters, contaminated rags and trash shall be removed.
- .4 Upon completion of the job, the Painting Contractor is to remove all surplus materials and scaffolds that relate to his trade from the premises.
- .5 It will be the Contractor's responsibility to ensure the rooms being painted have adequate fresh air for safe occupancy by workers.

3.5 CLEANING

- .1 As work proceeds, promptly remove paint where spilled, splashed or spattered.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 This Section specifies requirements and instructions that are common to mechanical work Sections of the Specification and it is a supplement to each Section and is to be read accordingly.

1.3 DEFINITIONS

- .1 Refer to Section 01 42 00, References. The following are definitions of words found in mechanical work Sections of the Specification and on associated drawings:
 - .1 "concealed" – means work hidden from normal sight in furred spaces, shafts, tunnels, ceiling spaces, walls and partitions
 - .2 "exposed" – means work normally visible, including work in equipment rooms and similar spaces
 - .3 "provide" (and tenses of provide) – means supply and install complete
 - .4 "install" (and tenses of install) – means install and connect complete
 - .5 "supply" – means supply only
 - .6 "finished area" - means any area or part of an area which receives a finish such as paint, or is factory finished
 - .7 "governing authority" and/or "regulatory authority" and/or "Municipal authority" – means all government departments, agencies, standards, rules and regulations that apply to and govern the mechanical work and to which the work must adhere
 - .8 "Consultant" – means the Architect or Consulting Engineer who has prepared the Contract Documents on behalf of the Owner
 - .9 "Equal to" – if products supplied by an "Equal to" manufacturer are proposed for use the "Equal to" product must be equivalent in quality, size and weight, performance, and operating characteristics (including energy efficiency), to the specified product, and acceptance or rejection of an "Equal to" product will be made by the Consultant
- .2 Wherever the words "indicated", "shown", "noted", "listed", or similar words or phrases are used in the specification they are understood, unless otherwise defined, to mean that the product referred to is "indicated", "shown", "listed", or "noted" on the drawings.
- .3 Wherever the words "approved", "satisfactory", "as directed", "submit", "permitted", "inspected" or similar words or phrases are used in the specification or on the drawings they are understood, unless otherwise defined, to mean that work or product referred to is "approved by", "inspected by", etc., the Consultant.
- .4 In the mechanical specification, singular may be read as plural, and vice-versa.

1.4 SUBMITTALS

- .1 Refer to Section 01 33 00, Project Record Documents. As specified in this Section, submit the following to the Consultant:
 - .1 project close-out documentation: O & M Manuals, record as-built drawings, and all associated data
 - .2 progress payment breakdown: a detailed breakdown of the mechanical work cost
 - .3 Extended Warranties: copies of all extended warranties specified, dated, signed, and in the name of the Owner
 - .4 Contractor's P. Eng. Documentation: the name, qualifications, and evidence of current liability insurance for all professional engineers to perform work associated with the Contract.

1.5 JOURNEYMAN/APPRENTICE TRADESPEOPLE

- .1 All mechanical work is to be done by tradespeople who perform only the work that their certificates permit. Apprentice tradespeople must work under direct on-site supervision of an experienced journeyman tradesperson.
- .2 Unless otherwise specified, the journeyman/apprentice ratio is to be in accordance with governing regulations.

1.6 CODES, REGULATIONS, AND STANDARDS

- .1 All Codes, Regulations, and Standards referred to in this Section and in Sections to which this Section applies are the latest edition of the Codes, Regulations, and Standards in effect at the time the building permit is obtained, or at the time of bid closing for the Project, whichever comes first.
- .2 All work is to be in accordance with requirements with Codes, Regulations, and Standards applied by governing authorities Included but not limited to the following:
 - 1) Ontario Building (OBC)
 - 2) Ontario Fire Code (OFC)
 - 3) Ontario Electric Safety Code (OESC)
 - 4) Canadian Standards Association (CSA)
 - 5) Underwriters Laboratory Canada (ULC)
 - 6) National Fire Prevention Association (NFPA)
- .3 All mechanical piping system work, including equipment, must comply in all respects with requirements of local technical standards authorities and CSA B51, Boiler, Pressure Vessels and Pressure Piping Code. Pressure vessels and fittings defined in Clause 4.3 of CSA B51 must bear a Canadian Registration Number (CRN).
- .4 Where any governing Code, Regulation, or Standard requires preparation and submission of applications, special details, or drawings for review, prepare and submit them. Pay all associated costs associated with these submittals.

- .5 All electrical items associated with mechanical equipment are to be certified and bear the stamp or seal of a recognized testing agency such as CSA, UL, ULC, or ETL, or bear a stamp to indicate special electrical approval.
- .6 Requirements of the Contract Documents are to take precedence when they are more stringent than codes, ordinances, standards, and statutes.

1.7 IMPERIAL AND METRIC MEASUREMENTS

- .1 Conform to requirements of CAN/CSA-Z234.1, Canadian Metric Practice Guide.
- .2 Both Metric and Imperial units of measurement are indicated in the mechanical Specification. Metric measurements are "soft" and have been rounded off.

1.8 EXAMINATION OF SITE AND DOCUMENTS

- .1 When estimating the cost of the work and prior to submitting a bid for the work, carefully examine all of the bid documents and visit the site to determine and review all existing site conditions that will or may affect the work, and include for all such conditions in the bid price.

1.9 DRAWINGS AND SPECIFICATION

- .1 The mechanical drawings are performance drawings, diagrammatic, and show approximate locations of equipment and connecting services. Any information regarding accurate measurement of the building is to be taken at the site.
- .2 The mechanical drawings are intended to convey the scope of work and do not show architectural and structural details. Provide, at your cost, all offsets, fittings, transformations, and similar products required as a result of obstructions and other architectural and structural details but not shown on the drawings.
- .3 The locations of equipment and materials shown may be altered, when reviewed by the Consultant, to meet requirements of the equipment and/or materials, other equipment or systems being installed, and of the building, all at your cost.
- .4 The mechanical drawings and specification are intended to be cooperative. Perform all work that is shown, specified, or reasonably implied on the drawings but not mentioned in the specification, or vice-versa, as though fully covered by both.
- .5 In the case of discrepancies between the drawings and specifications, the documents will govern in the order specified in the General Conditions, however, when the scale and date of the drawings are the same, or where the discrepancy exists within the specification, the costliest arrangement will take precedence.

1.10 PLANNING AND LAYOUT OF THE WORK, AND ASSOCIATED DRAWINGS

- .1 Properly plan, coordinate, and establish the locations and routing of services with all trades affected prior to installation such that the services will clear each other as well as any obstructions, including structural components of the building. Unless otherwise specified, the order of right-of-way for services is to be as follows:
 - .1 piping requiring uniform pitch
 - .2 piping 100 mm (4") diameter and larger
 - .3 large ducts (main runs)

- .4 electrical cable tray and bus duct
- .5 conduit 100 mm (4") diameter and larger
- .6 piping less than 100 mm (4") diameter
- .7 smaller branch ductwork
- .8 conduit less than 100 mm (4") diameter
- .2 Unless otherwise shown or specified, conceal all work in finished areas, and conceal work in partially finished or unfinished areas to the extent made possible by the area construction. Install piping, ductwork, and similar services as high as possible to conserve headroom and/or ceiling space. Notify the Consultant where headroom or ceiling space appears to be inadequate, prior to installation of the work.
- .3 Locate all shut-off valves, balancing devices, air vents, equipment, and similar products, particularly such products located above suspended ceilings, for easy access for servicing and/or removal.
- .4 Layout Drawings: Prepare layout drawings for mechanical work with locations of equipment and routing of services generally in accordance with the Contract Documents. Confirm inverts, coordinate with and make allowances for the work of other trades, accurately layout the work, and be entirely responsible for all work installed in accordance with layout drawings. Where any invert, grade, or size is at variance with the Contract Documents, notify the Consultant prior to proceeding with the work.
- .5 Interference Drawings: Prepare dimensioned working interference drawings, supplementary to the Contract Documents, for all areas where multiple services and/or equipment occur, or where the work due to architectural and structural considerations requires special study and treatment. Review interference drawings with the Consultant before the work is installed. Where your work has been installed in such areas without preparation of interference drawings and conflicts occur, revise your work to suit at no additional cost.

1.11 GENERAL RE: INSTALLATION OF EQUIPMENT

- .1 Unless otherwise specified or indicated, install all equipment in accordance with the equipment manufacturer's recommendations and instructions. Governing Codes, Standards, and Regulations take precedence over manufacturer's instructions.

1.12 PERMITS AND FEES

- .1 Apply for, obtain and pay for all permits required to complete the mechanical work.

1.13 WORKPLACE SAFETY

- .1 Comply with requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding the use, handling, storage and disposal of hazardous materials. Submit WHMIS MSDS (Material Safety Data Sheets) for all products where required, and maintain 1 copy at the site in a visible and accessible location available to all personnel.
- .2 Comply with all requirements of Occupational Health and Safety Regulations and all other regulations pertaining to health and safety, including worker's compensation/insurance board and fall protection regulations.

- .3 If at any time during the course of the work asbestos containing materials, black mould, lead paint, or any other such materials are encountered or suspected, and not previously identified, immediately report the discovery to the Consultant and cease all work in the area in question. Do not resume work in affected areas until the situation has been properly corrected and without written approval from the Owner.

1.14 SHOP DRAWINGS AND PRODUCT DATA SHEETS

- .1 Submittals under all Division 20 shall be in accordance with General Conditions and Section 01 33 00 – Submittal Procedures.
- .2 Submit for review, shop drawings and/or product data sheets indicating in detail the design, construction, and performance of products as requested in Sections of this Specification. The number of copies of shop drawings and/or product data sheets will be as later directed.
- .3 Shop drawings are those prepared specifically for the Project. Product data sheets are copies of manufacturer's standard catalogue, etc., literature.
- .4 Endorse each copy of each shop drawing or product data sheet "Correct for Review By Consultant", or "Certified to Be In Accordance With All Requirements" and include your company name, the submittal date, and the signature of an officer of your company to indicate your review and approval.

1.15 CHANGES OR REVISIONS TO THE WORK

- .1 Whenever the Consultant proposes in writing to make a change or revision to the design, arrangement, quantity, or type of any work from that required by the Contract, prepare and submit to the Consultant for approval, a quotation being your proposed cost for executing the change or revision.
- .2 Your quotation is to be a detailed and itemized estimate of all products, material, labour, and equipment costs associated with the change or revision, plus overhead and profit percentages and all applicable taxes and duties.
- .3 Unless otherwise stated in the Contract, the following requirements apply to all quotations submitted:
 - .1 when the change or revision involves deleted work as well as additional work, the cost of the deleted work (less overhead and profit percentages but including taxes and duties) is to be subtracted from the cost of the additional work before overhead and profit percentages are applied to the additional work
 - .2 material and labour costs are not to exceed those published in local estimating price guides, less applicable trade discounts, and labour costs for journeyman and apprentice labour must not exceed prevailing rates at the time of execution of the Contract, and must reflect the actual personnel performing the work
 - .3 costs for rental tools and/or equipment are not to exceed local rental costs
 - .4 the overhead percentage will be deemed to cover all quotation costs other than actual site labour, product and materials and rentals
 - .5 all quotations, including those for deleted work, must include a figure for any required change to the Contract time.
- .4 Failure to submit a proper quotation to enable the Consultant to expeditiously process the quotation and issue a Change Order will not be grounds for any additional change to Contract time.

1.16 SCAFFOLDING, RIGGING, AND HOISTING

- .1 Unless otherwise specified or directed, supply, erect and operate all scaffolding, rigging, hoisting equipment and associated hardware required for your work. Immediately remove from the site all scaffolding, rigging, and hoisting equipment when no longer required.
- .2 Do not place major erection loads on any portion of the structure without approval from the Consultant.
- .3 Submit for review, rigging and hoisting plans, contemplated dates, permits, equipment, safety measures, and personnel prior to hoisting operations.

1.17 PROJECT CLOSEOUT SUBMITTALS

- .1 Refer to Section 01 77 00, Closeout Procedures.
- .2 Prior to application for Substantial Performance, submit all required items and documentation specified, including the following:
 - .1 Operating and Maintenance Manuals
 - .2 as-built record drawings and associated data
 - .3 extended warranties for equipment as specified
 - .4 all operating test certificates, i.e. Sprinkler Test Certificate
 - .5 final TAB report
 - .6 identified keys for mechanical equipment and/or panels for which keys are required, and all other items required to be submitted
 - .7 other data or products specified
- .3 Operating and Maintenance Manuals: Submit 3 hard copies of operating and maintenance manuals consolidated in hardcover 3 "D" ring binders, each binder sized to include approximately 25% spare space for future data, and identified permanently with the Project name, "MECHANICAL OPERATING AND MAINTENANCE MANUAL" wording, and the date. Manuals are to include the following:
 - .1 an Introduction sheet listing the Consultant's, Contractor's, and Subcontractor names, street addresses, telephone and fax numbers, and e-mail addresses
 - .2 a Table of Contents sheet, and corresponding index tab sheets
 - .3 a copy of each shop drawing or product data sheet, with manufacturer's/supplier's name, telephone and fax numbers, email address, and the email address for local source of parts and service
 - .4 pressure test reports, and certificates issued by governing authorities
 - .5 Operating Data: Operating data is to include:
 - .1 a description of each system and its controls
 - .2 control schematics for equipment/systems including building environmental controls
 - .3 if applicable, the building automation system (BAS) architecture and all required operating data

- .4 description of operation of each system at various loads together with reset schedules and seasonal variances
- .5 operation instructions for each system and each component
- .6 description of actions to be taken in event of emergencies and/or equipment failure
- .7 valve tag schedule, and flow diagrams to indicate valve locations
- .6 Maintenance Data: Maintenance data is to include:
 - .1 servicing maintenance, operation and trouble-shooting instructions for each item of equipment and each system
 - .2 schedules of tasks, frequency, tools required, and estimated task time
 - .3 complete parts lists with numbers
- .7 Performance Data: Performance data is to include:
 - .1 equipment and system start-up data sheets
 - .2 equipment performance verification test results, and final commissioning report
 - .3 final testing adjusting and balancing reports
- .8 Review Submittal: Assemble one copy of the O & M Manual and submit to the Consultant for review prior to Owner training and instructions, and assembling the remaining copies. Incorporate all comments into the final submission.
- .9 Digital O & M Manuals: Submit 1 digital versions of the hard copy manual using the latest version of Adobe Acrobat Portable Document Format and enhanced with bookmarks, internet links, and internal document links. The digital copies are to be copied to USB with custom labels which indicate the project name, date, the Consultant's name, and "Operating & Maintenance Manual for Mechanical Systems".
- .4 Record "As-Built" Drawings and Data: As work progresses at the site, clearly mark in red in a neat and legible manner on a set of white prints of the Contract Drawings, all significant changes and deviations from the routing of services and locations of equipment shown on the Contract Drawings and resulting from the issue of Addenda, Site Instructions, Change Orders, and job conditions. Use notes marked in red as required. Maintain the white print red line as-built set at the site for the exclusive use of recording as-built conditions, keep the set up-to-date at all times, and ensure that the set is always available for periodic review. The as-built set is also to include the following:
 - .1 the dimensioned location of all inaccessible concealed work
 - .2 the locations of control devices with identification for each
 - .3 the location of all piping system air vents and water hammer arrestors
 - .4 the location and tag identification for all tagged valves
 - .5 for underground piping, including service entrance/exit piping, record dimensions, invert elevations, all offsets, fittings, cathodic protection and accessories if applicable, and locate dimensions from benchmarks that will be preserved after construction is complete

- .6 for fire protection systems, record actual locations of equipment, sprinkler heads, and valves, drains, and test locations, and deviations of pipe routing and sizing from that shown on the drawings
- .7 the location of all concealed services terminated for future extension
- .5 Digital Record "As-Built" Drawings: When work on site is complete, transfer all the as-built red line information from the site as-built drawings to a recordable and identified CAD disc with CAD work of equal quality to the Contract Drawings. Obtain a CAD disc as described below.
- .6 Review and Submittal: Prior to inspection for Substantial Performance of the work, submit for review, the red line site as-built white prints, a CAD digital file of the as-built drawings, and a bound set of white prints (of equal quality to the Contract Drawings) made from the digital file. The Consultant will review the drawings and, if necessary, return the disc and the marked-up white prints for corrections or further revisions, in which case complete the corrective and/or revision work and resubmit the disc and white prints until they are determined to be acceptable, all prior to issue of a Certificate of Substantial Performance.

1.18 REQUIREMENTS FOR CONTRACTOR RETAINED ENGINEERS

- .1 All professional engineers retained by you to perform consulting services with regard to your work, i.e. seismic engineer, fire protection engineer, structural engineer, are to be members in good standing with the local Association of Professional Engineers, and are to carry and pay for errors and omissions professional liability insurance in compliance with requirements of the governing authorities in the locale of the work.
- .2 Your engineer's professional liability insurance is to protect your Consultants and Sub-Consultants, and their respective servants, agents, and employees against any loss or damage resulting from the professional services rendered by your Consultants, Sub-Consultants, and their respective servants, agents, and employees in regards to the work of this Contract.
- .3 Liability insurance requirements are as follows:
 - .1 coverage is to be a minimum of \$2,000,000.00 inclusive of any one occurrence
 - .2 the insurance policy is not to be cancelled or changed in any way without the insurer giving the Owner a minimum of thirty days written notice
 - .3 liability insurance is to be obtained from an insurer registered and licensed to underwrite such insurance in the location of the work
 - .4 evidence of the required liability insurance in such form as may be required is to be issued to the Owner, the Owner's Consultant, and Municipal Authorities as required prior to commencement of your Consultant's services

1.19 EXTENDED WARRANTIES

- .1 All extended warranties specified in mechanical work Sections of the Specification are to be full parts and labour warranties, at the site, and in accordance with requirements of the Contract warranty, but direct and in writing from the equipment manufacturer/supplier to the Owner.
- .2 Submit signed and dated copies of extended warranties which clearly state requirements specified above.

1.20 EQUIPMENT AND MATERIAL MANUFACTURER REQUIREMENTS

- .1 Equipment and materials scheduled or specified on the drawings or in the Specification have been selected to establish a performance and quality standard.
- .2 In most cases acceptable equipment and material manufacturers are listed for any product specified. Unless otherwise stated the bid price may be based on products supplied by any of the manufacturers named as acceptable for the particular product. If acceptable manufacturers are not listed for a particular product, base the bid price on the products supplied by the specified manufacturers.
- .3 If products supplied by a manufacturer named as acceptable are used in lieu of the products specified by manufacturer's name and model number, ensure that the product is equivalent in performance and operating characteristics (including energy efficiency if applicable) to the specified product. Pay for any additional costs and changes to associated or adjacent work resulting from the use of products supplied by a manufacturer other than the specified manufacturer. In addition, in equipment spaces where products named as acceptable are used in lieu of the specified products and the dimensions of such products differ from the specified products prepare and submit for review, if requested, accurately dimensioned layouts of the rooms affected to prove that all the equipment in the room will fit properly.

1.21 PHASING OF THE WORK

- .1 Phasing of the work is required to maintain the existing building in operation, all as specified in Division 01. Include all costs for phasing the work including all required "off hours" premium time labour costs.

1.22 EQUIPMENT AND SYSTEM MANUFACTURER'S CERTIFICATION

- .1 When equipment/system installation is complete, but prior to start-up procedures, arrange and pay for the equipment/system manufacturer's authorized representative to visit the site to examine the installation, and when any required corrective measures have been made, to certify in writing to the Consultant that the equipment/system installation is complete and in accordance with the equipment/system manufacturer's instructions.

1.23 EQUIPMENT AND SYSTEM START-UP

- .1 When installation of equipment/systems is complete, but prior to commissioning, perform start-up for equipment/systems as specified in mechanical work Sections in accordance with the following requirements:
- .2 submit a copy of each equipment/system manufacturer's blank start-up report sheet to the Consultant for review, and incorporate any comments
- .3 under direct on-site supervision and involvement of the equipment/system manufacturer's representative, start-up the equipment/systems, make any required adjustments, document the procedures, leave the equipment/systems in proper operating condition, and submit a complete set of start-up documentation sheets signed by the manufacturer/supplier and the Contractor

1.24 EQUIPMENT AND SYSTEM COMMISSIONING

- .1 After successful start-up and prior to Substantial Performance, commission the mechanical work in accordance with requirements of CSA Z320, Building Commissioning. Use commissioning sheets included with the CSA Standard, and any supplemental commissioning sheets required. Submit final commissioning data sheets, TAB reports, project closeout documents, and other required submittals.

1.25 EQUIPMENT AND SYSTEM O & M DEMONSTRATION & TRAINING

- .1 Refer to equipment and system operational and maintenance training requirements specified in Division 01.
- .2 Train the Owner's designated personnel in all aspects of operation and maintenance of equipment and systems as specified in mechanical work Sections of the Specification. All demonstrations and training is to be performed by qualified technicians employed by the equipment/system manufacturer/supplier. The number of hours of training and the number of Owner's personnel to be involved will be specified in the mechanical work Sections to which this Section applies.
- .3 For each item of equipment and for each system for which training is specified, prepare training modules as specified below. Operating and Maintenance Manuals are to be used during the training sessions, and training modules are to include:
 - .1 Operational Requirements and Criteria: Requirements and criteria are to include but not be limited to equipment function, stopping and starting, safeties, operating standards, operating characteristics, performance curves, and limitations.
 - .2 Troubleshooting: Troubleshooting is to include but not be limited to diagnostic instructions, test and inspection procedures.
 - .3 Documentation: Documentation is to include but not be limited to equipment/system warranties, and manufacturer's/supplier's parts and service facilities, telephone numbers, email addresses, and the like.
 - .4 Maintenance: Maintenance requirements are to include but not be limited to inspection instructions, types of cleaning agents to be used as well as cleaning methods, preventive maintenance procedures, and use of any special tools.
 - .5 Repairs: Repair requirements are to include but not be limited to diagnostic instructions, disassembly, component removal and repair instructions, instructions for identifying parts and components, and review of any spare parts inventory.
- .4 Assemble the training modules into a training manual and submit a copy to the Consultant for review prior to scheduling training. Ensure that each participant in each training session has all required training material.
- .5 Schedule demonstrations and training at mutually agreed to times with a minimum of 7 working days notice.
- .6 Demonstration and Training Confirmation: Obtain a list of personnel to receive demonstration and training from the Consultant, and have each participant sign the list to confirm that he/she understood the demonstration and training session.

2 PRODUCTS

NOT APPLICABLE

3 EXECUTION

NOT APPLICABLE

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 This Section specifies products, common criteria and characteristics, and methods and execution that are common to one or more mechanical work Sections of the Specification, and it is intended as a supplement to each Section and is to be read accordingly.

1.3 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data:
 - .1 Submit product data sheets for:
 - .1 pressure gauges and thermometers
 - .2 strainers
 - .3 drain valves
 - .4 flexible connections
 - .5 equipment support assemblies, other than concrete pads
- .3 Samples:
 - .1 submit a sample of each proposed type of access door, and samples of materials and any other items as specified in mechanical work Sections of the Specification
- .4 Shop Drawings:
 - .1 Access door locations: submit white prints of architectural reflected ceiling plan drawings and elevation drawings to indicate proposed access door locations in walls and ceilings in finished areas
 - .2 List of equipment nameplates: submit a list of equipment identification nameplates indicating proposed wording and sizes
 - .3 Pipe & duct identification: submit a list of pipe and duct identification colour coding and wording
 - .4 Valve tag chart: submit a proposed valve tag chart and a list of proposed valve tag numbering and identification wording
- .5 Drive belts: as specified in Part 2 of this Section, submit a spare belt set, tagged and identified, for each belt driven piece of equipment
- .6 Additional submittals: submit any other submittals specified in this Section or other mechanical work Sections of the Specification

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:
 - .1 As listed in materials specified in this section.
 - .2 Requests for substitutions shall be made in conformance with Section 01 33 00 – Submittal Procedures.
 - .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.
 - .4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

- .1 Firestopping And Smoke Seal Materials
 - .1 Firestopping and smoke seal system materials for mechanical penetrations through fire rated construction are specified in the mechanical work Section entitled Firestopping and Smoke Seal Systems and the work is to be done as part of the mechanical work.
- .2 Pipe Escutcheon Plates
 - .1 One-piece chrome plated brass or #4 finish type 302 stainless steel plates with matching screws for attachment to the building surface, each plate sized to completely cover the pipe sleeve or building surface opening, and to fit tightly around the pipe or pipe insulation.
- .3 Piping Hangers And Supports
 - .1 General: Pipe hanger and support materials, including accessories, are to be, unless otherwise specified, in accordance with the Manufacturers Standardization Society (MSS) Standard Practice Manual SP-58, Pipe hangers and Supports-Materials, Design and Manufacture, and where possible, MSS designations are indicated with each product specified below. Conform to the following requirements:
 - .1 Unless otherwise specified, all ferrous hanger and support products are to be electro-galvanized.
 - .2 Hangers and supports for insulated piping are to be sized to fit around the insulation and the insulation jacket.
 - .2 Horizontal Suspended Piping: Hangers and supports are to be:
 - .1 Adjustable steel clevis hanger – MSS Type 1.
 - .2 Adjustable swivel ring band type hanger – MSS Type 10.

- .3 Horizontal Pipe On Vertical Surfaces: Epoxy coated steel pipe stays are not permitted. Supports are to be:
 - .1 Carbon steel offset pipe clamp to support pipe away from the support surface.
 - .2 Heavy-duty steel pipe bracket – MSS type 26.
 - .3 Single steel pipe hook .
- .4 Floor Supports For Vertical Risers: Supports are to be:
 - .1 Copper tubing riser clamp (plastic coated) – MSS Type 8.
 - .2 Heavy-duty steel riser clamp – MSS Type 8.
- .5 Vertical Piping on Vertical Surfaces: Epoxy coated steel pipe stays are not permitted. Supports are to be:
 - .1 Carbon steel offset pipe clamp to support pipe away from the support surface.
 - .2 Heavy-duty steel pipe bracket or soil pipe bracket – MSS Type 26.
 - .3 Extension split pipe clamp – MSS Type 12.
- .6 Special Hangers and Supports: Special hangers and supports for various applications are as follows:
 - .1 For sections of piping connected to vibration isolated equipment – hangers and supports as specified above but complete with MSS Type 48 spring cushions.
 - .2 For fire protection piping – generally as above but ULC listed and/or FM approved, and in accordance with Chapter requirements of the NFPA Standard applicable to the piping system.
 - .3 For bare horizontal copper piping – generally as above but factory vinyl coated to prevent direct copper/steel contact.
 - .4 For bare copper vertical piping – corrosion resistant ferrous clamps with flexible rubber gasket type material (not tape) to isolate the pipe from the clamp.
 - .5 Insulation protection shields to & including 40 mm (1½") diameter – galvanized steel shields with ribs to keep the shield centred on the hanger – MSS SP-58 Type 40.
- .7 Hanger Rods: Electro-galvanized carbon steel (unless otherwise specified), round, threaded, complete with captive machine nuts with washers at hangers, sized to suit the loading in accordance with Table 3 in MSS SP-58, but, in any case, minimum 9.5 mm (3/8") diameter and in accordance with ASTM A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength, and ASME B18.31.3, Threaded Rods (Inch Series).
- .4 Piping Strainers – “Y” Shaped
 - .1 Wye shaped strainers, bronze with sweat type or flanged connections in copper piping, cast iron with screwed, flanged, or grooved end connections in steel piping, minimum 1725 kPa (250 psi) rated and complete with a removable perforated type 304 stainless steel 20 mesh screen, and, for strainers 40 mm (1½") diameter and larger, a blow down pipe connection tapping.
- .5 Piping Drain Valves

- .1 Minimum 2070 kPa (300 psi) water rated, 20 mm ($\frac{3}{4}$ ") diameter, straight pattern full port bronze ball valves, each complete with a lever handle, threaded outlet suitable for coupling connection of 20 mm ($\frac{3}{4}$ ") diameter garden hose, and a cap and chain.
- .6 Access Doors
 - .1 Prime coat painted steel (unless otherwise specified) flush access doors, each complete with a minimum #16 gauge frame, minimum #18 gauge door panel, heavy-duty rust-resistant concealed hinges, a positive locking screwdriver lock, and mounting and finishing features to suit the particular construction in which it is to be installed.
 - .2 Access door sizes are to suit the concealed work for which they are supplied, and wherever possible they are to be of a standard size for all applications, but, in any case, they are to be minimum 300 mm x 300 mm (12" x 12") for hand entry and 600 mm x 600 mm (24" x 24") for body entry.
 - .3 Access doors in fire rated construction are to be ULC listed and labelled and of a rating to maintain the fire separation integrity.
 - .4 Where access doors are located in surfaces where special finishes are required, they are to be of a recessed door type capable of accepting the finish in which they are to be installed so as to maintain the final building surface appearance throughout, and constructed of stainless steel with a #4 finish.
- .7 Pressure Gauges And Thermometers
 - .1 Pressure Gauges: Adjustable, glycerine filled, stainless steel, 100 mm or 115 mm (4" or 4½") diameter, in accordance with requirements of ASME B40.100, Pressure Gauges and Gauge Attachments, complete with a dual scale white dial with a scale range such that the working pressure of the system is at the approximate mid-point of the scale, each accurate to within 1% of scale range, and with additional accessories/requirements as follows:
 - .1 A bronze ball type shut-off valve in the piping to each pressure gauge.
 - .2 A brass pressure snubber for each pressure gauge for piping and equipment with normal everyday flow.
 - .3 ULC listing and labelling for pressure gauges in fire protection piping.
 - .2 Thermometers: Round, adjustable, hermetically sealed stainless steel, 125 mm (5") diameter, adjustable (90°) angle bimetal dial type thermometers in accordance with requirements of ASME B40.200, Thermometers, Direct Reading and Remote Reading, each complete with:
 - .1 A white aluminum dual scale dial with black and blue markings and a range such that the working temperature of the system is the approximate mid-point of the scale.
 - .2 A suitable thermowell.
 - .3 For thermometers in domestic water piping, ANSI/NSF 61 lead free certification.
- .8 Equipment Belt Drives
 - .1 ANSI/RMA Standard V-belt type rated at minimum 1.5 times the motor nameplate rating, and in accordance with the following requirements:
 - .1 Belts are to be reinforced cord and rubber, and multiple belts are to be matched sets.

- .2 Sheaves are to be cast iron or steel, secured to shafts with removable keys unless otherwise specified, standard adjustable pitch ($\pm 10\%$ range) for motors under 10 HP, fixed pitch type with split tapered bushing and keyway for motors 10 HP and larger, and, if required, replaced as part of the mechanical work to suit system air/water quantity testing and balancing work.
- .3 Motor slide rail adjustment plates are to allow for centre line adjustment.
- .2 Supply a spare belt set (tagged and identified) for each belt drive and hand to the Owner upon Substantial Performance of the work.
- .9 Equipment Drive Guards And Accessories
 - .1 For V-belt drives - removable, four sided, fully enclosed, galvanized sheet steel guards to OSHA standards, cleaned, factory primed and painted with yellow equipment enamel, complete with a 2-piece full length hinged front panel to permit belt maintenance or replacement without removing the guard, and 40 mm (1½") diameter tachometer openings at each shaft location.
 - .2 For flexible couplings - removable "U" shaped galvanized steel guards to OSHA Standards with a 2.3 mm (3/32") thick frame and expanded mesh face.
 - .3 For unprotected fan inlets & outlets - unless otherwise specified, removable 20 mm (¾") galvanized steel wire mesh with galvanized steel frames, all to OSHA Standards.
- .10 Electric Motors
 - .1 Unless otherwise specified, motors are to conform to EEMAC Standard MG1, applicable IEEE Standards, and applicable CSA C22.2 Standards, and are to meet NEMA standards for maximum sound level ratings under full load. Confirm motor voltages prior to ordering.
 - .2 Vertically mounted and submersible motors are to be purposely designed for mounting in this attitude.
 - .3 AC Motor Efficiency: The efficiency of single phase AC motors to 1 HP is to be in accordance with CAN/CSA C747. The efficiency of all three phase motors 1 HP and larger is to be in accordance with CAN/CSA C390 or IEEE 112B.
 - .4 Single Phase AC Motors: Unless otherwise specified, AC motors smaller than ½ HP are to be 115 volt, continuous duty capacitor start type with an EEMAC 48 or 56 frame size, solid base, heavy-gauge steel shell with solid die-cast end shields, dynamically balanced die-cast rotor, integral automatic reset thermal overload protection, Class "B" insulation, and a 1.15 service factor at 40°C (105°F) ambient temperature.
 - .5 Two-Speed AC Motors: Two-speed motor(s) are to be as specified above but two-speed, single or double winding type as specified and/or scheduled.
 - .6 Motors for VFD's: Motors for equipment with variable frequency drives are to be generally as specified above but inverter duty type to NEMA Standard MG-1, Section IV, Part 31, quantified by CSA for operation from a variable frequency drive of the type specified, and complete with Class "H" insulation and a shaft grounding bearing protection ring.
 - .7 Acceptable Manufacturers: Acceptable motor manufacturers are:
 - .1 Westinghouse Canada Inc.
 - .2 Canadian General Electric

- .3 Baldor Electric Co.
 - .4 U.S. Electrical Motors
 - .5 Weg Electric Corp.
 - .6 Marathon Electric
 - .7 Magna-Tech Canada
 - .8 Toshiba Corp.
 - .9 Leeson Canada
- .11 Mechanical Work Identification Materials
- .1 In accordance with existing identification at the site.
 - .2 Equipment Nameplates: Minimum 1.6 mm (1/16") thick 2-ply laminated coloured plastic plates, minimum 12 mm x 50 mm (½" x 2") for smaller items such as damper motors and control valves, minimum 25 mm x 65 mm (1" x 2½") for equipment, and minimum 50 mm x 100 mm (2" x 4") for control panels and similar items. Additional requirements are as follows:
 - .1 Unless otherwise specified or required, each nameplate is to be white, complete with bevelled edges and black engraved capital letter wording to completely identify the equipment and its use with no abbreviations.
 - .2 Wording is generally to be as per the drawings, i.e. Fan EF-1, and is to include equipment service and building area/zone served, but must be reviewed prior to engraving.
 - .3 Supply stainless steel screws for securing nameplates in place.
 - .4 Nameplates for equipment suspended above floor level or generally not within easy viewing from floor level are to be increased in size so as to be easily readable from floor level
 - .3 Valve Tags: Coloured, 40 mm (1½") square, 2-ply laminated plastic with bevelled edges, red-white, green-white, yellow-black, etc., to match the piping identification colour, each complete with a 3.2 mm (1/8") diameter by 100 mm (4") long brass plated steel bead chain, and four lines of engraved maximum size identification wording, i.e.:
 - .1 VALVE V2
 - .2 100 mm (4")
 - .3 CHILL. WATER
 - .4 NORMALLY OPEN
 - .4 Standard Pipe Identification: Standard pipe identification is to be equal to Smillie McAdams Summerlin Ltd. or Brady vinyl plastic with indoor/outdoor type vinyl ink lettering and directional arrows, as follows:
 - .1 For pipe to and including 150 mm (6") diameter, coiled type snap-on markers of a length to wrap completely around the pipe or pipe insulation.
 - .2 For pipe larger than 150 mm (6") diameter, saddle type strap-on markers with 2 opposite identification locations and complete with nylon cable ties.

- .5 Standard Pipe Identification Wording and Colours: Identification wording and colours for pipe identification materials are to be as follows:

PIPE SERVICE	IDENTIFICATION COLOUR	LEGEND
sanitary drainage	green	SAN.
fire protection standpipe	red	F.P. STANDPIPE
fire protection sprinklers	red	F.P. SPRINKLER
heat pump loop – load side supply	green	H.P. LOOP SUPPLY
Heat pump loop – load side return	green	H.P. LOOP RETURN

- .6 Colours For Legends & Arrows: Colours for pipe identification legends and directional arrows are to be as follows:

IDENTIFICATION COLOUR	LEGEND & ARROW COLOUR
yellow	black
green	white
red	white

- .7 Duct Identification: Custom made Mylar stencils with 50 mm (2") high lettering to accurately describe the duct service, i.e. "AHU-1 SUPPLY", complete with a directional arrow, and coloured ink with ink pads and roller applicators. Ink colour is generally to be black but must contrast with the lettering background.

.12 Flexible Connectors

- .1 Double wall stainless steel flexible connectors for piping connections to vibration isolated equipment, each selected by the manufacturer to suit the application. Shop drawings or product data sheets must indicate construction and performance requirements that suit the application. Acceptable manufacturers are:

- .1 Hyspan Precision Products Inc.
- .2 Senior Flexonics Ltd.
- .3 The Metraflex Co.

3 EXECUTION

3.1 INSTALLATION

.1 General Piping And Ductwork Installation Requirements

- .1 Unless otherwise specified, locate and arrange horizontal pipes and ducts above or at the ceiling on floors on which they are shown, arranged so that under consideration of all other work in the area, the maximum ceiling height and/or usable space is maintained. If required to maintain ceiling heights, reroute and/or resize ductwork, with Consultant's approval.

- .2 Unless otherwise specified, install all work concealed in finished spaces, and concealed to the degree possible in partially finished and unfinished spaces. Refer to and examine the Architectural drawings and room finish schedules to determine finished, partially finished, and unfinished areas. Note that walls which are painted are considered finished.
 - .3 Install all pipes and ducts parallel to building lines and to each other.
 - .4 Neatly group and arrange all exposed work.
 - .5 Service and Maintenance Access: Locate all work to permit easy access for service or maintenance as required and/or applicable. Locate all valves, dampers and any other equipment which will or may need maintenance or repairs and which are installed in accessible construction so as to be easily accessible from access doors. Where valves, dampers and similar piping or ductwork accessories occur in vertical services in shafts, pipe spaces or partitions, locate the accessories at the floor level.
 - .6 Dissimilar Metal Pipe Connections: Make all connections between pipes of different materials using proper approved adapters. Provide cast brass dielectric type adapters/unions at connections between ferrous and copper pipe.
 - .7 Cleaning: Carefully clean all ducts, pipe and fittings prior to installation. Temporarily cap or plug ends of pipe, ducts and equipment which are open and exposed during construction.
 - .8 Insulation Clearance: Install piping and ductwork which are to be insulated so that they have sufficient clearance to permit insulation and finish to be applied continuously and unbroken around the pipe or duct, except for ductwork at fire barriers, in which case the insulation will be terminated at each side of the duct fire damper.
 - .9 Surfaces To Receive Your Work: Inspect surfaces and structure prepared by other trades before performing your work. Verify that surfaces or the structure to receive your work have no defects or discrepancies which could result in poor application or cause latent defects in installation and workmanship. Report defects in writing. Installation of your work will constitute acceptance of such surfaces as being satisfactory.
 - .10 Piping Rust and Dirt: Any ferrous piping that exhibits in excess of 5% surface rust, either inside or outside or both is to be wire brush cleaned to bare metal and coated with suitable primer. Steel pipe, fittings and accessories are to be free of corrosion and dirt when work is complete or prior to being concealed from view. Where dirt is evident, clean the piping prior to being concealed.
 - .11 Repair of Finished Surfaces: For factory applied finishes, repaint or refinish all surfaces damaged during shipment and installation. The quality of the repair work is to match the original finish. This requirement also applies to galvanized finishes.
 - .12 Unions and Flanges: Whether shown or specified on the drawings or not, provide screwed unions or flanges in all piping connections to equipment, and in regular intervals in new piping runs in excess of 12 m (40') to permit removal of sections of piping.
 - .13 Elbows and Eccentric Reducers: Unless otherwise specified and except where space limitations do not permit, all piping elbows are to be long radius. Eccentric reducers are to be installed with the straight side at the top of the piping.
- .2 Pipe Joint Requirements
 - .1 Do not make pipe joints in walls or slabs.
 - .2 Ream all piping ends prior to making joints.

- .3 Screwed Steel Piping: Properly cut threads in screwed steel piping and coat male threads only with Teflon tape or paste, or an equivalent thread lubricant. After the pipe has been screwed into the fitting, valve, union, or piping accessory, not more than 2 pipe threads are to remain exposed.
 - .4 Welded Steel Piping: Site bevel steel pipe to be welded or supply mill bevelled pipe. Remove all scale and oxide from the bevels and leave smooth and clean. Use factory made welding tees or welding outlet fittings for piping branches off mains. Do not use shop or site fabricated fittings unless written approval has been obtained.
 - .5 Welding Requirements: Welding is to be TSSA registered. Welded joints are to be made by CWB certified, licensed journeyman welders qualified in accordance with CSA B51, Boiler Pressure Vessel and Pressure Piping Code, and who are in possession of a proper certificate of qualification for each procedure to be performed. Each weld is to be identified with the welder's identification symbol, and welds are not to be concealed until they have been inspected and approved. Electrodes are to be in accordance with CSA W48 Series, Electrodes, and requirements of CAN/CSA W117.2, Safety in Welding, Cutting and Allied Processes are to be followed.
 - .6 Flanged Joints: Unless otherwise specified, make all flanged joints with EDPM gasket materials to suit the application, and bolts and nuts. Bolts are not to be longer than the length necessary to screw the nut up flush to the end of the bolt. Bolts used for flanged connections in all piping with a working pressure of 690 kPa (100 psi) and greater are to be ASTM A-193, Grade B-7, with heavy hexagon nuts to ASTM A-194, CL-2H. Provide suitable washers between each bolt head and the flange and between each nut and the flange.
 - .7 Examination of Flanged Joints: A random check of bolted flanged connections will be made to verify that flanged connections are properly mated with no shear force acting on bolts. Supply all labour to disconnect and reconnect the selected flanged joints. If improperly mated joints are found, remove and reinstall the affected piping so that the flanges mate properly. If improperly mated joints are found, additional joints will be checked, and you will be responsible for the repair of any other improper joints discovered.
 - .8 Soldered Joints: Unless otherwise specified make all soldered joints in copper piping using flux suitable for and compatible with the type of solder being used. Clean the outside of the pipe end and the inside of the fitting, valve, or similar accessory prior to soldering. Comply with requirements of ASTM B828, Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
 - .9 Mechanical Joints: Install mechanical joint fittings and couplings in accordance with the manufacturer's instructions.
 - .10 Grooved Pipe & Coupling Joints: Make arrangements with the coupling and fitting manufacturer for shop and/or site instructions and demonstrations as required, and adhere to the manufacturer's instructions with respect to pipe grooving, support, type of gasket required, anchoring and guiding the grooved piping system.
 - .11 PVC Piping Solvent Weld Joints: Solvent weld PVC piping in 2 parts, primer stage and cementing stage, in accordance with the manufacturer's recommendations, ASTM D2855, and CSA requirements.
 - .12 PVC Piping Gasketed Joints: Install PVC piping with gasketed joints in accordance with the manufacturer's current published specifications, instructions and recommendations, and CSA requirements.
- .3 Installation Of Pipe Sleeves

- .1 Sleeves In Fire Rated Construction: Where sleeves are required in fire rated construction they are to be Schedule 40 galvanized steel pipe or Class 4000 cast iron pipe
 - .2 Size sleeves, unless otherwise specified, to leave 12 mm (½") clearance around the pipes, or where the pipe is insulated, a 12 mm (½") clearance around the pipe insulation.
 - .3 Pack and seal the void between the pipe sleeves and the pipe or pipe insulation in non-fire rated construction for the length of the sleeves as follows:
 - .1 Interior construction: pack sleeves in interior construction with mineral wool and seal both ends of the sleeves with non-hardening silicone base caulking compound.
 - .2 Exterior walls above grade: pack sleeves in exterior walls above grade with mineral wool and seal both ends of the sleeves water-tight with approved non-hardening silicone base caulking compound unless mechanical type seals have been specified.
 - .3 Exterior walls below grade: seal sleeves in exterior walls below grade (and any other wall where water leakage may be a problem) with link type mechanical seals as specified below.
 - .4 Terminate piping for sleeves that will be exposed so that the sleeve is flush at both ends with the building surface concerned so that the sleeve may be completely covered by an escutcheon plate, except for sleeves in waterproof floors which are to terminate 100 mm (4") above the finished floor.
 - .5 "Gang" type sleeving will not be permitted.
 - .6 Where sleeves are provided in non-fire rated construction for future piping, or where piping has been removed from existing sleeves, cap and seal both ends of the sleeved opening.
- .4 Installation Of Pipe Escutcheon Plates
 - .1 Provide escutcheon plates suitable secured over all new exposed piping passing through finished building surfaces. A finished building surface is any surface with a factory finish or that receives a site applied finish.
 - .2 Install the plates so that they are tight against the building surface concerned, and ensure that the plates completely cover pipe sleeves and/or openings, except where waterproof sleeves extend above floors, in which case the plate is to fit tightly around the sleeve.
 - .5 Installation Of Fastening And Securing Hardware
 - .1 Provide all fastening and securing hardware required for mechanical work to maintain installations attached to the structure or to finished floors, walls and ceilings in a secure and rigid manner capable of withstanding the dead loads, live loads, superimposed dead loads, and any vibration of the installed products.
 - .2 Use fasteners compatible with structural requirements, finishes and types of products to be connected. Do not use materials subject to electrolytic action or corrosion where conditions are liable to cause such action.
 - .3 Where the floor, wall or ceiling construction is not suitable to support the loads, provide additional framing or special fasteners to ensure proper securement to the structure that is to support the products. Provide reinforcing or connecting supports where required to distribute the loading to the structural components. Submit support details for review prior to installation.
 - .4 Obtain written consent before using explosive actuated fastening devices. If consent is obtained, comply with requirements of CSA Standards CAN3-Z166.1 and CAN3-Z166.2.

- .5 Do not attach fasteners to steel deck without written consent from the Consultant.
- .6 Installation Of Pipe Hangers And Supports
 - .1 Provide all required pipe hangers and supports.
 - .2 Provide any additional structural steel channels, angles, inserts, beam champs and similar accessories required for hanging or supporting pipe. Unless otherwise shown or specified, hang or support pipes from the structure only.
 - .3 For Insulated Pipe: Size the hanger or support to suit the diameter of the insulated pipe and install the hanger or support on the outside of the insulation and insulation finish.
 - .4 Horizontal Above Ground Piping: Unless otherwise shown or specified, hang and/or support horizontal pipe above ground by means of hangers and/or supports specified in Part 2 of this Section. Unless otherwise shown or specified, hangers for suspended pipe to and including 25 mm (1") diameter are to be clevis type or adjustable ring type, and hangers for suspended pipe 40 mm (1½") diameter and larger are to be adjustable clevis type. Space hangers and supports in accordance with the following:
 - .1 Cast iron pipe: hang or support at every joint with maximum 2.4 m (8') spacing.
 - .2 Copper and steel pipe: hang or support at spacing in accordance with the following schedule:

PIPE DIA.	MAX. SPACING STEEL (meters)	MAX. SPACING COPPER (meters)
to 25 mm (1")	2.4 m (8')	1.8 m (6')
40 mm (1½")	2.7 m (9')	2.4 m (8')
50 mm (2")	3.0 m (10')	2.7 m (9')
65 mm (2½")	3.6 m (12')	3.0 m (10')
75 mm (3")	3.6 m (12')	3.0 m (10')
90 mm (3½")	3.6 m (12')	3.6 m (12')
100 mm (4")	4.2 m (14')	3.6 m (12')
250 mm (10")	6.0 m (20')	
300 mm (12")	6.7 m (22')	

- .3 Flexible grooved pipe/coupling joint piping: as above but with not less than 1 hanger or support between joints.
- .4 Changes in direction: where pipes change direction, either horizontally or vertically, provide a hanger or support on the horizontal pipe not more than 300 mm (12") from the elbow, and where pipes drop from tee branches, support the tees in both directions not more than 50 mm (2") on each side of the tee.
- .5 Grouped piping: when pipes with the same slope are grouped and a common hanger or support is used, space the hanger or support to suit the spacing requirement of the smallest pipe in the group and secure pipes in place on the common hanger or support.

- .5 Vertical Piping: Unless otherwise shown or specified, support vertical piping by means of supports specified in Part 2 of this Section, spaced in accordance with the following:
 - .1 Support vertical pipes at maximum 3 m (10') intervals or at every floor, whichever is lesser.
 - .2 For sections of vertical piping with a length less than 3 m (10'), support the pipe at least once.
 - .3 For all vertical cast iron plain end pipe (mechanical joint type), secure the riser or pipe clamp around the pipe under a flange integral with the pipe for vertical support purposes, or provide a length of hub and spigot pipe to facilitate proper support.
 - .4 For all vertical steel pipe risers in excess of 3 m (10'), weld shear lugs to the pipe to carry the load.
- .6 Isolation for Bare Copper piping or Tubing: Each hanger, support or securement for horizontal bare copper is to be plastic coated to prevent direct contact between the pipe and the ferrous hanger. Each wall or floor clamp for vertical bare copper piping is to be isolated from the pipe by means of strips of flexible rubber inserts. The use of painted ferrous hangers and supports, including those painted with copper coloured paint, is not acceptable. Site application of tape or other types of isolation is not acceptable.
- .7 Insulation Protection Shields: For insulated horizontal piping to and including 40 mm (1½") diameter, provide galvanized steel insulation protection shields between the insulation and the hanger or support. Install shields immediately after the pipe is insulated.
- .8 Pipe Support from Steel Deck: Do not support piping from steel deck without written consent from the Consultant.
- .7 Installation Of Pipeline Strainers
 - .1 Provide strainers in piping systems where shown on the drawings or identified in specifications.
 - .2 Equip each strainer with a construction screen and remove after piping has been flushed and cleaned. Install permanent screens/mesh.
 - .3 Provide isolating valves in piping a maximum of 3 m (10') from the strainer on each side of a strainer.
 - .4 For "Y" shaped strainers 40 mm (1½") diameter and larger, provide blow-off piping complete with a shut-off valve with cap and chain, and terminate blow-off piping downward in a vertical position.
- .8 Installation Of Equipment Drains And Piping Drain Valves
 - .1 Unless otherwise shown or specified, provide minimum 40 mm (1½") diameter type DWV copper drain piping from equipment overflows, condensate drain pans, pump bases, fresh air intake plenum drains, etc., to a floor drain location. Equip the drain piping with deep seal traps located in heated areas.
 - .2 Provide a drain valve at the bottom of piping risers, at all other piping low points, and wherever else shown and/or specified.
 - .3 Locate drain valves so that they are easily accessible.
- .9 Supply Of Access Doors

- .1 Supply access doors to give access to all mechanical work which may need maintenance or repair but which is concealed in inaccessible construction, except as otherwise specified herein or on the drawings.
 - .2 Locate access doors as inconspicuously as possible in walls and partitions and arrange mechanical work such that it is clearly within view and accessible for inspection and servicing, and to suit access door locations shown on the reviewed and approved white prints of reflected ceiling plan and elevation drawings submitted as per Part 1 of this Section.
 - .3 Group piping and ductwork to ensure the minimum number of access doors is required. Access doors will be installed by the trades responsible for the particular type of construction in which the doors are required.
 - .4 Submit a sample of each proposed access door for review prior to ordering.
- .10 General Re: Installation Of Valves
- .1 Generally, valve locations are indicated or specified on drawings or specified in Sections of the Specification where the valves are specified, however, regardless of locations shown or specified, the following requirements apply:
 - .1 Provide shut-off valves to isolate all systems, at the base of all vertical risers, in branch take-offs at mains and risers on all floors, to isolate all equipment, to permit work phasing as required, and wherever else required for proper system operation and maintenance.
 - .2 Install shut-off valves with handles upright or horizontal, not inverted, and located for easy access.
 - .3 Unless otherwise specified, provide a check valve in the discharge piping of each pump.
 - .4 Valve sizes are to be the same as the connecting pipe size.
 - .5 Valves are to be permanently identified with the size, manufacturer's name and figure number, and wherever possible, valves are to be the product of the same manufacturer.
 - .6 The manufacturer's name, valve model or figure number, and the pressure rating are to be clearly marked on each valve.
 - .7 For valves in insulated piping, the design of the valve stem, handle and operating mechanism is to be such that the insulation does not have to be cut or altered in any manner to permit valve operation.
- .11 Installation Of Pressure Gauge & Thermometer Access Fittings
- .1 Provide pressure gauge and thermometer access fittings in 6.4 mm (¼") threaded opening fittings for insertion/removal of piping mounted pressure gauges and thermometers. Where piping is insulated, provide extended length access fittings to accommodate the insulation.
 - .2 Unless pressure gauges and/or thermometers are provided with equipment, provide access fittings in the following locations:
 - .1 Wherever shown and/or specified on the drawings or in the Specification.
 - .3 All metal surfaces that are in contact with domestic water are to be NSF/ANSI 61 certified.
- .12 Installation Of Pressure Gauges And Thermometers

- .1 Pressure Gauges: Provide pressure gauges in the following locations:
 - .1 Wherever shown and/or specified on the drawings or in the Specification.
- .2 Thermometers: Provide thermometers in the following locations:
 - .1 Wherever shown and/or specified herein or on the drawings.
- .3 Installation Requirements: Conform to the following installation requirements:
 - .1 For installation of thermometers in piping wells, provide a coat of metallic base heat transfer paste or grease in the piping well.
 - .2 For pressure gauges in piping at equipment locations, install the pressure gauge between the equipment and the first pipe fitting.
 - .3 Locate, mount and adjust all instruments so they are easily readable.
 - .4 Where pressure gauges and/or thermometers are located at high level or in an area where they cannot be easily seen, provide remote reading instruments.
 - .5 All metal surfaces that are in contact with domestic water are to be NSF/ANSI 61 certified.
- .13 Installation Of Equipment Drive Guards And Accessories
 - .1 Provide OSHA guards for all exposed accessible rotating parts such as belt drives, couplings, fan wheels, and shaft ends on all mechanical equipment.
 - .2 Install belt guards to allow movement of motors for adjusting belt tension.
 - .3 Provide a means to permit lubrication and use of test instruments with guards in place.
 - .4 Secure guards to the equipment or equipment base but do not bridge sound or vibration isolation.
 - .5 Where equipment oil level gauges, oil reservoirs, grease cups, or grease gun fittings are integral with the equipment but are not easily accessible for service, extend to an accessible location using aluminium or copper tubing.
- .14 Mechanical Work Identification
 - .1 Identify all new/relocated mechanical work in accordance with existing identification standards at the site.
 - .2 Exposed Piping & Ductwork: Identify new exposed piping and ductwork as per Part 2 of this Section in locations such that it can be seen from the floor or service platforms, as follows:
 - .1 At every end of every piping or duct run.
 - .2 Adjacent to each valve, strainer, damper and similar accessory.
 - .3 At each piece of connecting equipment.
 - .4 On both sides of every pipe and duct passing through a floor, wall, or partition.
 - .5 At 6 m (20') intervals on pipe and duct runs exceeding 6 m (20') in length.
 - .6 At least once in each room, and at least once on pipe and duct runs less than 6 m (20') in length.

- .3 Concealed Piping & Ductwork: Unless otherwise specified identify new concealed piping and ductwork as per Part 2 of this Section in locations as follows:
 - .1 At points where pipes or ducts enter and leave rooms, shafts, pipe chases, furred spaces, and similar areas.
 - .2 At maximum 6 m (20') intervals on piping and ductwork above suspended accessible ceilings, and at least once in each room.
 - .3 At each access door location.
 - .4 At each piece of connected equipment, automatic valve, etc.
- .4 Equipment: Provide an identification nameplate for each new piece of equipment, including items such as control valves, motorized dampers, instruments, and similar products. Secure nameplates in place, approximately at eye level if possible, with stainless steel screws unless such a practice is prohibitive, in which case use epoxy cement applied to cleaned surfaces. Locate all nameplates in the most conspicuous and readable location. Unless otherwise specified, equipment identification terminology is to be as per drawing identification.
- .5 Valve Tagging & Chart: Tag valves and prepare a valve tag chart in accordance with the following requirements:
 - .1 Attach a valve tag to each new valve, except for valves located immediately at the equipment they control.
 - .2 Prepare a computer printed valve tag chart to list all tagged valves, with, for each valve, the tag number, location, valve size, piping service, and valve attitude (normally open or normally closed).
 - .3 If an existing valve tag chart is available at the site, valve tag numbering is to be an extension of existing numbering and the new valve tag chart is to incorporate the existing chart.
 - .4 Frame and glaze one copy of the chart and, unless otherwise directed, affix to a wall in each main mechanical and/or equipment room.
 - .5 Include a copy of the valve tag chart in each copy of the operating and maintenance instruction manuals.
 - .6 Hand an identified and packaged (jewel case) compact disc of the valve tag chart to the Owner at the time the O & M Manuals are submitted.
- .6 Ceiling Tacks or Stickers: Where new shut-off valves, control dampers, sensors, and similar items which will or may need maintenance and/or repair are located above accessible suspended ceilings, provide round coloured ceiling tacks in the ceiling panel material, or stickers equal to Brady "Quick Dot" on the ceiling grid material to indicate locations of the items. Unless otherwise specified, ceiling tack or sticker colours are to be as follows:
 - .1 HVAC piping valves and equipment yellow
 - .2 Fire protection valves and equipment red
 - .3 Plumbing valves and equipment green
 - .4 HVAC ductwork dampers and equipment blue

- .5 Control system hardware and equipment orange
- .15 Finish Painting Of Mechanical Work
 - .1 Finish painting of exposed mechanical work is specified in Division 09 and is part of the work of Division 09.
- .16 Pipe Leakage Testing
 - .1 Before new piping has been insulated or concealed, and before equipment, fixtures and fittings have been connected, test all piping for leakage.
 - .2 Tests may be witnessed by the Consultant and/or Owner's representative, and, where required, representatives of governing authorities. Give ample notice of tests in writing and verify attendance. Have completed test report sheets dated and signed by those present to confirm proper test results.
 - .3 When circumstances prevent scheduled tests from taking place, give immediate and adequate notice of cancellation to all who were scheduled to attend.
 - .4 Gravity Drainage & Vent Piping: Securely close all openings and pipe ends and fill piping with water up to the highest level, and ensure that the water stands at the same level for a minimum of 2 hours. After the fixtures and fittings are set and the pipes connected to the building drain or drains, turn on water into all pipe, fixtures, fittings and traps in order to detect any imperfect material or workmanship. Make a smoke test if required by the Municipality. At your option, drain and vent piping may be pressure tested with cold water at 345 kPa (50 psi) for 2 hours with zero leakage.
 - .5 Sprinkler System Piping: Test all system piping in accordance with requirements of NFPA No. 13, "INSTALLATION OF SPRINKLER SYSTEMS", and in accordance with any additional requirements of governing authorities.
 - .6 Heat Transfer (HVAC) System Piping: Test piping with cold water at a pressure of 1035 kPa (150 psi) for a minimum of 2 hours.
 - .7 General Re: All Testing: The following requirements apply to all testing:
 - .1 Ensure that all piping has been properly flushed, cleaned and is clear of foreign matter prior to pressure testing.
 - .2 Temporarily remove or valve off all piping system specialties or equipment which may be damaged by test pressures prior to pressure testing the systems, and flush piping to remove foreign matter.
 - .3 When testing is carried out below the highest level of the particular system, increase the test pressure by the hydrostatic head of 7 kPa (1 psi) for every 600 mm (24") below the high point.
 - .4 Include for temporary piping connections required to properly complete the tests.
 - .5 Piping under test pressure is to have zero pressure drop for the length of the test period.
 - .6 Make tight leaks found during tests while the piping is under pressure, and if this is impossible, remove and refit the piping and reapply the test until satisfactory results are obtained.

- .7 Where leaks occur in threaded joints in steel piping, no caulking of these joints will be allowed under any conditions.
 - .8 Tests are to be done in reasonably sized sections so as to minimize the number of tests required.
 - .9 In addition to the leakage tests specified above, demonstrate proper flow throughout the systems including mains, connections and equipment, as well as proper venting and drainage, and include for any necessary system adjustments to achieve the proper conditions.
- .17 Electrical Wiring Work For Mechanical Work
- .1 Unless otherwise specified or indicated, the following electrical wiring work for mechanical equipment will be done as part of the electrical work:
 - .1 "Line" side power wiring to motor starters or disconnect switches in motor control centres and starters or disconnects on motor starter panels, and "load" side wiring from the starters or disconnects to the equipment.
 - .2 "Line" side power wiring to individual wall mounted starters, and "load" side wiring from the starters to the equipment.
 - .3 "Line" side power wiring to pre-wired power and control panels and variable frequency drives, and "load" side power wiring from the panels and VFD's to the equipment.
 - .4 Provision of receptacles for plug-in equipment.
 - .5 Provision of disconnect switches for all motors that are in excess of 10 m (30') from the starter location, or that cannot be seen from the starter location, and all associated power wiring.
 - .6 All motor starter interlocking in excess of 24 volts.
 - .7 Wiring from motor winding thermistors in motors 30 HP and larger to motor starter contacts.
 - .8 Provision of dedicated 120 volt, 15A-1P circuits terminated in junction boxes in mechanical equipment rooms for automatic control and building automation system wiring connections to be made as part of the automatic controls work.
 - .2 Mechanical wiring work not listed above or specified herein or on the drawings to be done as part of the electrical work is to be installed in conduit and is to be done as part of the mechanical work in accordance with wiring requirements specified for the electrical work.
- .18 Interruption To And Shut-Down Of Mechanical Services And Systems
- .1 Co-ordinate all shut-down and interruption to existing mechanical systems with the Owner.
 - .2 Upon award of a Contract, submit a list of anticipated shut-down times and their maximum duration.
 - .3 Prior to each shut-down or interruption, inform the Owner and Consultant in writing 72 hours in advance of the proposed shut-down or interruption and obtain written approval to proceed. Do not shut-down or interrupt any system or service without such written approval.

- .4 Perform work associated with shut-downs and interruptions as continuous operations to minimize the shut-down time and to reinstate the systems as soon as possible, and, prior to any shut-down, ensure that all materials and labour required to complete the work for which the shut-down is required are available at the site.
- .19 Installation Of Equipment Bases And Supports
 - .1 Steel Framework Supports: Where indicated, support base mounting smaller HVAC equipment such as heat pumps, condensing units, and fan equipment on galvanized steel adjustable tubular steel framework support assemblies.
- .20 Cutting, Drilling, And Patching For Mechanical Work
 - .1 Do all cutting, drilling and patching of the existing building for the installation of your work. Perform all cutting and drilling with proper tools and equipment. Confirm the exact location of cutting and drilling with the Consultant prior to commencing the cutting and/or drilling work.
 - .2 Patch surfaces, where required, to exactly match existing finishes using tradesmen skilled in the particular trade or application worked on.
 - .3 Where new pipes pass through existing construction, core drill an opening. Size openings to leave 12 mm (½") clearance around the pipes or pipe insulation.
 - .4 Prior to drilling or cutting an opening in poured concrete construction, determine the location, if any, of existing services concealed in the construction to be drilled or cut. X-ray or Ferro Scan Test the walls or slabs if required.
 - .5 You will be responsible for the repair of any damage to existing services, exposed or concealed, caused as a result of your cutting or drilling work.
- .21 Packing And Sealing Core Drilled Pipe Openings
 - .1 Pack and seal the void between the pipe opening and the pipe or pipe insulation for the length of the opening as follows:
 - .1 Non-fire rated interior construction: pack openings in non-fire rated interior construction with mineral wool and seal both ends of the opening with non-hardening silicone base caulking compound to produce a water-tight seal.
- .22 Cleaning Mechanical Work
 - .1 Refer to cleaning requirements specified in Division 01.
 - .2 Clean all mechanical work prior to application for Substantial Performance of the work.
 - .3 Include for vacuum cleaning the interior of air handling units and ductwork systems.
- .23 Use Of Mechanical Systems For Temporary Heating
 - .1 Permanent building mechanical systems are not to be used for temporary heating purposes during construction.
- .24 Maintaining Equipment Prior To Acceptance
 - .1 Maintain all equipment in accordance with the manufacturer's printed instructions prior to start-up, testing and commissioning.

- .2 Employ a qualified millwright to check and align shafts, drives, and couplings on all base mounted split coupled motor driven equipment.
 - .3 Where equipment lubrication fittings are not easily accessible, extend the fittings to accessible locations using copper or aluminium tubing.
 - .4 All filters are to be new upon Substantial Performance of the work. This is in addition to any spare filters specified.
- .25 Connections To Other Equipment
- .1 Carefully examine the Contract Documents during the bidding period and include for mechanical work piping and/or ductwork connections to equipment requiring such connections.
- .26 Waste Management And Disposal
- .1 Separate and recycle waste materials in accordance with requirements specified in Division 01.
- .27 Installation Of Flexible Connectors
- .1 Provide flexible connectors in all piping connections to vibration isolated equipment.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 This Section specifies vibration isolation product requirements that are common to mechanical work Sections of the Specification and it is a supplement to each Section and is to be read accordingly.

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 American National Standards Institute / Sheet Metal and Air Conditioning Contractors' National Association (ANSI/SMACNA):
 - .1 ANSI/SMACNA – Seismic Restraint Manual-Guidelines for Mechanical Systems
 - .2 Canadian Standards Association (CSA):
 - .1 CAN/CSA-S832 – Seismic Risk Reduction of Operational and Functional Components (OFC's) of Buildings

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data:
 - .1 Product Data: Submit copies of manufacturer's product data sheets for all products specified in this Section. Product data sheets are to include product characteristics, limitations, dimension, finishes, and installation recommendations.

1.5 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Manufacturer's:
 - .1 Mechanical vibration isolation product manufacturers are to current members of the Vibration Isolation & Seismic Restraint Manufacturers Association.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:

- .1 Mason Industries Inc.
 - .2 Kinetics Noise Control Inc.
 - .3 The VMC Group
 - .4 Vibro-Acoustics
- .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
 - .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.
 - .4 Single source responsibility: Obtain each type of vibration specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

- .1 General:
 - .1 Vibration isolation products are to be in accordance with the drawing schedule and details, and as specified below.
 - .2 Springs: All springs are to be stable, colour coded, selected to operate at no greater than ¾ solid load, designed in accordance with the Society of Automotive Engineers Handbook Supplement 9 entitled Manual on Design and Application of Helical and Spiral Springs, and with spring diameters in accordance with the manufacturer's recommendations to suit the static deflection and maximum equipment load.
 - .3 Finishes: All steel components of isolation products not exposed to the weather or moisture are to be zinc plated. All steel components of isolation products exposed to the weather or in a damp, moist environment are to be factory finished with rust inhibiting primer and fusion bonded epoxy, or hot dipped galvanized.
 - .4 Where the weight of isolated equipment may change significantly due to draining or filling with a liquid, vibration isolators are to be equipped with limit stops to limit spring extensions.
 - .5 Flexible Piping Connections: Flexible piping connections to vibration isolated equipment are specified in the appropriate piping sections of the Specification.
- .2 Isolation Pads:
 - .1 Sandwich type pads, 20 mm (¾") nominal thickness, selected for 3.2 mm (1/8") static deflection unless otherwise specified, consisting of 2 waffle type or ribbed 50 durometer neoprene elastomer in-shear pads permanently bonded to a minimum #10 gauge steel plate, and complete with rubber bushed bolt holes and equipment anchor bolts with neoprene isolation grommets.
- .3 Rubber Floor Isolators:
 - .1 Captive, bridge bearing quality neoprene mount selected for a minimum 4 mm (0.15") static deflection unless otherwise specified, with an integral cast or ductile iron housing and integral equipment anchor bolt.

- .4 Spring Hangers:
 - .1 Welded steel plate housing with top and bottom rod mounting holes and spring retainer, neoprene double deflection isolation element, stable colour coded spring, and heavy-duty rubber washers.
- .5 Neoprene Hanger Isolators:
 - .1 Neoprene double deflection rod isolators with steel housing and hanger rod bushing, selected for a minimum 4 mm (0.15") static deflection unless otherwise specified.

3 EXECUTION

3.1 INSTALLATION

- .1 Vibration Isolation Materials:
 - .1 Provide vibration isolation products for mechanical work in accordance with the drawing schedule and details, and requirements specified herein and/or on the drawings.
 - .2 Supply to the vibration isolation product manufacturer or supplier a copy of a "reviewed" shop drawing or product data sheet for each piece of equipment to be isolated and dimensioned pipe layouts of associated piping to be isolated.
 - .3 Unless otherwise specified, all vibration isolation products are to be the product of one manufacturer.
 - .4 Ensure that the vibration isolation manufacturer coordinates material selections with equipment provided in order to ensure adherence to performance criteria. Allow for expansion and contraction when material is selected and installed.
 - .5 Maintain a minimum clearance of 50 mm (2") between vibration isolated equipment and adjacent structures, piping, ductwork, conduit, and similar items.
 - .6 Isolation of Piping: Isolate all piping larger than 25 mm (1") dia. directly connected to motorized and/or vibration isolated equipment with 25 mm (1") static deflection spring hangers at spacing intervals in accordance with the following:
 - .1 For pipe to and including 100 mm (4") diameter – first three points of support.
 - .2 The first point of isolated piping support is to have a static deflection of twice the deflection of the isolated equipment but maximum 50 mm (2").
 - .3 Secure the top of the spring hanger frame rigidly to the structure, and do not install spring hangers in concealed locations.
 - .4 Where it is impossible to use at least two spring hangers, provide Senior Flexonics Ltd. Style 102 (or 102-U as required) or equal, twin sphere, moulded rubber flexible connection assemblies, selected by the manufacturer and suitable in all respects for intended application, and complete with required nipples and connections to provide proper vibration isolation.

- .7 Control Wiring Connections: For all control wiring connections to vibration isolated equipment ensure that flexible metallic conduit with 90° bend is used for conduit 25 mm (1") diameter and smaller, and for conduit larger than 25 mm (1") diameter, use Crouse Hinds EC couplings. Connections are to be long enough so that the conduit will remain intact if the equipment moves 300 mm (12") laterally from its installed position, and flexible enough to transmit less vibration to the structure than is transmitted through the vibration isolation. Coordinate these requirements with the mechanical trades involved. If electrical power connections are not made in a similar manner as part of the electrical work, report this fact to the Consultant.
- .8 Manufacturer's Inspection & Certification: Refer to the Section entitled Mechanical Work General Instructions.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 This Section specifies thermal insulation requirements that are common to mechanical work Sections of the Specification. It is a supplement to each Section and is to be read accordingly.

1.3 REFERENCES

- .1 Definitions:
 - .1 "concealed" means mechanical services and equipment above suspended ceilings, in non-accessible chases, in accessible pipe spaces, and furred-in spaces
 - .2 "exposed" means exposed to normal view during normal conditions and operations
 - .3 "domestic water" means all piping (cold, hot, tempered) extended from the building Municipal supply main
 - .4 "WHMIS sheets" means Workplace Hazardous Materials Information System sheets
 - .5 "mineral fibre" means a type of insulation manufactured from molten rock, slag, or glass in accordance with requirements of ASTM C547
 - .6 "insulation system" means insulation material, fasteners, jacket, and any other accessory.
 - .7 "TIAC" means Thermal Insulation Association of Canada.
- .2 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strap for Pressure Vessels and for General Applications
 - .2 ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - .3 ASTM C534 – Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
 - .4 ASTM C547 - Standard Specification for Mineral Fibre Pipe Insulation
 - .5 ASTM C552 – Standard Specification for Cellular Glass Thermal Insulation
 - .6 ASTM C553 – Standard Specification for Mineral Fibre Blanket Thermal Insulation
 - .7 ASTM C612 – Standard Specification for Mineral Fiber Block and Board Thermal Insulation

- .8 ASTM C1136 – Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
- .9 ASTM C1290 – Standard Specification for Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts
- .10 ASTM D1784 – Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
- .2 Thermal Insulation Association of Canada (TIAC):
 - .1 Best Practices Guide
 - .2 TIAC Quality Standard 1501
- .3 Underwriters Laboratories of Canada (ULC):
 - .1 CAN/ULC-S101 – Fire Endurance Tests of Building Construction and Materials
 - .2 CAN/ULC-S114 – Test for Non-Combustibility

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data Sheets & WHMIS Sheets:
 - .1 Submit a product data sheet and a WHMIS sheet for each insulation system product. Product data sheets must confirm that the product conforms to requirements of referenced Codes, Standards, and material properties.

1.5 QUALITY ASSURANCE

- .1 Mechanical insulation requirements specified in this Section are based on the Thermal Insulation Association of Canada Best Practices Guide.
- .2 Qualifications:
 - .1 Installer's:
 - .1 The company with the sub-contract for mechanical insulation work is to be a member in good standing of the Thermal Insulation Association of Canada.
 - .2 Mechanical insulation is to be applied by journeyman tradespersons in the Heat and Frost Insulation Trade. Registered apprentice tradespersons must be under direct, daily, on-site supervision of a journeyman.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:

- .1 Acceptable insulation product manufacturers are listed in Section 4, Products, of the TIAC Best Practices Guide
- .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
- .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.
- .4 Single source responsibility: Obtain each type of valve from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

- .1 Fire Hazard Ratings:
 - .1 Unless otherwise specified, all insulation system materials inside the building and above ground must have a fire hazard rating of not more than 25 for flame spread and 50 for smoke developed when tested in accordance with CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
- .2 Thermal Performance:
 - .1 Unless otherwise specified, thermal performance, i.e. conductivity, of insulation is to meet or exceed the values given in the National Energy Code of Canada for Buildings, and ASHRAE/IES Standard 90.1.
- .3 Pipe Insulation Materials:
 - .1 Horizontal Pipe Insulation at Hangers & Supports: Insulated pipe support inserts consisting of minimum 150 mm (6") long, premoulded, rigid, sectional phenolic foam or fiberglass insulation (of same thickness as adjoining insulation) with a reinforced foil and kraft paper vapour barrier jacket and a 180° captive galvanized steel saddle. Acceptable products are:
 - .1 Belform Insulation Ltd. "Koolphen K-Block"
 - .2 Shur-Fit Products Ltd. "Pro-Pipe Supports"
 - .2 Specialty Insulation for Piping: Factory fabricated foamed glass or closed cell foamed plastic insulation fittings specifically made for pipe mechanical joint fittings and couplings, and pipe risers at riser clamps. Acceptable manufacturers are:
 - .1 Shur-Fit Products Ltd.
 - .2 Armacell Canada Inc.
 - .3 Owens Corning "FOAMGLASS"
 - .3 TIAC Standard 1501, Code A2, Preformed Mineral Fibre: Rigid, sectional, sleeve type insulation to ASTM Standard C 547, Standard Specification for Mineral Fibre Pipe Insulation, supplied in 915 mm (3') lengths with a factory applied vapour barrier jacket and adhesive jacket closure to ASTM C1136, Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation, with a minimum thermal conductivity of 0.033 W @ 24° C.

- .4 Ductwork System Insulation Materials:
 - .1 TIAC Standard 1502, Code A2, Rigid Mineral Fibre Board: Preformed board type insulation to ASTM C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation, with a factory applied reinforced aluminum foil and Kraft paper facing to ASTM C1136, Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation, a minimum thermal conductivity of 0.033 W @ 24° C., and a minimum density of 48 kg/m³.
 - .2 TIAC Standard 1502, Code B2, Flexible Mineral Fibre: Roll form insulation to ASTM C1290, Standard Specification for Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts, with a factory applied vapour barrier facing to ASTM C1136, Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation, a minimum thermal conductivity of 0.042 W @ 24° C., and a minimum density of 12 kg/m³.
- .5 Insulating Coatings:
 - .1 Equal to Robson Thermal Manufacturing Ltd. insulating coatings as follows:
 - .1 Anti-condensation coating, "No Sweat-FX".
 - .2 Thermal insulating coating, "ThermaLite".
- .6 Insulation Fastenings:
 - .1 Wire: Minimum #15 gauge galvanized annealed wire.
 - .2 Duct Insulation Fasteners: Weld-on 2 mm (3/32") diameter zinc coated steel spindles of suitable length, complete with minimum 40 mm (1½") square zinc plated steel self-locking washers.
 - .3 Tape Sealant: Equal to MACtac Canada Ltd. self-adhesive insulation tapes, types PAF, FSK, ASJ, or SWV as required to match the surface being sealed.
 - .4 Adhesive - Mineral Fibre Insulation: Clear, pressure sensitive, brush consistency adhesive, suitable for a temperature range of -20°C to 82°C (-4°F to 180°F), compatible with the type of material to be secured, and WHMIS classified as non-hazardous.
 - .5 Adhesive – Flexible Elastomeric Insulation: Armacell "Armaflex" #520 air-drying contact adhesive.
 - .6 Adhesive – Closed Cell Foamed Glass Insulation: Equal to Pittsburgh Corning PC88 multi-purpose two-component adhesive.
 - .7 Lagging Adhesive: White, brush consistency, ULC listed and labelled, 25/50 fire/smoke rated lagging adhesive for canvas jacket fabric, suitable for colour tinting, complete with fungicide and washable when dry.
 - .8 Sheet Metal Screws: No. 10 stainless steel sheet metal screws.
- .7 Insulation Jackets and Finishes:
 - .1 TIAC Code C11, Canvas: ULC listed and labelled, 25/50 rated, roll form, minimum 170 g (6 oz.) canvas jacket material.
 - .2 TIAC Code C1, PVC: Roll form sheet and fitting covers in accordance with ASTM D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds, minimum 15 mil thick, white, PVC, 25/50 rated, complete with installation and sealing accessories.

3 EXECUTION

3.1 INSTALLATION

- .1 General Insulation Application Requirements:
 - .1 Unless otherwise specified, do not insulate the following:
 - .1 Factory insulated equipment and piping.
 - .2 Heated liquid system pump casings, valves, strainers and similar accessories.
 - .3 Manufactured expansion joints and flexible connections.
 - .4 Acoustically lined ductwork and/or equipment.
 - .2 Do not apply insulation unless leakage tests have been satisfactorily completed.
 - .3 Ensure that all surfaces to be insulated are clean and dry.
 - .4 Ensure that the ambient temperature is minimum 13° C (55° F) for at least one day prior to the application of insulation, and for the duration of insulation work, and that relative humidity is and will be at a level such that mildew will not form on insulation materials.
 - .5 All insulation materials must be stored on site in a proper and dry storage area. Any wet insulation material is to be removed from the site and replaced.
 - .6 Install insulation directly over pipes and ducts and not over hangers and supports.
 - .7 Install piping insulation and jacket continuous through pipe openings and sleeves.
 - .8 Install duct insulation continuous through walls, partitions, and similar surfaces except at fire dampers.
 - .9 Where mineral fibre rigid sleeve type insulation is terminated at valves, equipment, unions, etc., neatly cover the exposed end of the insulation with a purpose made PVC cover on "cold" piping, and with canvas jacket material on "hot" piping.
 - .10 Where there is interference between weld bead, mechanical joints, etc., and insulation, use purpose made insulation fittings or otherwise neatly and properly insulate these items to maintain the insulation value of the work. Seal all exposed surfaces of insulation.
 - .11 Where thermometers, gauges, and similar instruments occur in insulated piping, and where access to heat transfer piping balancing valve ports and similar items are required, create a neat, properly sized hole in the insulation and provide a suitable grommet in the opening.
 - .12 Where existing insulation work is damaged as a result of a new mechanical work, repair the damaged insulation work to new work standards.
- .2 Insulation For Pipe Mechanical Joint Fittings & Couplings, Etc.:
 - .1 Provide manufactured insulation fittings, the same thickness as the adjoining pipe insulation, for mechanical joint fittings and couplings, and for piping at riser clamps through the floor. Cover with purpose made PVC covers with joints sealed with tape.
- .3 Insulation For Horizontal Pipe At Hangers And Supports:

- .1 At each hanger and support location for piping 50 mm (2") diameter and larger and scheduled to be insulated, except where roller hangers and/or supports are required, and unless otherwise specified, supply a factory fabricated section of phenolic foam pipe insulation with integral vapour barrier jacket and captive galvanized steel shield. Supply the insulation sections to the piping installers for installation as the pipe is erected.
- .4 Pipe Insulation Requirements – Inside Building & Above Ground:
 - .1 Insulate pipe inside the building and above ground, as scheduled below, in accordance with TIAC Quality Standard 1501, Piping, as follows:
 - .1 Material: Type A3 mineral fibre.
 - .2 Insulation application:
 - .1 1501-H for hot piping.
 - .2 1501-C for cold piping.
 - .3 Insulation finish: CPF/1 canvas jacket or CPF/4 PVC jacket for exposed piping.

PIPE SERVICE	DIAMETER	INSULATION THICKNESS
Condensate Drain From A/C Equipment Drain Pans	all	25 mm

- .5 Ductwork System Insulation Requirements – Inside Building:
 - .1 Insulate duct systems inside the building and above ground, as scheduled below, in accordance with TIAC Quality Standard 1502, Ductwork and Plenums, as follows:
 - .1 Material:
 - .1 Type A2 rigid mineral fibre for exposed rectangular ducts, and all plenums
 - .2 Type B2 flexible mineral fibre for concealed rectangular ducts, and concealed and exposed round or oval ducts
 - .2 Insulation application:
 - .1 CER/1 for heating and ventilating system rigid insulation
 - .2 CER/2 for heating and air conditioning system rigid insulation
 - .3 CEF/1 for heating and ventilation system flexible insulation
 - .4 CEF/2 for heating and air conditioning system flexible insulation
 - .3 Insulation finish:
 - .1 CRF/1 for exposed rectangular duct systems
 - .2 CRD//1 for exposed round/oval duct systems

DUCT SYSTEM SERVICE	INSULATION THICKNESS	
	Rigid Insulation	Flexible Insulation
Fresh (Outside) Air Ducts	40 mm	50 mm
Fresh (Outside) Air Casings And Plenums	40 mm	n/a
Mixed Air Casings And Plenums	25 mm	n/a
Mixed Air Supply Ducts (Except Where Exposed In Area Served)	25 mm	40 mm
3 M Of Exhaust Discharge Ducts Downstream (Back) From Exhaust Openings To Atmosphere	25 mm	40 mm
Exhaust Air Casings And Plenums Within 3 M Of Exhaust Openings To Atmosphere	25 mm	n/a
Heat Recovery System Fresh Heated Air	25 mm	40 mm

Notes:

#1 Provide commercial quality corner bead only on exposed rigid duct, plenum and casing insulation in all equipment rooms, corridors, and similar areas where the insulation is subject to damage.

.6 Common Duct System Insulation application Requirements:

- .1 At duct connection flanges insulate the flanges with neatly cut strips of the rigid insulation material secured with adhesive to side surfaces of the flange with a top strip to cover the exposed edges of the side strips, then butt the flat surface duct insulation up tight to the flange insulation, or alternatively, increase the insulation thickness to the depth of the flange and cover the top of the flanges with tape sealant.
- .2 The installation of fastener pins and washers is to be concurrent with the duct insulation application.
- .3 Cut insulation fastener pins almost flush to the washer and cover with neatly cut pieces of tape sealant.
- .4 Accurately and neatly cut and fit insulation at duct accessories such as damper operators (with standoff mounting) and pitot tube access covers.
- .5 Prior to concealment of insulation by either construction finishes or jacket material, patch all vapour barrier damage by means of tape sealant.
- .6 At trapeze hanger locations for rectangular duct install insulation between the duct and the hanger.
- .7 At each duct hanger for round duct provide a 100 mm (4") wide full length piece of rigid mineral fibre board insulation between the duct and the hanger.

.7 Application Of Insulating And Protective Coatings:

- .1 Apply insulating and protective coatings in accordance with the manufacturer's instructions. Remove any splatter from adjacent surfaces. Apply insulating/protective coating to the following surfaces:
 - .1 Paint all bare metal surfaces clear of "cold" piping and/or equipment insulation for a distance of from 300 mm (12") to 600 mm (24") clear of the pipe or equipment insulation, with "No Sweat-FX" anti-condensation coating.
 - .2 Paint all bare metal surfaces associated with mechanical systems with an operating temperature 60°C (140°F) with "ThermaLite" insulating coating.
 - .3 Coat elastomeric foamed insulation (pipe & duct) with 1 coat of the specified coating on all insulation inside the building and 2 coats (with 24 hours between coats) of the specified coating on all insulation outside the building.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 This Section specifies requirements, criteria, methods and execution for mechanical demolition work that are common to one or more mechanical work Sections, and it is intended as a supplement to each Section and is to be read accordingly.

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 Canadian Standards Association (CSA):
 - .1 CAN/CSA-S350 – Code of Practice for Safety in Demolition of Structures.

1.4 SUBMITTALS

- .1 Special Procedure Submittals:
 - .1 Submit documentation to confirm that reclaimed refrigerant has been properly removed and stored, recycled, or disposed of as applicable.

2 PRODUCTS

2.1 MATERIALS

Not Applicable

3 EXECUTION

3.1 REMOVALS

- .1 Disconnection and Removal of Existing Mechanical Work:
 - .1 Where indicated on the drawings, disconnect and remove existing mechanical work, including hangers, supports, insulation, and similar items. Disconnect at the point of supply, remove obsolete connecting services and make the system safe.
 - .2 Cut back obsolete piping behind finishes, identify, and cap water-tight unless otherwise specified.
 - .3 The scope and extent of the demolition or revision work is only generally indicated on the drawings. Estimate the scope, extent and cost of the work at the site during the bidding period scheduled site visit(s).
 - .4 Where deemed necessary by the Owner and Consultant, existing shafts, walls, and inaccessible ceilings will be opened by the Owner to permit site visit inspection of services to be removed/revised as part of the work but usually concealed behind such construction.

- .5 Claims for extra costs for demolition work not shown or specified but clearly visible or ascertainable at the site during bidding period site visits will not be allowed.
 - .6 If existing isolation valves are not available to isolate sections of piping to be removed, provide such valves as required. Determine this requirement at the site during the bidding period.
 - .7 Where existing valves are removed, remove the valve tags, revise existing valve tag charts, and hand the obsolete tags to the Owner.
 - .8 If any re-design is required due to discrepancies between the mechanical drawings and site conditions, notify the Consultant who will issue a Site Instruction. If, in the opinion of the Consultant, discrepancies between the mechanical drawings and actual site conditions are of a minor nature, the required modifications are to be done at no additional cost.
 - .9 Where existing mechanical services extend through, or are in an area to serve items which are to remain, maintain the services in operation. Include for rerouting existing services concealed behind existing finishes and which become exposed during the renovation work, so as to be concealed behind new or existing finishes.
 - .10 Unless otherwise specified, remove from the site and dispose of all existing materials which have been removed and are not to be relocated or reused.
- .2 Decommissioning or Alterations to Refrigeration Equipment:
- .1 Remove and reclaim refrigerant from all applicable equipment to be decommissioned and/or altered. All refrigerant reclaim and recycling work is to be in accordance with Refrigerant Management Canada guidelines, and governing codes and regulations. Do not under any circumstances vent refrigerant from existing equipment to atmosphere.
 - .2 Use refrigerant recovery equipment designed specifically to reclaim and recycle refrigerant, and use only skilled refrigeration mechanics to perform the reclaim and recycle work.
 - .3 Provide approved, properly sized and sealable refrigerant containers for reclaimed refrigerant.
 - .4 Dispose of reclaimed refrigerant by engaging the services of a licensed firm specializing in recycling of reclaimed refrigerant. Submit documentation to confirm that the refrigerant has been properly removed from the site and recycled or disposed of.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 This Section specifies mechanical system testing, adjusting, and balancing requirements that are common to mechanical work Sections of the Specification and it is a supplement to each applicable Section and is to be read accordingly.

1.3 REFERENCES

- .1 Definitions:

- .1 The following are definitions of words used in this Section:

- .1 "TAB" – means testing, adjusting and balancing to determine and confirm quantitative performance of equipment and systems and to regulate the specified fluid flow rate and air patterns at the terminal equipment, e.g., reduce fan speed, throttling, etc.
- .2 "hydronic systems" – includes heating water, chilled water, glycol-water solution, condenser water, and any similar system
- .3 "air systems" – includes all outside air, supply air, return air, exhaust air, and relief air systems
- .4 "flow rate tolerance" – means the allowable percentage variation, minus to plus, of actual flow rate values in the Contract Documents
- .5 "report forms" – means test data sheets arranged for collecting test data in logical order for submission and review, and these forms, when reviewed and accepted, should also form the permanent record to be used as the basis for required future testing, adjusting and balancing
- .6 "terminal" – means the point where the controlled fluid enters or leaves the distribution system, and these are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods
- .7 "main" – means the duct or pipe containing the system's major or entire fluid flow
- .8 "sub-main" – means the duct or pipe containing part of the systems' capacity and serving two or more branch mains
- .9 "branch main" – means duct or pipe servicing two or more terminals
- .10 "branch" – means duct or pipe serving a single terminal

- .2 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction.

.1 Standards: Testing, adjusting and balancing of the complete mechanical systems is to be performed over the entire operating range of each system in accordance with 1 of the following publications:

- .1 National Standards For A Total System Balance published by the Associated Air Balance Council
- .2 Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems published by the National Environmental Balancing Bureau
- .3 Chapter 37, Testing, Adjusting, and Balancing of ASHRAE Handbook HVAC Applications

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Name and Qualifications of Testing and Balancing Agency: Within 30 days of work commencing at the site, submit the name and qualifications of the proposed testing and balancing agency in accordance with requirements of the article below entitled Quality Assurance.
- .3 Sample Test Forms: Submit sample test forms, if other than those standard forms prepared by the Canadian Associated Air Balance Council (CAABC) or National Environmental Balancing Bureau (NEBB) are proposed for use.
- .4 Drawing Evaluation Report: Submit a report by the Agency to indicate the Agency's evaluation of the mechanical drawings with respect to service routing and location or lack of balancing devices. Include the set of drawings used and marked-up by the Agency to prepare the report.
- .5 Site Visit Reports: Submit a report by the Agency after each site visit made by the Agency during the construction phase of this Project.
- .6 Draft and Final Reports: Submit a draft report and a final report as specified in Part 3 of this Section.

1.5 CLOSEOUT SUBMITTALS

- .1 Submittals under this Section shall be in conformance with Section 01 77 00.
- .2 Warranty: Submit a testing and balancing warranty as specified in Part 3 of this Section.
- .3 Post Construction Site Visit Reports: Submit reports listing observations and results of post construction site visits as specified in Part 3 of this Section.

1.6 QUALITY ASSURANCE

- .1 Testing Agencies:
 - .1 Provide services from Air Audit Inc. to be the single source of responsibility to test, adjust, and balance the building mechanical systems to achieve the design objectives.

2 PRODUCTS

Not applicable.

3 EXECUTION

3.1 SCOPE OF WORK

- .1 Perform total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications and comfort conditions, and recording and reporting the results.
- .2 Mechanical systems to be tested, adjusted and balanced include:
 - .1 Heating Systems: TAB of heating systems is to include all piping and equipment fluid temperatures, flows and control, and if TAB is not done during the heating season, a follow-up site visit during the heating season will be required to confirm proper flows and temperatures, and any required system "fine tuning".
 - .2 Cooling Systems: TAB of cooling systems is also to include all piping and equipment fluid temperatures, flows and control, and if TAB is not done during the cooling season, a follow-up site visit during the cooling season will be required to confirm proper flows and temperatures, and any required system "fine".
 - .3 Air Handling Systems: TAB of air handling systems is to include all equipment and ductwork air temperatures, capacities and flows.
 - .4 Existing Systems: The following existing systems, revised as part of the mechanical work, are to be tested, adjusted and balanced as for new systems:
 - .1 Ventilation air branches serving replaced heat pumps

3.2 TESTING, ADJUSTING AND BALANCING

- .1 General Requirements: Conform to the following requirements:
 - .1 As soon as possible after award of Contract, the Agency is to carefully examine a white print set of mechanical drawings with respect to routing of services and location of balancing devices, and is to issue a report listing the results of the evaluation.
 - .2 The set of drawings examined by the Agency is to be returned with the evaluation report, with red line mark-ups to indicate locations for duct system test plugs, and required revision work such as relocation of balancing devices and locations for additional devices.
 - .3 After review of the mechanical work drawings and specification, the Agency is to visit the site at frequent, regular intervals during construction of the mechanical systems, to observe routing of services, locations of testing and balancing devices, workmanship, and anything else that will affect testing, adjusting and balancing.
 - .4 After each site visit, the Agency is to report results of the site visit indicating the date and time of the visit, and detailed recommendations for any corrective work required to ensure proper adjusting and balancing.
 - .5 Testing, adjusting and balancing is not to begin until:
 - .1 Building construction work is substantially complete and doors have been installed.
 - .2 Mechanical systems are complete in all respects, and have been checked, started, and adjusted.
 - .6 All mechanical systems to be tested, adjusted and balanced are to be maintained in full, normal operation during each day of testing, adjusting and balancing.

- .7 Obtain copies of reviewed shop drawings of all applicable mechanical plant equipment and terminals, and temperature control diagrams and sequences.
 - .8 The Agency is to walk each system from the system "head end" equipment to terminal units to determine variations of installation from design, and the system installation trades will accompany the Agency.
 - .9 The Agency is to check all valves and dampers for correct and locked position, and temperature control systems for completeness of installation before starting equipment.
 - .10 Wherever possible, the Agency is to lock all balancing devices in place at the proper setting, and permanently mark settings on all devices.
 - .11 For belt-driven equipment, the Agency is to report to the Commissioning Agent who in turn is to inform the Contractor and Consultant of any situation where sheaves have to be replaced to suit testing and balancing, and replacements are to be done by the Contractor at no cost.
 - .12 Noise: the Agency is to balance all systems with due regard to objectionable noise which is to be a factor when adjusting fan speeds and performing terminal work such as adjusting air quantities, and should objectionable noise occur at the design conditions, the Agency is to immediately report the problem and submit data, including sound readings, to permit an accurate assessment of the noise problem to be made.
 - .13 Stratification: the Agency is to check all supply air handling system mixing plenums for stratification, and where the variation of mixed air temperature across coils is found to be in excess of $\pm 5\%$ of design requirements, the Agency is to report the problem and issue a detail sketch of plenum baffle(s) required to eliminate the stratification.
 - .14 Tolerances: the Agency is to perform testing, adjusting and balancing to within $\pm 5\%$ of design values, and make and record measurements which are within $\pm 2\%$ of actual values.
 - .15 Filters for all air handling systems equipped with air filters, test and balance the systems with simulated 50% loaded (dirty) filters by providing a false pressure drop.
 - .16 Seasonal requirements: test, adjust and balance air conditioning systems during the summer season and heating systems during winter season, including at least a period of operation at outside conditions within 2.8°C (5°F) wet bulb temperature of maximum summer design condition, and within 5.5°C (10°C) dry bulb temperature of minimum winter design condition, and take final temperature readings during seasonal operation.
- .2 Preparation of Reports: Prepare reports as indicated below:
- .1 Draft Reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on CAABC or NEBB forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.
 - .2 Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final reports. Use units of measurement (SI or Imperial) as used on the Project Documents.
 - .3 Report Format: Report forms are to be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, 3-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the divisions listed below, separated by divider tabs:

- .1 General Information and Summary
 - .2 Plumbing Systems
 - .3 Air Systems
 - .4 Hydronic Systems
 - .5 Temperature Control Systems
 - .6 Special Systems
- .4 Report Contents: The Agency is to provide the following minimum information, forms and data:
- .1 Inside cover sheet to identify the Agency, the Contractor, and Project, including addresses, e-mail addresses and contact names and telephone numbers and a listing of the instrumentation used for the procedures along with the proof of calibration.
 - .2 The remainder of the report is to contain the appropriate forms containing as a minimum, the information indicated on the standard CAABC or NEBB report forms prepared for each respective item and system.
 - .3 The Agency is to include for each system to be tested, adjusted and balanced, a neatly drawn, identified (system designation, plant equipment location, and area served) schematic "as-built" diagram indicating and identifying all equipment, terminals, and accessories.
 - .4 The Agency is to include report sheets indicating building comfort test readings for all rooms.
- .3 Verification of Reports: After the final testing and balancing report has been submitted, the Agency is to visit the site with the Contractor and Consultant to spot check results indicated on the balancing report. The Agency is to supply all labour, ladders, and instruments to complete spot checks. Note that if results of spot checks do not, on a consistent basis, agree with the final report, the spot check procedures will stop and the Agency is to then rebalance the systems involved, resubmit the final report, and again perform spot checks with the Contractor and Consultant.
- .4 Certification and Warranty: When the final report has been accepted, the Contractor is to submit to the Owner, in the name of the Owner, a certificate equal to the CAABC National Guaranty Certification or a NEBB Quality Assurance Program Bond, and in addition, the Contractor is to submit a written extended warranty from the Agency covering 1 full heating season and 1 full cooling season, during which time any balancing problems which occur, with the exception of minor revision work done during scheduled site visits, will, at no cost, be investigated by the Agency and reported on to the Owner, and if it is determined that the problems are a result of improper testing, adjusting and balancing, they are to be immediately corrected without additional cost to the Owner.
- .5 Post Balancing Site Visits: After acceptance of the final report, the Agency is to perform post testing and balancing site visits in accordance with the following requirements:
- .1 Post-testing and balancing site visits are to be made:
 - .1 Once during the 1st month of building operation.
 - .2 Once during the 3rd month of building operation.
 - .3 Once between the 4th and 10th months in a season opposite to the 1st and 3rd month visit.
 - .2 During each return visit and accompanied by the Owner's representative, the Agency is to spot rebalance terminal units as required to suit building occupants and eliminate complaints.

- .3 The Agency is to schedule each visit with the Contractor and the Owner, and inform the Consultant.
- .4 After each follow-up site visit, the Agency is to issue to the Contractor and Consultant a report indicating any corrective work performed during the visit, all abnormal conditions and complaints encountered, and recommended corrective action.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 This Section specifies fire stopping and smoke seal requirements that are common to mechanical work Sections of the Specification and it is a supplement to each Section and is to be read accordingly.

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 Underwriters Laboratories of Canada (ULC):
 - .1 CAN/ULC-S101, Standard Method of Fire Endurance Tests of Building Construction and Materials
 - .2 CAN/ULC-S115 - Standard Method of Fire Tests of Firestop Systems

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data & WHMIS Sheets:
 - .1 Submit a product data sheet and a WHMIS sheet for each firestopping and smoke seal product. Identify each product with the manufacturer's name and type, the ULC designation, and the proposed use.
- .3 Name & Experience of Proposed Applicator:
 - .1 Submit for approval the full company name and experience of the proposed firestopping and smoke seal system applicator.
- .4 Letter of Certification:
 - .1 Submit a letter of proper firestopping and smoke seal certification as specified in Part 3 of this Section.

1.5 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Applicator:
 - .1 The applicator is to have a minimum of 3 years of successful experience on projects of similar size and complexity and is to be approved by the Consultant.

1.6 PROJECT CONDITIONS

- .1 Ambient Conditions:
 - .1 Environment Conditions: Comply with the firestopping and smoke seal product manufacturer's recommendations regarding suitable environment conditions for product installation.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:
 - .1 A/D Fire Protection Systems "FIREBARRIER"
 - .2 Tremco Inc. Fire Protection Systems Group "TREMstop"
 - .3 3M Canada "Fire Barrier"
 - .4 Hilti (Canada) Ltd. Firestop Systems
 - .5 Specified Technologies Inc.
 - .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
 - .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.
 - .4 Single source responsibility: Obtain each type of valve from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 DESCRIPTION

- .1 Regulatory requirements:
 - .1 OBC
 - .2 OFC
 - .3 NFPA
 - .4 ULC

2.3 MATERIALS

- .1 Firestopping and Smoke Seal System Materials:

- .1 Asbestos-free elastomeric materials tested, listed and labelled by ULC in accordance with CAN/ULC-S115, Standard Method of Fire Tests of Firestop Systems and CAN/ULC-S101, Standard Method of Fire Endurance Tests of Building Construction and Materials for installation in ULC designated firestopping and smoke seal systems to provide a positive fire, water and smoke seal, and a fire-resistance rating (flame, hose stream and temperature) not less than the fire resistance rating of surrounding fire rated construction.
- .2 Materials are to be compatible with abutting dissimilar materials and finishes and complete with primers, damming and back-up materials, supports, and anchoring devices in accordance with the firestopping manufacturer's recommendations and the ULC tested assembly.
- .3 Pipe insulation forming part of a fire and smoke seal assembly is specified in the Mechanical Insulation Section.

3 EXECUTION

3.1 INSTALLATION

- .1 Installation of Firestopping and Smoke Seal Materials:
 - .1 Where mechanical work penetrates fire rated construction, provide ULC listed and labelled firestopping and smoke seal materials to seal the penetrations, installed in accordance with requirements of CAN/ULC-S115 (ratings F, FT, FH, and FTH as required), CAN/ULC-S101, all other governing authorities, and the product manufacturer's instructions.
 - .2 Preparation: Abide by the following requirements:
 - .1 Report any unsuitable or unsatisfactory conditions to the Consultant in writing, prior to commencement of work, and note that commencement of work will mean acceptance of conditions and surfaces.
 - .2 Mask where necessary to avoid spillage and over coating onto adjoining surfaces, and remove stains on adjacent surfaces.
 - .3 Application: Conform to the following application requirements:
 - .1 Provide temporary forming as required and remove only after materials have gained sufficient strength and after initial curing.
 - .2 Tool or trowel exposed surfaces to a neat, smooth, consistent finish.
 - .3 Remove excess compound promptly as work progresses and upon completion.
 - .4 At all fusible link damper locations, seal the perimeter of the angle iron framing on both sides of the wall or slab with ULC listed and labelled sealant materials to provide a positive smoke seal.
 - .4 Inspection: Notify the Consultant when the work is complete and ready for inspection, and prior to concealing or enclosing firestopping and smoke seal materials and service penetration assemblies. Arrange for final inspection of the work by the Municipal Building Inspector prior to concealing or enclosing work. Make any corrections required.

- .5 Certification: On completion of the firestopping and smoke sealing installation submit a letter of assurance to the Consultant certifying that the firestopping and smoke sealing installation has been carried out throughout the building to all mechanical service penetrations and that the installation has been done in strict accordance with the requirements of governing Codes and Regulations, ULC requirements, and the manufacturer's instructions.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 Section includes: Provide fire protection system, including but not limited to the following:
 - .1 Wet sprinkler systems
 - .2 Standpipe systems

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 American National Standards Institute (ANSI):
 - .1 ANSI/ASME B16.4, Grey Iron Threaded Fittings (Classes 125 and 250)
 - .2 American Society for Testing and Materials (ASTM):
 - .1 ASTM A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded
 - .2 ASTM A106, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
 - .3 ASTM A234, Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
 - .3 Canadian Standards Association (CSA):
 - .1 CSA B64.10, Selection and Installation of Backflow Preventers
 - .2 CSA B137.2, PVC Injection-Molded Gasketed Fittings for Cold-Water Pressure Services
 - .3 CSA B137.3, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications
 - .4 CAN/CSA B64.10, Backflow Preventers and Vacuum Breakers
 - .4 National Fire Protection Association (NFPA):
 - .1 NFPA 13, Standard for the Installation of Sprinkler Systems
 - .2 NFPA 14, Standard for the Installation of Standpipes and Hose Systems
 - .5 Underwriters Laboratories of Canada (ULC):
 - .1 CAN/ULC-S1001, Integrated Systems Testing of Fire Protection and Life Safety Systems

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
 - .1 Shop Drawings/Product Data: Submit shop drawings/product data sheets to the regulatory authority for review and approval prior to submitting to the Consultant. Conform to the following requirements:
- .2 Shop Drawings
 - .1 submit complete CAD white print layout drawings indicating source of water supply with pipe size and test flow and pressure, "head-end" equipment piping schematic, pipe routing and sizing, and risers, all signed and sealed by the design P. Eng.
 - .2 submit copies of all calculations stamped and signed by the design P. Eng., and a listing of all design data used in preparing the calculations, system layout and sizing
- .3 Product Data:
 - .1 product data sheets are to include all products specified in this Section except pipe and fittings, each clearly marked to indicate the manufacturer, model number, construction and performance of the products being supplied, and each stamped and signed by the system design P. Eng.
- .4 Samples:
 - .1 If requested, submit samples of sprinkler / standpipe materials for review.
- .5 Test and Evaluation Reports:
 - .1 Inspection Reports: Submit copies of the system design P. Eng.'s bi-weekly inspection reports as specified below.
 - .2 Test Certificates: Submit completed NFPA system material and test certificate(s) as specified in Part 3 of this Section, and documentation to confirm successful testing and commissioning in accordance with CAN/ULC-S1001.
 - .3 Backflow preventer test reports in accordance with CSA B64.10.
- .6 Final Completion Signoff Letter: Following completion of the system, the design P.Eng. responsible for the review is to provide a stamped signoff letter.

1.5 MAINTENANCE MATERIALS SUBMITTALS

- .1 Extra stock materials:
 - .1 Spare Sprinkler Head Cabinet:
 - .1 Surface wall mounted, red enamelled steel, identified cabinet with hinged door, shelves with holes for mounting sprinkler heads, a wrench or wrenches suitable for each type of sprinkler head, and a full complement of spare sprinkler heads.
 - .2 The cabinet is to be sized to accommodate a minimum of 4 spare heads for each type of head used on the Project, however, each cabinet is to be full of spare heads.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Site Personnel: All site personnel are to be Sprinkler Fitters or Sprinkler and Fire Protection Installers licensed in the jurisdiction of the work and under the continuous supervision of a site foreman who is a journeyman.
 - .2 System Installer: The system installer is to be an experienced fire protection system company and a member in good standing of the Canadian Automatic Sprinkler Association and is to be certified to CSA-W47.1 for welding.
 - .3 Dimensions and Coordination: Check and verify all dimensions and conditions at the site and ensure that the work can be performed as indicated. Co-ordinate work with all trades at the site and accept responsibility for and the cost of making adjustments to piping and/or spacing to avoid interference with other building components.
 - .4 Bi-Weekly Inspection Reports: The design P. Eng. is to conduct bi-weekly site inspections for quality control, and prepare and submit an inspection report after each site inspection.
 - .5 All system components must be UL and/or ULC listed and labelled, and FM approved.
 - .6 Existing System: Verify the working condition of all existing fire protection system equipment which has direct interface with the new work and is to remain. Replace with new equipment where necessary.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:
 - .1 Fire Suppression System Design and Installation
 - .1 C&H Fire Suppression
 - .2 Forest City Fire Protection
 - .3 Vipond
 - .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
 - .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.

2.2 PERFORMANCE/DESIGN CRITERIA

- .1 System Designer: Fire protection work to be installed is to be designed by a fully qualified mechanical P. Eng. registered and licensed in the jurisdiction of the Project. Refer to the mechanical work Section entitled Mechanical Work General Instructions for requirements governing the employment of the Engineer.

- .2 Water Flow and Pressure Test Data: If water supply flow and pressure test data is not available, conduct Municipal main water flow and pressure tests at the nearest fire hydrant to obtain criteria to be used in system design. Include the hydrant location and flow and pressure test data with system design calculations.
- .3 Standpipe System Design Criteria: Fire protection standpipe work is to be designed in accordance with NFPA 14 and Provincial Standards, and, where required, local building and fire department requirements and, if required, the standards of the Owner's Insurer.
- .4 Sprinkler System Design Criteria: Fire protection sprinkler work is to be designed in accordance with NFPA 13 and Provincial Standards, and, where required, local building and fire department requirements and, if required, the standards of the Owner's Insurer.
- .5 Sprinkler /System Occupancy – Hazard Design requirements: As per NFPA 13 occupancy-hazard density requirements, unless otherwise specified.

2.3 MATERIALS

- .1 Pipe, Fittings and Joints:
 - .1 Pipe, fittings and joints are to be as follows, with exceptions as specified in Part 3 of this Section:
 - .1 Schedule 40 Black Steel – Grooved Coupling Joints: North American produced Schedule 40 mild black carbon steel, ASTM A53, Grade B, complete with fittings and couplings equal to Victaulic "FireLock" fittings and Victaulic Style 005 rigid coupling joints. Strap-on fittings such as Victaulic "Snap-Let" strap type fittings are not acceptable.
 - .2 Schedule 40 Black Steel – Screwed and Welded Joints: North American produced Schedule 40 mild black carbon steel, ASTM A53, Grade B. Screwed piping is to be complete with Class 125 cast iron screwed fittings to ANSI/ASME B16.4. Welded piping is to be complete with factory made seamless carbon steel butt welding fittings to ASTM A234, Grade WPB, long sweep pattern wherever possible.
 - .3 Schedule 10 Black Steel – Grooved Coupling Joints: North America produced Schedule 10 mild black carbon steel, ASTM A53, Grade B, complete with grooved ends and fittings and couplings equal to Victaulic "FireLock" fittings and Victaulic Style 005 rigid coupling joints.
 - .4 Schedule 10 Black Steel – Screwed Joints: North America produced Schedule 10 mild black carbon steel, ASTM A53, Grade B, complete with mill or site threaded ends, Class 125 cast iron screwed fittings to ANSI/ASME B16.4, and screwed joints.
 - .5 Flexible Pipe: Flexible metallic hose sprinkler head connections, each complete with an attachment bracket or connector.
 - .2 Sprinkler Heads:
 - .1 Sprinkler heads are to be as specified/scheduled on the drawings.
 - .2 Recessed sprinkler heads in finished areas are to be chrome plated unless otherwise specified. Concealed sprinkler head ceiling plates are to match the ceiling colour.
 - .3 Where exposed pendent heads occur in areas with suspended ceilings, they are to be complete with chrome plated escutcheon plates. Similarly, sidewall heads with concealed piping are to be complete with chrome plated escutcheon plates.
 - .4 Sprinkler heads which are exposed in areas where they may be subject to damage are to be complete with wire guards, chrome plated where in finished areas.

.3 Spare Sprinkler Head Cabinet:

- .1 Surface wall mounting, red enamelled steel, identified cabinet with hinged door, shelves with holes for mounting sprinkler heads, a wrench or wrenches suitable for each type of sprinkler head, and a full complement of spare sprinkler heads.
- .2 The cabinet is to be sized to accommodate a minimum of 4 spare heads for each type of head used on the Project, however, each cabinet is to be full of spare heads.

3 EXECUTION

3.1 PREPARATION

.1 Demolition / Removal:

- .1 Do all required fire protection system demolition work. Refer to demolition requirements specified in the mechanical work Section entitled Demolition and Revision Work..

3.2 INSTALLATION

.1 Piping Installation Requirements

- .1 Provide all required fire protection system piping. Do all piping work in accordance with "Reviewed" shop drawings and NFPA requirements. Unless otherwise specified, piping is to be as follows:
 - .1 for "wet" system piping inside building and above ground, Schedule 40 grooved end black steel with Victaulic or equal fittings and coupling joints, or, for piping to and including 50 mm (2") diameter, screwed fittings and joints, or piping 65 mm (2½") diameter and larger, welding fittings and welded joints
 - .2 for "wet" sprinkler piping downstream of "head end" alarm valve(s) and equipment: Schedule 10 black steel pipe with Victaulic or equal fittings and coupling joints or screwed fittings and joints
 - .3 for branch sprinkler piping to heads in suspended ceilings, etc.: flexible piping installed in accordance with the manufacturer's instructions
 - .2 All pipe sizes, pipe routing, equipment quantities and locations, and layout of work shown on the drawings are to assist you during the tendering period. Ensure adequate fire protection system coverage. Do not reduce the size of the fire protection system main or re-route the main unless approved.
 - .3 All pipe, fittings, couplings, flanges and similar components are to be cleaned after erection is complete. Any ferrous pipe, fitting, coupling, flange, hanger, support and similar component which exhibits rust is to be wire brush cleaned and carefully coated with suitably coloured primer.
 - .4 Slope all horizontal piping so that it may be completely drained. Provide capped drain points.
 - .5 When fire protection work is complete, test the system components and the overall system(s) and submit completed NFPA material and test certificate(s), and any other documentation required.
- .2 Shut-Off Valves And Check Valves:
- .1 Provide shut-off valves and check valves in piping where shown and wherever else required.
 - .2 Locate all valves for easy operation and maintenance.

- .3 Confirm exact locations prior to roughing-in.
- .3 Shut-Off Valve Supervisory Switches:
 - .1 Unless otherwise specified, equip each shut-off valve with a supervisory switch.
 - .2 Identify each supervised valve with a 150 mm (6") square, engraved, laminated red-white plastic tag to correspond with supervised valve numbering specified and/or shown as part of the electrical work fire alarm system.
- .4 Flow Alarm Switches:
 - .1 Provide water flow alarm switches in accessible locations in zone piping where shown.
 - .2 Adjust to suit site water pressure conditions. Check and test operation.
 - .3 Identify each switch with a 150 mm (6") square red-white laminated engraved plastic tag. Confirm wording prior to engraving.
- .5 Sprinkler Heads:
 - .1 Provide all required sprinkler heads.
 - .2 Sprinkler head locations must be carefully coordinated with all drawings, including architectural reflected ceiling plan drawings, and, where applicable, electrical drawings. Coordinate sprinkler head locations in areas with suspended ceilings with the location of lighting, grilles, diffusers, and similar items recessed in or surface mounted on the ceiling as per the reflected ceiling plans. In areas with lay-in tile, centre the sprinkler head both ways in the lay-in tile wherever possible. Confirm locations prior to roughing-in.
 - .3 Maintain maximum headroom in areas with no ceilings.
 - .4 Provide guards for heads where they are subject to damage.
 - .5 Provide high temperature heads in equipment rooms and similar areas over heat producing or generating equipment.
- .6 Spare Sprinkler Head Cabinet:
 - .1 Supply a full complement (to fill cabinet) of spare sprinkler heads of the types used (minimum four of each type) and place in a wall mounting storage cabinet located adjacent to the sprinkler system "head end" equipment where later directed.

3.3 TESTING AND COMMISSIONING

- .1 Test and commission the fire protection system in accordance with requirements of CAN/ULC-S1001.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 Section includes: Provide drainage waste and vent piping and valves.
- .2 Related sections: The following is included for reference only and shall not be presumed complete:
 - .1 Section 22 13 18 – Drainage and Vent Piping Specialties
 - .2 Section 22 13 19 – Drainage Pumps and Accessories

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 - .2 ASTM B306 - Standard Specification for Copper Drainage Tube (DWV)
 - .2 Canadian Standards Association (CSA):
 - .1 CAN/CSA-B70 -
 - .2 CAN/CSA B182.2 - PVC Sewer Pipe and Fittings (PSM Type)
 - .3 CAN/CSA-B602 -
 - .3 Underwriters Laboratories of Canada (ULC):
 - .1 CAN/ULC-S102.2 – Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.
 - .2 CAN/ULC-S115 - Standard Method Of Fire Tests Of Firestop Systems

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data:
 - .1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers listed throughout Part 2 are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification.
- .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
- .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.
- .4 Single source responsibility: Obtain each type of valve from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

- .1 Pipe, Fittings and Joints:
 - .1 Above Ground PVC - DWV: Rigid IPS PVC drain, waste and vent pipe and fittings to CAN/CSA B181.2, complete with a flame spread rating less than 25 and a smoke developed rating less than 50 when tested to CAN/ULC-S102-2, solvent weld joints, and, for fire barrier penetration, approved firestop conforming to CAN4-S115.
 - .2 Copper- Solder Joint: Type DWV hard temper to ASTM B306, with forged copper solder type drainage fittings and 50% lead - 50% tin solder joints.
 - .3 Cast Iron: Class 4000 cast iron pipe and fittings to CAN/CSA-B70, cast iron soil pipe, fittings, and means of joining, and mechanical coupling joints to CAN/CSA-B602, Mechanical couplings for drain, waste, and vent pipe and sewer pipe, equal to Anaco "Husky" Series 400, 4-strap type for pipe to 100 mm (4") and 6-strap type for piping larger than 100 mm (4").

3 EXECUTION

3.1 PREPARATION

- .1 Demolition / Removal:
 - .1 Do all required drainage and vent piping demolition work. Refer to demolition requirements specified in the mechanical work Section entitled Demolition and Revision Work.

3.2 INSTALLATION

- .1 Drain and Vent Piping Installation Requirements:
 - .1 Provide all required drainage and vent piping. Pipe, unless otherwise specified, is to be as follows:
 - .1 for pipe inside the building and above ground in sizes to and including 65 mm (2½") diameter - type DWV copper
 - .2 for pipe inside the building and above ground in lieu of type DWV copper and cast iron, at your option and where permitted by governing Codes and Regulations – 25/50 rated rigid IPS PVC drain, waste and vent pipe

- .2 Unless otherwise specified, slope horizontal drainage piping above ground in sizes to and including 75 mm (3") diameter 25 mm (1") in 1.2 m (4'), and pipe 100 mm (4") diameter and larger 25 mm (1") in 2.4 m (8').
- .3 Unless otherwise specified, slope horizontal branches of vent piping down to the fixture or pipe to which they connect with a minimum pitch of 25 mm (1") in 1.2 m (4').
- .4 Extend vent stacks up through the roof generally where shown but with exact locations to suit site conditions and in any case a minimum of 3 m (10') from fresh air intakes. Terminate vent stacks a minimum of 330 mm (13") above the roof (including roof parapets) in vent stack covers.
- .5 Provide proper dielectric unions at connections between copper pipe and ferrous pipe or equipment.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 Section includes: Provide drainage and vent piping specialties.
- .2 Related sections: The following is included for reference only and shall not be presumed complete:
 - .1 Section 22 13 16 – Drainage Waste and Vent Piping and Valves
 - .2 Section 22 13 19 – Drainage Pumps and Accessories

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM C32 – Standard Specification for Sewer and Manhole Brick
 - .2 Canadian Standards Association (CSA):
 - .1 CAN/CSA-B79 – Commercial and residential drains and cleanouts
 - .2 CAN/CSA-S157 – Strength Design in Aluminum

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data:
 - .1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:
 - .1 For floor cleanout terminations:
 - .1 Zurn Industries Ltd.
 - .2 Watts Canada,

- .3 Mifab Inc.,
- .4 J. R. Smith Mfg. Co.,
- .5 Wade Canada
- .2 For floor, area, roof, etc., drains:
 - .1 Zurn Industries Ltd.,
 - .2 Watts Canada,
 - .3 Mifab Inc.,
 - .4 J. R. Smith Mfg. Co.,
 - .5 Wade Canada
- .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
- .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.
- .4 Single source responsibility: Obtain each type of drainage component from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

- .1 All drainage products (floor drains, roof drains, cleanouts, etc.) specified in this Section are to be in accordance with requirements of CSA B79, Commercial and Residential Drains and Cleanouts.
- .2 Cleanouts:
 - .1 Horizontal Piping: TY pipe fitting with an extra heavy brass plug screwed into the fitting.
 - .2 Vertical Piping: Bronze or copper cleanout tees in copper piping, each complete with a bronze ferrule, and, for cast iron piping, "BARRETT" type cast iron cleanout tees, each gas and water-tight and complete with a bolted cover.
- .3 Floor Cleanout Terminations:
 - .1 Factory finished cast iron terminations, each adjustable and complete with:
 - .1 a cast iron body with neoprene sleeve
 - .2 solid, gasketed, round (except as noted) polished nickel-bronze scoriated top access cover to suit the floor finish
 - .3 a seal plug
 - .4 captive, vandal-proof, stainless steel securing hardware
 - .2 All cleanout terminations in areas with a tile or sheet vinyl floor finish are to be as above but with a square top in lieu of a round top.

3 EXECUTION

3.1 INSTALLATION

.1 Cleanouts:

.1 Provide cleanouts in drainage piping in locations as follows:

- .1 in the building drain or drains as close as possible to the inner face of the outside wall, and, if a building trap is installed, locate the cleanout on the downstream side of the building trap;
 - .2 at or as close as practicable to the foot of each drainage stack
 - .3 at maximum 15 m (50') intervals in horizontal pipe 100 mm (4") diameter and smaller
 - .4 at maximum 30 m (100') intervals in horizontal pipe larger than 100 mm (4") diameter
 - .5 wherever else shown on the drawings
- .2 Cleanouts are to be the same diameter as the pipe in piping to 100 mm (4") diameter, and not less than 100 mm (4") diameter in piping larger than 100 mm (4") diameter.
- .3 Where cleanouts in vertical piping are concealed behind walls or partitions, install the cleanouts near the floor and so that the cover is within 25 mm (1") of the finished face of the wall or partition.

.2 Floor Cleanout Terminations:

- .1 Where cleanouts occur in horizontal inaccessible underground piping, extend the cleanout TY fitting up to the floor, and provide a cleanout termination set flush with the finished floor.
- .2 In waterproof floors, ensure that each cleanout termination is equipped with a flashing clamp device. Cleanout terminations are to suit the floor finish.
- .3 Where cleanout terminations occur in finished areas, confirm locations prior to rough-in and arrange piping to suit.
- .4 Ensure that cleanout termination covers in tiled floor are square in lieu of round.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 Section includes: Provide drainage pumps and accessories.
- .2 Related sections: The following is included for reference only and shall not be presumed complete:
 - .1 Section 22 13 16 – Drainage Waste and Vent Piping and Valves
 - .2 Section 22 13 18 – Drainage and Vent Piping Specialties

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM A48 – Standard Specification for Gray Iron Castings
 - .2 ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data:
 - .1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section.
- .3 Shop Drawings:
 - .1 Submit shop drawings including:
 - .1 motor product data sheets
 - .2 pump curves
 - .3 power and control wiring schematics
 - .4 product data for all accessories.
- .4 Test and Evaluation Reports:
 - .1 Start-Up and Test Data: Submit, prior to Substantial Performance, start-up or test data specified in Part 3 of this Section.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:
 - .1 For drainage pump:
 - .1 Hydromatic Pump Co.
 - .2 F. E. Myers/Pentair Canada Inc.
 - .3 ABS Pumps Corp.
 - .4 Zoeller Canada
 - .5 Liberty Pump Inc.
 - .6 ITT Flyght Canada
 - .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
 - .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.
 - .4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

- .1 Condensate Drainage Pump Set:
 - .1 Automatic condensate removal pump as per the drawing schedule, complete with:
 - .1 a minimum 1.89 L (0.4 gal.) capacity plastic tank with inlet drain holes
 - .2 a removable check valve
 - .3 a 115 volt, 1 phase, 60 Hz., CSA certified float activated pump integral with a removable and reversible plastic tank cover and complete with overload protected motor, safety switch, ABS impeller, stainless steel shaft, and 1.8 m (6') of power cord with grounding plug

3 EXECUTION

3.1 INSTALLATION

- .1 Condensate Drainage Pump:
 - .1 Provide a small package type drainage pump where shown to pump equipment condensate drainage into a gravity discharge main. Conform to drawing installation requirements.

- .2 Plug the pump set into a receptacle provided as part of the electrical work.

3.2 SYSTEM STARTUP

- .1 Refer to requirements of the article entitled Equipment and System Start-Up in the Mechanical Work General Instructions Section.

3.3 ADJUSTING

- .1 Adjust pumps and other moving or operating parts to operate/function smoothly and properly.

3.4 CLOSEOUT ACTIVITIES

- .1 Demonstration and Training:
 - .1 Refer to the article entitled Equipment and System O & M Demonstration and Training in the Mechanical Work General Instructions Section. Include for 2 hours of on-site training for 2 groups of 2 people for submersible drainage pumps:

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 Section includes: Provide hydronic piping and valves.
- .2 Related sections: The following is included for reference only and shall not be presumed complete:
 - .1 Section 23 21 16 – Hydronic Piping Specialties
 - .2 Section 23 25 00 – HVAC Water Treatment

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 American Society of Testing and Materials (ASTM):
 - .1 ASTM A53, Standard Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated, Welded and Seamless
 - .2 ASTM B88, Standard Specification for Seamless Copper Water Tube
 - .3 ASTM A105, Standard Specification for Carbon Steel Forgings for Piping Applications
 - .4 ASTM A234, Standard Specification for Piping Fittings of Wrought Carbon Steel for Moderate and High Temperature Service
 - .5 ASTM A536, Standard Specification for Ductile Iron Castings
 - .2 American National Standards Institute (ANSI):
 - .1 ANSI/ASME B16.4, Cast Iron Threaded Fittings
 - .2 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data:
 - .1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:
 - .1 Valves (Bronze, Cast Iron)
 - .1 Kitz
 - .2 Nibco
 - .3 Toyo
 - .2 Valves (Steel)
 - .1 Bonney Forge
 - .2 Kitz
 - .3 Beric
 - .3 Butterfly Valves
 - .1 Kitz
 - .2 Bray
 - .3 Nibco
 - .4 Toyo
 - .5 W-K-M
 - .4 Circuit Balancing Valves
 - .1 Tour & Andersson
 - .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
 - .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.
 - .4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

- .1 Pipe, Fittings And Joints:

- .1 Black Steel - Screwed Joint: Mild black carbon steel, Grade B, ERW, ASTM A53, complete with Class 125 cast iron threaded fittings to ANSI/ASME B16.4, and screwed joints.
 - .2 Black Steel - Grooved End Mechanical Joint: Mild black carbon steel, Grade B, ERW, ASTM A53, factory or site roll grooved, complete with Victaulic Co. (or equal) cast ductile iron grooved end fittings, including full flow elbows, conforming to ASTM A536, and Victaulic Style 07 "Zero-Flex" (or equal) rigid couplings for piping in the Mechanical Rooms and for piping risers, Style 77 (or equal) standard flexible couplings for all other piping.
 - .3 Hard Copper - Solder Joint: Type "L" hard drawn seamless copper to ASTM B88, complete with wrought copper fittings to ANSI B16.22, and 95% tin/5% Antimony solder joints.
- .2 Piping Unions:
- .1 Screwed Piping: Malleable iron, ground joint, bronze or brass to iron or bronze to bronze seat screwed unions and union elbows with a minimum pressure rating of 1725 kPa (250 psi) steam at 260° C (500° F).
 - .2 Flanged Piping: Forged carbon steel slip-on type raised faced welding flange unions to ASTM A105, 150 lb. Class for steel pipe, and slip-on type 150 lb. Class bronze flanges for copper pipe.
- .3 Shut-off valves:
- .1 Ball Type: Class 600, 4140 kPa (600 psi) WOG rated full port 2-piece ball valves, each complete with:
 - .1 A forged brass or bronze body and cap.
 - .2 Blowout-proof stem.
 - .3 Solid forged brass chrome plated ball.
 - .4 "Teflon" or "PTFE" seat.
 - .5 Ends to suit the piping being connected.
 - .6 Removable and identified lever handle.
 - .2 Butterfly Type: Cast ductile iron, lug body style, 1200 kPa (175 psi) rated butterfly valves, each suitable for bubble-tight dead end service with the valve closed and either side of the connecting piping removed, and each complete with:
 - .1 A neck to permit 50 mm (2") of insulation above the flange.
 - .2 A field replaceable EPDM seat.
 - .3 Ductile iron disc.
 - .4 Stainless steel shaft with EPDM seal.
 - .5 A lever handle for valves to and including 150 mm (6") diameter, and a handwheel and gear type operator for valves larger than 150 mm (6") diameter.
- .4 Swing Check Valves:
- .1 Bronze - Screwed: Class 125, 1380 kPa (200 psi) WOG rated horizontal swing check valves, each complete with:

- .1 A "Y" pattern bronze body.
- .2 Hinged brass disc.
- .3 Easy access screw-in cap.
- .4 Screwed ends.
- .2 Steel - Grooved Ends: Victaulic Co. of Canada Ltd. Series 716 "Vic-Check" grooved end carbon steel check valves suitable for mounting horizontally or vertically.
- .3 Cast Iron - Screwed and Flanged: Cast iron, bronze trim, 1380 kPa (200 psi) rated swing check valves, each complete with
 - .1 A bronze disc and seat.
 - .2 Malleable iron hinge.
 - .3 Bolted cover.
 - .4 Screwed or flanged ends as required.
- .5 Vertical Lift Check Valves:
 - .1 Class 150, 1380 kPa (200 psi) WOG rated bronze body vertical lift check valves, each complete with:
 - .1 A conical brass disc.
 - .2 Stainless steel, bushing, guide rod, and spring.
 - .3 PTFE seat.
 - .4 Screwed ends.
- .6 Drain Valves:
 - .1 Refer to Part 2 of the mechanical work Section entitled Basic Mechanical Materials and Methods.
- .7 Circuit Balancing Valves:
 - .1 Globe style, "Y" pattern circuit balancing valves designed to facilitate precise flow measurement, precision flow balancing, and positive shut-off, each rated for 2070 kPa at 120° C (300 psi at 250° F) and complete with:
 - .1 A brass body, stem and plug for valves to 50 mm (2") diameter, and a cast or ductile iron body with bronze plug disc and stem for valves larger than 50 mm (2") diameter.
 - .2 A multi-turn, 360° adjustment handwheel with micrometer type indicators and a lockable hidden memory feature.
 - .3 Two 6.4 mm (¼") threaded brass metering ports with check valves and gasketed caps on the inlet side of the valve for connection to a differential pressure meter.

3 EXECUTION

3.1 INSTALLATION

- .1 Demolition:
 - .1 Do all required hydronic piping system demolition/revision work. Refer to demolition requirements specified in the mechanical work Section entitled Demolition and Revision Work.
- .2 Piping Installation Requirements:
 - .1 Provide all required hydronic piping. Pipe, unless otherwise specified, is to be:
 - .1 For pipe to and including 65 mm (2½") diameter, Schedule 40 black steel, screwed, or type "L" hard copper with solder joints.
 - .2 For pipe 65 mm (2½") diameter and larger, Schedule 40 black steel with grooved ends and Victaulic fittings and couplings, or, Schedule 40 black steel with welding fittings and welded joints.
 - .2 Slope horizontal piping mains to provide a minimum continuous up-grade of 25 mm (1") in 6 m (20') to high points. Slope branch supply and return piping connections to equipment a minimum of 25 mm (1") in 1.2 m (4'). Leave sufficient room at high points for installation and maintenance of air vents.
 - .3 Install automatic control valves, piping wells and similar piping and/or equipment mounted control components required for automatic temperature control systems supplied as part of the control. Refer to drawing control diagrams and details.
 - .4 Connect equipment provided as part of the work of other Sections of the Specification with piping as indicated and/or required. Refer to pipe connection details on drawings.
 - .5 Unions: Provide screwed unions, removable mechanical joint couplings, or weld-on or solder-on flanges in piping at all connections to valves, strainers and similar piping system components which may need maintenance or repair, at all equipment connections, in runs of piping exceeding 9 m (30') at 4.5 m (15') regular intervals to permit removal of sections of piping, and wherever else indicated on the drawings.
 - .6 Shut-off Valves: Provide shut-off valves in piping connections to equipment, to isolate piping risers, to isolate other sections of systems as shown, and wherever else indicated on the drawings. Valves in piping to and including 50 mm (2") diameter are to be ball type. All other shut-off valves are to be ball or butterfly type unless otherwise specified. Locate all valves so that they are easily accessible. Wherever possible, install valves at uniform height. Provide chain operators for valves which are inaccessible for operation from floor level.
 - .7 Check Valves: Provide a check valve in the discharge piping of every pump, and elsewhere in piping where shown on the drawings. Where check valves are required in vertical piping, ensure that they are suitable in all respects for the application. Note that check valves for vertical in-line and/or base mounted circulating pumps are integral with the discharge accessory.
 - .8 Drain Valves: Refer to Part 3 of the mechanical work Section entitled Basic Mechanical Materials and Methods.
 - .9 Circuit Balancing Valves: Provide circuit balancing valves in piping generally where shown on the drawings but with exact locations in accordance with instructions of personnel doing system flow balancing work. Confirm locations prior to installation.
- .3 Flushing And Cleaning Piping:

- .1 Flush and clean new piping in accordance with requirements specified in the mechanical work Section entitled HVAC Water Treatment.

- .4 Testing, Adjusting And Balancing:
 - .1 When work is complete and equipment is operating as intended, test, adjust and balance water flows in accordance with requirements specified in the mechanical work Section entitled Testing, Adjusting, and Balancing.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 Section includes: Provide hydronic piping specialties.
- .2 Related sections: The following is included for reference only and shall not be presumed complete:
 - .1 Section 23 21 13 – Hydronic Piping and Valves
 - .2 Section 23 25 00 – HVAC Water Treatment

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 American Society of Mechanical Engineers (ASME)
 - .1 ASME Boiler and Pressure Vessel Code

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data:
 - .1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:
 - .1 Air Eliminators / Air Vents
 - .1 Spirax Sarco
 - .2 Crane Supply, Brownall
 - .3 Taco
 - .2 Strainers
 - .1 Sarco

- .2 Armstrong
- .3 Zurn

- .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
- .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.
- .4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

- .1 Air Vents:
 - .1 Manual Air Vents: Brass or bronze manual air vent with NPT connection, chrome plated where located exposed in finished areas, each maximum 1035 kPa (150 psi) rated at 100° C (212° F), and equipped with:
 - .1 A knurled handwheel.
 - .2 A discharge nozzle.
 - .3 An integral check valve.
 - .4 A fibre hygroscopic disc.
- .2 Strainers:
 - .1 Refer to Part 2 of the mechanical work Section entitled Basic Mechanical Materials and Methods.

3 EXECUTION

3.1 INSTALLATION

- .1 Installation Of Air Vents:
 - .1 Provide an air vent in piping mains at all high points, at equipment connections, and wherever else shown and/or specified. Equip each air vent with a ball type shut-off valve. Install vents in 100 mm (4") diameter and larger piping and all vents in mechanical rooms in accordance with the drawing detail.
- .2 Installation Of Strainers:
 - .1 Refer to Part 3 of the mechanical work Section entitled Basic Mechanical Materials and Methods.
- .3 Installation Of Flexible Piping Connections:
 - .1 Provide flexible connections in piping connections to equipment where shown.
 - .2 Install in accordance with the manufacturer's instructions.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 Section includes: Provide H & A/C condensate removal pumps
- .2 Related sections: The following is included for reference only and shall not be presumed complete:
 - .1 Section 22 13 16 – Drainage Waste and Vent Piping
 - .2 Section 23 13 19 – Drainage Pumps and Accessories
 - .3 Section 23 23 05 – Variable Refrigerant Flow System

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data:
 - .1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:
 - .1 Franklin Electric Co. Inc. "Little Giant"
 - .2 Eckerle Industries
 - .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
 - .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.

- .4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

- .1 Condensate Removal Pump:
 - .1 Pump Model No. & Construction: "Little Giant" Model No. VCMA-20ULS-PRO CSA certified, tank mounted vertical centrifugal pump set with ABS pump housing, switch housing, and tank, polypropylene impeller, thermally protected fan cooled PSC motor with stainless steel shaft, two 28.6 mm (1 $\frac{1}{8}$ ") diameter inlet openings, a 9.5 mm ($\frac{3}{8}$ ") discharge opening with check valve, automatic start-stop, dual function NO and NC safety overflow switch with 125 mm (5") lead wires, a high water level alarm contact, and 1.8 m (6') of 3-conductor power cord with grounded 3-prong plug prewired to the pump motor.
 - .2 Pump Characteristics: Pump characteristics are as follows:
 - .1 Pump HP: 1/30
 - .2 Electrical: 115 volts, 1 phase, 60 Hz, 1.5 amps.
 - .3 Pump capacity: 160 L/hr (42 GPH) @ kPa (15 ft.) head.

3 EXECUTION

3.1 INSTALLATION

- .1 Installation Of Condensate Removal Pumps:
 - .1 Provide condensate removal pumps where shown.
 - .2 Provide all required mounting and connection hardware and secure in place where indicated.
 - .3 Provide suction and discharge tubing. Indirectly terminate discharge tubing with proper slope over a suitable drain point.
 - .4 Plug each pump into an adjacent receptacle, and document proper operation in the presence of the Owner.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 Section includes: Provide HVAC water treatment
- .2 Related sections: The following is included for reference only and shall not be presumed complete:
 - .1 Section 23 21 13 – Hydronic Piping and Valves
 - .2 Section 23 21 16 – Hydronic Piping Specialties
 - .3 Section 23 21 23 – Hydronic Pumps

1.3 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data:
 - .1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.
- .3 Shop Drawings:
 - .1 Submit shop drawings indicating system configuration and cleaning procedures.
- .4 Test and Evaluation Reports:
 - .1 Chemical Treatment Inspection/Test Results: Submit signed test results and inspection and test log cards for each system as specified in Part 3 of this Section.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the manufacturers noted throughout Part 2 are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification.
- .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
- .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.
- .4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 Characteristics Of Chemicals:

- .1 All chemicals specified in this Section are to be non-toxic when released to atmosphere, non-corrosive and non-staining if a leak occurs, and compatible with all system components.
- .2 All chemicals must be approved by governing authorities for release into the Municipal sewer system.

.2 Manufacturers/Suppliers Of Chemicals And Feed Equipment:

- .1 Acceptable manufacturers/suppliers of chemical feed equipment and treatment chemical specified in this Section are:
 - .1 Ashland Hercules Water Technologies
 - .2 Klenzoid Inc.
 - .3 Magnus Inc.
 - .4 Norkem Inc.

.3 Existing Treatment Systems:

- .1 The Owner has a contract with a treatment chemical supplier to maintain proper levels of chemical in the building systems. New chemicals and/or treatment delivery hardware are to be supplied by this supplier. Obtain the supplier's name during the bidding process and obtain the required pricing information.

.4 Piping System Flushing and Cleaning Chemical:

- .1 Liquid form alkaline type cleaner consisting of a concentrated blend of highly active penetrating agents and detergents with a 12.5 pH and specifically formulated to remove oil, mill scale and oxides from piping and equipment.

.5 Closed Heat Transfer System Treatment:

- .1 Chemicals, chemical feed equipment, and test equipment to control corrosion in closed heat transfer circulating systems as indicated on the drawings and as specified below.
- .2 Chemicals: Chromate free, nitrite/borate type corrosion inhibitor suitable for use with both ferrous and non-ferrous metals.
- .3 Testing Equipment: Test equipment is to consist of a test kit for measuring inhibitor level.

3 EXECUTION

3.1 INSTALLATION

.1 Piping System Flushing And Cleaning:

- .1 After new heat transfer system piping has been installed and leakage testing has been satisfactorily completed, but before mechanical equipment start-up and performance tests, flush and chemically clean the piping systems.

- .2 Provide all required temporary piping connections, including bypass piping to isolate dirt sensitive mechanical plant equipment. Remove instrumentation such as flow meters and switches, orifice plates, meter valves and similar devices and plug pipe openings. Reinstall when flushing and cleaning work has been certified complete by the chemical manufacturer/installer. Ensure that control valves are operational and fully open during flushing and cleaning.
 - .3 Flushing Prior to Chemical Cleaning: Flush the piping, including dead ends, with water to remove loose solids. Clean all strainers. Replace chemical feeder line filters as required. Flush and drain until the water runs clear.
 - .4 Chemical Cleaning: When flushing with water is complete, fill the systems with fresh clean water. Meter the amount of water required to fill each system or otherwise calculate system capacity. Ensure that all air is vented from the systems. Add cleaning chemical as instructed by the chemical manufacturer and circulate the solution for a period of time and at a temperature as required to produce a clean piping system. Conduct daily pH, conductivity, and total iron tests in accordance with the chemical supplier's instructions.
 - .5 Flushing After Chemical Cleaning: When test results indicate a clean system, drain the solution from the piping, refill with clean water and circulate the water for a minimum of 24 hours to flush out remaining chemical solution, then drain the water from the piping using all drain points and again clean all system strainers and replace filters. Arrange for the chemical supplier to check each system after flushing and cleaning is complete and to certify in writing that flushing and cleaning procedures have been properly performed. Submit a copy of the certification letter. Fill the systems.
- .2 Installation Of Closed Heat Transfer System Treatment:
- .1 After the initial fill of boiler plant water, arrange and pay for the chemical treatment system supplier to visit the site to take water samples, and to analyse the samples in the laboratory to determine that the treatment chemicals proposed are the proper chemicals for the system water chemistry. Submit a copy of the laboratory report to the Consultant.
 - .2 Supply and feed into each system, sufficient chemical to charge the system to proper concentrations of chemical, and maintain proper levels in the system until Substantial Performance of the work.
- .3 Manufacturer's Certification, Start-Up, And Training:
- .1 For all water treatment equipment include for on-site certification, start-up supervision, and system training by the treatment chemical manufacturer's representative as follows:
 - .1 Equipment and system manufacturer's certification: refer to the article entitled Equipment and System Manufacturer's Certification in the Mechanical Work General Instructions Section.
 - .2 Start-up: refer to the article entitled Equipment and System Start-up in the Mechanical Work General Instructions Section.
 - .3 Demonstration and training: refer to the article entitled Equipment and System O & M Demonstration & Training in the Mechanical Work General Instructions Section. And include for 4 hours of on-site operation demonstration and training for 2 groups of 6 people.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 Section includes: Provide standard ductwork
- .2 Related sections: The following is included for reference only and shall not be presumed complete:
 - .1 Section 23 31 06 – Special Systems Ductwork
 - .2 Section 23 31 07 – Ductwork Cleaning
 - .3 Section 23 32 00 – Casings and Plenums
 - .4 Section 23 33 00 – Duct System Dampers and Accessories
 - .5 Section 23 33 05 – Silencers

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 American National Standards Institute (ANSI):
 - .1 ANSI/SMACNA HVAC Duct Construction Standards- Metal and Flexible
 - .2 American Society of Testing and Materials (ASTM):
 - .1 ASTM A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Coated (Galvannealed) by the Hot-Dip Process
 - .3 Underwriters Laboratories Canada (ULC):
 - .1 CAN/ULC-S110, Standard Methods of Test for Air Ducts
 - .2 CAN/ULC-S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
 - .4 National Fire Protection Association (NFPA):
 - .1 NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilation Systems

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for duct and fittings.

.3 Test and Evaluation Reports:

.1 Duct Pressure Tests

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Flexible Ductwork

.1 Flexmaster

.2 Continental

.3 Wiremold

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 Galvanized Steel Ductwork:

.1 General: Galvanized steel sheet is to be hot dipped in accordance with requirements of ASTM A653. Galvanizing for bare uncovered duct to be finish painted is to be G60. All other galvanizing is to be G90.

.2 Rectangular: Lock forming grade hot dip galvanized steel, ASTM A653, shop fabricated, minimum #26 gauge.

.3 Round: Factory machine fabricated, spiral, mechanically locked flat seam, single wall duct, fittings and couplings.

.4 Flat Oval: Factory machine fabricated, single wall, 4-ply spiral lock seam duct, fittings and couplings.

.2 Flexible Metallic Ductwork

- .1 Insulated: Spirally wound, semi-rigid, self-supporting corrugated aluminum duct with continuous triple lock seams, ANSI/SMACNA Form "M-I", ULC-S110 listed and labelled as a Class 1 Air Duct, constructed of dead soft aluminum strip, supplied in 3 m (10') lengths and factory covered with 40 mm (1½") thick, 12 kg/m³ (0.75 lb/ft³) density, minimum 6 R-value fibreglass insulation with a vinyl jacket meeting flame spread and smoke developed requirements of CAN/ULC-S102.
- .3 Metal Duct System Joint Sealant
 - .1 ULC listed and labelled, premium grade, grey colour, water base, non-flammable duct sealer, brush, or gun applied, with a CAN/ULC S102 maximum flame spread rating of 5 and smoke developed rating of 0.
- .4 Acoustic Lining
 - .1 Minimum 25 mm (1") thick acoustic lining material meeting NFPA 90A requirements and flame spread and smoke developed fire hazard ratings of CAN/ULC-S102, flexible for round ducts, board type for rectangular ducts, consisting of a bonded fiberglass mat coated on the inside (airside) face with a black fire-resistant coating.

3 EXECUTION

3.1 INSTALLATION

- .1 Demolition:
 - .1 Do all required standard ductwork system demolition/revision work. Refer to demolition requirements specified in the mechanical work Section entitled Demolition and Revision Work.
- .2 Fabrication And Installation Of Galvanized Steel Ductwork:
 - .1 Provide all required standard galvanized steel ductwork, rectangular and/or round and/or flat oval as shown. Note that where rectangular ductwork is shown, round or flat oval ductwork of equivalent cross-sectional area is acceptable.
 - .2 Unless otherwise specified, construct and install ductwork in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible to suit the duct pressure class designation of minimum 500 Pa (2" w.c.) positive or negative as applicable, a minimum velocity of 10 m/s (2000 fpm), and so that the ductwork does not "drum". All flat surfaces of rectangular ductwork are to be cross-broken. Duct system sealing is to meet ANSI/SMACNA Seal Class A requirements.
 - .3 Duct Routing and Dimensions: Confirm the routing of all ductwork at the site and site measure ductwork prior to fabrication. Note that duct dimensions may be revised to suit site routing and building element requirements, if dimension revisions are reviewed with and approved by the Consultant. Duct routing and/or dimension revisions to suit conditions at the site are not grounds for a claim for an extra cost.
 - .4 Ducts Run Within or Through OWSJ: Refer to structural drawings. Where ductwork is to be run within or through open web steel joists, note that ductwork shown on the mechanical drawings is schematic only and is to be altered as required to suit the steel joist configuration, spacing, panel points, and cross-bridging at no additional cost.
 - .5 Ductwork Located at Sprayed Fireproofing: Wherever ductwork is required at locations where sprayed fireproofing is applied to building construction, install the ductwork only after the fireproofing work is complete and do not compromise the fire rating of the sprayed fireproofing.

- .6 Automatic Control Components: Install all duct system mounted automatic control components supplied as part of the automatic control work.
 - .7 Heat Transfer Equipment Connections: Where indicated, provide duct connections to fan powered heat transfer equipment with integral coils.
 - .8 Rectangular Duct Support Inside Building: Support horizontal rectangular ducts inside the building in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, but use trapeze hangers with, unless otherwise specified, galvanized steel channels, and galvanized steel hanger rods for all ducts that are exposed, and all concealed ducts wider than 500 mm (20").
 - .9 Round and Flat Oval Duct Support Inside Building: Support round and flat oval ducts inside the building in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, but, unless otherwise specified, for both uninsulated and insulated ducts exposed in finished areas, use bands and secure at the top of the duct to a hanger rod, all similar to Ductmate Canada Ltd. type "BA". If the duct is insulated, size the strap to suit the diameter of the insulated duct.
 - .10 Flanged Duct Joints: Where flanged duct joints are used, do not locate the joints in wall or slab openings, or immediately at wall or slab openings. Do not use flanged joints for exposed uninsulated ducts in finished areas.
 - .11 Application of Sealants: Apply sealants by brush or gun to cleaned metal surfaces. Where bare ductwork is exposed apply neat uniform lines of sealant. Randomly brushed, sloppy looking sealant applications will be rejected and must be repaired or replaced with a neat application of the sealant.
 - .12 Connection of Dissimilar Metal Ducts: Where dissimilar metal ducts are to be connected, isolate the ducts by means of flexible duct connection material as specified in the Section entitled Duct System Dampers and Accessories.
- .3 Installation Of Flexible Ductwork:
- .1 Provide maximum 3 m (10') long lengths of flexible ductwork for connections between galvanized steel duct mains and branches, and necks of ceiling grilles and diffusers. Do not install flexible ductwork through walls, even if shown on the drawings.
 - .2 Stretch out lengths of duct prior to cutting and installation.
 - .3 At rectangular galvanized steel duct, accurately cut holes and provide flanged or "Spin-in" round flexible duct connection collars. Seal joints with duct sealer.
 - .4 Install flexible ducts as straight as possible and support in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, and secure at each end with nylon or stainless steel gear type clamps, and seal joints. Provide long radius duct bends where they are required.
 - .5 Do not penetrate fire barriers with flexible duct.
- .4 Installation Of Acoustic Lining:
- .1 Provide acoustic lining in ductwork in locations as follows:
 - .1 Wherever shown and/or specified on the drawings.

- .2 Supply ductwork downstream of air terminal boxes for a distance of 2.4 m (8') measured along the duct and outward from the box in all directions.
- .3 For all transfer air ducts.
- .2 Install lining in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, however, for all installations regardless of velocity, at leading and trailing edges of duct liner sections, provide galvanized steel nosing channel as per the detail entitled Flexible Duct Liner Installation found in the ANSI/SMACNA manual referred to above.
- .5 Duct System Protection, Cleaning And Start-Up:
 - .1 Temporarily cover all open ends of new ducts during construction.
 - .2 Vacuum all dirt and foreign matter from the entire duct systems and clean duct system terminals and the interior of air handling units prior to operating fans.
 - .3 Prior to starting any supply air handling system provide 50 mm (2") thick glass fibre construction filters at fan equipment in place of permanent filters.
 - .4 Provide cheesecloth over all duct system inlets and outlets and run the system for twenty-four hours, after which remove the cheesecloth, the construction filters, and install new permanent filters.
 - .5 Include all labour for a complete site walk-through with testing and balancing personnel following the route of all duct systems to be tested, adjusted and balanced for the purpose of confirming the proper position and attitude of dampers, the location of pitot tube openings, and any other work affecting the testing and balancing procedures. Perform all corrective work required as a result of this walk-through.
- .6 Testing, Adjusting And Balancing:
 - .1 When work is complete and equipment is operating as intended, test, adjust and balance air flows and temperatures in accordance with requirements specified in the mechanical work Section entitled Testing, Adjusting, and Balancing.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 Section includes: Provide duct system dampers and accessories
- .2 Related sections: The following is included for reference only and shall not be presumed complete:
 - .1 Section 23 31 05 – Standard Ductwork
 - .2 Section 23 31 06 – Special Systems Ductwork
 - .3 Section 23 31 07 – Ductwork Cleaning
 - .4 Section 23 32 00 – Casings and Plenums
 - .5 Section 23 33 05 – Silencers

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 American National Standards Institute (ANSI):
 - .1 ANSI/SMACNA HVAC Duct Construction Standards- Metal and Flexible
 - .2 American Society of Testing and Materials (ASTM):
 - .1 ASTM A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Coated (Galvannealed) by the Hot-Dip Process
 - .3 Underwriters Laboratories Canada (ULC):
 - .1 CAN/ULC-S110, Standard Methods of Test for Air Ducts
 - .2 CAN/ULC-S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
 - .4 National Fire Protection Association (NFPA):
 - .1 NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilation Systems

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data:

- .1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers listed throughout Part 2 are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
- .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
- .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.
- .4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

- .1 Round To Rectangular Duct Connections:
 - .1 Galvanized steel, flared, flanged or notched as required, "SPIN-IN" type round duct take-off collars with locking dampers in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.
- .2 Splitter Dampers:
 - .1 Minimum #20 gauge damper blade constructed of the same material as the duct, reinforced as required to suit blade size, system velocity, and to prevent "chatter", and complete with operating hardware equal to Dyn Air Inc. #Q-50 "DYN-A-QUAD S-S" quadrant regulator with RW-50 backup washers to prevent leakage, long square bearing pin, and slide pin.
- .3 Air Turning Vanes:
 - .1 For square elbows - multiple-radius turning vanes, interconnected with bars, adequately reinforced to suit the pressure and velocity of the system, constructed of the same material as the duct they are associated with, and in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.
- .4 Manual Balancing (Volume) Dampers:
 - .1 Flanged and drilled, low leakage, single or parallel blade (depending on damper size) manual balancing dampers with AMCA certified maximum leakage through a 1.2 m x 1.2 m (4' x 4') damper of 52 L/s/m² (110 ft³/min) against 1 kPa (0.145 psi) differential static pressure, each constructed of the same material as the connecting ductwork unless otherwise specified, each designed to maintain the internal free area of the connecting duct, and each complete with:
 - .1 Rectangular dampers: such as a Nailor Industries Inc. Model 1010 and 1020 damper, maximum size 1.2 m x 1.2 m (4' x 4') for a single damper and complete with:

- .1 #16 gauge hat channel frame with reinforced corners and #16 gauge blades, galvanized steel for galvanized steel ductwork, Type 304 stainless steel for other ductwork unless otherwise specified.
 - .2 Dual durometer bulb type extruded PVC blade seals, and compression type cambered metal jamb seals.
 - .3 A hexagonal or square shaft extension through the frame.
 - .4 Non-stick, non-corrosive synthetic bearings for rectangular dampers, flange stainless steel bearings for round dampers, with an outboard support bearing and outboard support bearing bracket.
 - .5 Blade stops for single blade dampers, designed to prevent the blade from moving more than 90°.
 - .6 Plated steel linkage for multiple blade dampers, totally enclosed within the frame and out of the airstream.
 - .7 A locking hand quadrant damper operator with, for insulated ducts 50 mm standoff mounting.
- .2 Round dampers: such as a Nailor Industries Inc. Model 1090 butterfly style damper, maximum 600 mm (24") diameter, equipped with:
- .1 A #20 gauge frame with stiffening beads.
 - .2 2 #20 gauge blades laminated together, equivalent to #14 gauge, 90° rotation, with open/close end stops and a cross-linked polyethylene blade steel.
 - .3 12 mm (½") diameter drive shaft bolted to the blade and extended approximately 100 mm (6") beyond the frame.
 - .4 "Celcon" or equal bearings.
 - .5 A locking hand quadrant damper operator with, for insulated ducts 50 mm standoff mounting.
- .2 Multiple Damper Section Assembly: An assembly supplied with the dampers or site constructed of the same material as the damper and designed for tight and secure mounting of the individual dampers.
- .3 Acceptable manufacturers are:
- .1 Nailor Industries Inc.
 - .2 T.A. Morrison & Co. Inc. "TAMCO"
 - .3 NCA Manufacturing Ltd.
 - .4 Greenheck Fan Corp.
 - .5 Ruskin Co.
- .5 Flexible Connection Material:

.1 Waterproof, indoor-outdoor type flexible connection material meeting requirements of NFPA 90A, consisting of woven glass fibre fabric coated on both sides with synthetic rubber. Acceptable products are:

.1 Duro Dyne Canada Inc. "DUROLON"

.2 Dyn Air Inc. "HYPALON"

.6 Duct Access Doors:

.1 In accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, with sizes suitable in all respects for the purpose for which they are provided, and, unless otherwise specified, constructed of the same material as the duct they are associated with.

.7 Instrument Test Ports:

.1 Equal to Duro-Dyne of Canada Ltd. #IP1 or #IP2 (to suit insulation thickness where applicable) gasketed, leak-proof instrument test ports for round or rectangular ducts as required, each complete with a neoprene expansion plug and a plug securing chain.

.8 Motorized Control Dampers:

.1 Volume dampers as specified above in this Section, each equipped with a damper motor equal to a Belimo CSA certified, spring return, direct coupled electric motor damper actuator, 24 volt, electronic overload protected, complete with position indicator, a housing to suit the mounting location, and additional features as required to suit the application and control sequence.

3 EXECUTION

3.1 INSTALLATION

.1 Installation Of Round To Rectangular Duct Connections:

.1 Cut round holes in rectangular ducts using a purpose made hole cutter and provide round to rectangular "Spin-In fittings with dampers for connection of flexible round ductwork. Seal the cut duct around the fitting.

.2 Installation Of Splitter Dampers:

.1 Provide splitter dampers in supply ductwork at branch duct connections off supply air mains, and wherever else shown and/or specified on the drawings. Install splitter dampers so they cannot vibrate and rattle and so that the damper operation mechanisms are in an easily accessible and operable location. Ensure that operators for dampers in insulated ducts are equipped with stand-off mounting brackets.

.3 Installation Of Turning Vanes:

.1 Provide turning vanes in ductwork elbows where shown on the drawings and wherever else required where, due to site installation routing and duct elbow radius, turning vanes are recommended in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

.4 Installation Of Manual Balancing (Volume) Dampers:

.1 Provide manual balancing dampers in all open end ductwork, in all duct mains, and wherever else shown and/or specified.

- .2 Install the dampers so that the operating mechanism is accessible and positioned for easy operation, and so that the dampers cannot move or rattle. Ensure that operating mechanisms for dampers in insulated ducts are complete with stand-off mounting brackets.
- .3 Dampers in fresh air ducts, exterior wall/roof openings, etc., are to be insulated type.
- .4 Confirm exact damper locations with personnel doing air quantity balancing testing work and install dampers to suit. Include for providing five additional dampers at no additional cost.
- .5 Installation Of Flexible Connection Material:
 - .1 Provide a minimum of 100 mm (4") of flexible connection material where ducts, plenums, and/or casings connect to fans, and wherever else shown or specified.
 - .2 Rigidly secure a minimum of 75 mm (3") of duct material (minimum #24 gauge) to each edge of the flexible fabric and to the fan, duct, plenum, etc., in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible. Ensure that connections to the flexible fabric material are arranged and supported so as to not impose any external forces on the fabric.
- .6 Installation Of Duct Access Doors:
 - .1 Provide access doors in ductwork for access to all components which will or may need maintenance and/or repair, including reheat coils. Install in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.
 - .2 Identify access doors provided for fusible link damper maintenance with "FLD" stencil painted or marker type red lettering and ensure that the doors are properly located for damper maintenance.
 - .3 When requested, submit a sample of proposed duct access doors for review.
 - .4 Where sectionalized fusible link dampers and/or balancing dampers are provided in large ducts, provide a plenum type access door to suit, and adequately reinforce the ductwork to suit the access door installed.
- .7 Installation Of Instruments Test Ports:
 - .1 Provide instrument test ports in all main ducts at connections to fans, plenums or casings, in all larger branch duct connections to mains, and wherever else required for proper air quantity balancing and testing.
 - .2 Locate test ports where recommended by personnel performing air quantity testing and balancing work.
- .8 Installation Of Motorized Control Dampers:
 - .1 Provide motorized control dampers where shown. Secure in place to prevent movement or rattle, and to prevent air bypass around the damper.
 - .2 Equip each damper with an electric motor actuator, 24 volt. Ensure that each actuator is equipped with all required features to suit the application.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 Section includes: Provide grilles and diffusers
- .2 Related sections: The following is included for reference only and shall not be presumed complete:
 - .1 Section 23 31 05 – Standard Ductwork
 - .2 Section 23 31 06 – Special Systems Ductwork
 - .3 Section 23 33 00 – Duct System Dampers and Accessories

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 American National Standards Institute (ANSI):
 - .1 ANSI/ASHRAE Standard 70, Method of Testing the Performance of Air Outlets and Air Inlets

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data:
 - .1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:
 - .1 Price Industries Inc.
 - .2 Krueger Division of Air System Components Inc.
 - .3 Titus HVAC
 - .4 Nailor Industries Inc.
 - .5 Metalaire

- .2 Requests for substitutions shall be made in conformance with Section 01 33 00 – Submittal Procedures.
- .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.
- .4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

- .1 Grilles And Diffusers:
 - .1 Grilles and diffusers of the type, size, capacity, finish, and arrangement as shown on the drawings and as per the drawing schedule, each equipped with all required mounting and connection accessories to suit the mounting location and application.

3 EXECUTION

3.1 INSTALLATION

- .1 Installation Of Grilles And Diffusers:
 - .1 Provide grilles and diffusers where shown on the drawings. Wherever possible, grilles and diffusers are to be the product of one manufacturer.
 - .2 Unless otherwise specified connect grilles and diffusers in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.
 - .3 Exactly locate grilles and diffusers to conform to the final architectural reflected ceiling plans and detailed wall elevations, and to conform to the final lighting arrangement, ceiling layout, ornamental and other wall treatment.
 - .4 Equip supply diffusers having a basic four-way or all round air pattern for operation in one, two, or three way pattern where indicated on the drawings.
 - .5 Confirm grille and diffuser finishes prior to ordering.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 Section includes: Provide air filters and accessories
- .2 Related sections: The following is included for reference only and shall not be presumed complete:
 - .1 Section 23 31 05 – Standard Ductwork
 - .2 Section 23 31 06 – Special Systems Ductwork
 - .3 Section 23 33 00 – Duct System Dampers and Accessories

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 Canadian Standards Association (CSA):
 - .1 CAN/ULC-S111, Standard Method of Fire Tests for Air Filter Units
 - .2 American National Standards Institute (ANSI):
 - .1 ANSI/ASHRAE Standard 52-2, Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Sizes
 - .2 ANSI/AHRI Standard 850-I-P, Performance Rating of Commercial and Industrial Air Filter Equipment

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data:
 - .1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:
 - .1 Air Filters:

- .1 AAF International
 - .2 Camfil Farr Inc.
 - .3 Modern Air Filter Corp.
 - .4 General Filter Inc.
- .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
 - .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.
 - .4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

- .1 General:
 - .1 Unless otherwise specified or noted, filters are to be synthetic and/or glass fibre disposable media type in accordance with the drawing schedule(s).
 - .2 Minimum Efficiency Reporting Values (MERV) ratings are to be as per ASHRAE Standard 52.2.
- .2 Construction Filters:
 - .1 Roll type, disposable, MERV 7 to 9 woven glass fibre media.

3 EXECUTION

3.1 INSTALLATION

- .1 Installation Of Construction Filters:
 - .1 Provide roll type medium efficiency disposable media filter(s) across the entire filter bank of each supply air handling unit, either at the factory where the fan is produced or at the site as soon as the fan is installed. Secure the media in place so it will not be dislodged by fan operation. Replace the roll media periodically if it becomes loaded and clogged prior to time for removal.
 - .2 For exhaust systems, secure the filter media across exhaust air openings and ductwork to prevent construction dirt and dust from fouling the fan
 - .3 Leave the media in place until fan start-up, at which time remove and dispose of the construction media.
- .2 Installation Of Air Filters:
 - .1 Provide all required filter media when fan equipment is ready for start-up and performance testing. Provide any required filter framing/racks.

- .2 Prior to Substantial Performance supply a complete spare set of filter media in original packaging and clearly identified as to the applicable system for each air handling system with filters. Store the filters at the site where directed by the Owner.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 Section includes: Provide water-to-air heat pumps
- .2 Related sections: The following is included for reference only and shall not be presumed complete:
 - .1 Section 23 21 13 – Hydronic Piping and Valves
 - .2 Section 23 21 16 – Hydronic Piping Specialties
 - .3 Section 23 21 23 – Hydronic Pumps
 - .4 Section 23 31 05 – Standard Ductwork
 - .5 Section 23 31 06 – Special Systems Ductwork
 - .6 Section 23 33 00 – Duct System Dampers and Accessories

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
 - .1 ASHRAE/IES Standard 90A, Energy Conservation in New Buildings
 - .2 ASHRAE/ANSI/AHRI/ISO 13256-1, Water Source Heat Pumps

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Product Data:
 - .1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:
 - .1 Daikin Applied Canada Inc.

- .2 Omega
 - .3 United Technologies “Carrier”
 - .4 Trane Canada
- .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
- .3 Substitution Limitations:
- .1 No further substitutions will be permitted.
- .4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

- .1 Vertical Stacked Heat Pump (Omega Series)
- .1 Cabinet casing shall be 20-gauge galvanized steel. Internal components shall be welded and riveted for rigidity. Insulate all internal surfaces with 1 inch thick 3.5lbs density insulation. Insulation shall be mold resistant. Insulation shall meet NFPA 90, UL-181, and ASTM-C1071 standards and insulation shall have a flame spread of less than 25, and a smoke developed classification of less than 50 per ASTM E-84 and UL 723.
 - .2 Provide high temperature, high pressure water hoses for connection of the risers to the chassis. Hoses shall be constructed with an inner core of rubber, a metal braided covering and an outer rubber coating. Fittings shall be brass construction. Hoses shall carry a pressure rating of 600 PSI. Steel braided hoses without the outer rubber covering are not acceptable
 - .3 Unit cabinet shall ship in one piece, chassis ships loose. Contractor shall install flex connection on all discharge openings. There shall be no rigid connection to supply-air discharge grilles or supply ducts except on units designed with split casing.
 - .4 Unit cabinet shall be complete with a factory installed 3/8-inch neoprene isolation pad under the legs.
 - .5 Physical dimensions of each unit shall be accommodated within furring / ceiling-slab spaces provided as shown on the architectural drawings.
 - .6 Provide a minimum 5” high stand factory installed on the base of the casing to elevate the unit 5” above the floor.
 - .7 The drain pan shall be 16-gauge stainless steel. Provide a 7/8 OD copper drain connection. Provide a flexible P-Trap condensate hose for connection to the condensate riser.
 - .8 A factory installed motorized shut-off valve and flow regulating device shall be provided to maintain specified unit water flow rate and to shut-off water flow when compressor is NOT running. Flow regulating valves shall be field serviceable and maintain specified unit flow rate regardless of system pressure fluctuations. Motorized shut off vales shall carry a pressure rating of 400 PSI Shut-off valve close off differential pressure shall be 25 PSIG.
 - .9 Fans

- .1 Each unit shall include a factory mounted forward curved, double inlet double width centrifugal direct drive fan and motor assembly with internal overload protection. The blower fan assembly shall be positioned horizontally from a sheet metal blower deck.
 - .2 Units shall be supplied with an ECM, controlled using a PWM signal. Fan motors speeds shall be field selectable using unit mounted 3- speed fan switch or by compatible multispeed thermostat.
- .10 Refrigeration Circuit
- .1 The compressor chassis which includes the evaporator and condenser coil shall be mounted on 12-gauge slide rails using a double isolated base. An additional set of RIS isolators shall be mounted under the compressor footing. Chassis shall be complete with an acoustical enclosure ensuring compressor noise is isolated from the air stream. Provide plug type electrical connections so that the chassis can be easily removed from the front of the cabinet for service.
 - .2 Compressor shall be a hermetically sealed type with internal thermal overload protection and mounted on rubber vibration isolators.
 - .3 The refrigeration circuit shall have two service valves for servicing of high- and low-pressure circuits.
 - .4 The refrigerant circuit shall contain reversing valve and Thermal Expansion Valve (TXV) refrigerant metering device arranged for reversing refrigerant flow.
 - .5 Air side coils shall have copper tubes mechanically bonded to aluminum fins. Coils shall be sized to meet scheduled performance for cooling and heating. Provide 1" throwaway filters on coil face.
 - .6 Water side heat exchanger shall be coaxial type with steel outer tube and copper inner tube. Condenser shall be rated at 500 PSI water side and 650 PSI refrigerant side.
- .11 Controls
- .1 Unit mounted control enclosure shall contain: Microprocessor controls for compressor, reversing valve and fan motor; 24-volt control power transformer; terminal block for low voltage field wiring connection; terminal block for main electrical connection; unit mounted disconnect switch. Reset of safety devices shall be accomplished by interrupting power supply to the unit. All control components shall be mounted on a circuit board with plug in quick connects to components they are controlling. Compressor capacitor and relay/contactors shall be located in the control panel.
 - .2 The operating and safety controls shall be monitored by the microprocessor controller. Sensor parameters and timers shall be field adjustable to meet site conditions. Controller shall have the following safety switches and sensors:
 - .1 Low Pressure Safety Switch
 - .2 High Pressure Safety Switch
 - .3 Entering Water Temperature sensor
 - .4 Leaving Water Temperature sensor
 - .5 Suction line freeze-stat temperature sensor

- .6 Supply Air Temperature sensor
- .7 Compressor Anti-Short Cycle timer
- .8 Water Valve open and Closed timer
- .9 Low-pressure bypass timer
- .10 Random wait time on unit power up
- .11 Fan-On and Fan-Off timer
- .3 Controller shall have data logging with stored alarm states, supply and leaving water temperature, suction line temperature, and supply air temperature readings.
- .4 Microprocessor controller shall have 'future proof' feature to accept software updates. Microprocessor board shall be capable of being field updated with newer software patches or custom software as needed.
- .5 Microprocessor board shall have a field selectable setting for use with multi-speed or single speed thermostats.
- .6 Electrical box shall have a factory mounted 3-speed selector switch allowing for unit to be field configurable to either manual speed mode.
- .12 Testing and Warranty
 - .1 Each chassis unit shall be factory tested using a multi-step computer-controlled testing unit. Test results shall be matched to chassis serial number and shall be retained for future reference.
 - .2 Manufacturer's parts warranty shall be for 2 years not to exceed 30 months from date of shipment for parts only.
- .2 Horizontal and Vertical Water Source Heat Pumps
 - .1 Units shall be AHRI certified and C.S.A. approved. Units shall provide capacities detailed in schedule at the ampacity and voltage detailed in the schedule. All units shall have COPs to meet the requirements of ASHRAE 90.1.
 - .2 Sound
 - .1 Heat pump units shall meet the sound power levels indicated in the equipment schedule. Sound power data is in accordance with AHRI 260 and must be provided in 8 octave band format, at full load.
 - .2 Unless authorized written exception is granted by the owner or the consultant, suppliers who cannot meet the sound levels scheduled shall supply and install sound attenuating devices as required to meet the specified performance.
 - .3 Cabinet
 - .1 The cabinet shall be fabricated from heavy gauge G-60 galvanized sheet metal. Interior surfaces shall be lined with insulation in the compressor and air handler sections as described below:

- .1 Less than 2-tons: Two layers of ½-inch thick, 1-1/2 lb. density fiberglass insulation throughout the entire unit.
 - .2 2-tons to 6-tons: Two layers of ½-inch thick, 1-1/2 lb. density fiberglass insulation in air handling section, and a single layer of the same insulation in the compressor section.
 - .3 Larger than 6-tons: ½-inch thick, 1-1/2 lb. density fiberglass insulation throughout the entire unit.
 - .4 In all sizes: The insulation shall have a flame spread of less than 25 and a smoke developed classification of less than 50 per ASTM E-84 and UL 723. All insulation must meet NFPA 90A requirements.
- .2 For additional sound attenuation on unit sizes 2-tons and larger, a compressor blanket constructed from high performance Duracoustic sound material with superior sound absorption and deadening properties shall be provided. The sound rated material has a density of 1.5 lb./ft³ and is made from a loaded vinyl reinforced barrier and is embedded with 0.5" urethane foam.
 - .3 All units shall have a factory-installed 1" duct flange on the discharge of the blower and must have a minimum of two access panels to provide access to the compressor compartment and one access to the blower compartment. Unit shall have an insulated panel separating the blower compartment from the compressor compartment.
 - .4 Supply and return condenser water connections shall be FPT fittings, brazed copper water tubes and securely flush mounted to the cabinet corner post allowing for connection to a flexible hose without the use of a back-up wrench. Condensate drain connection shall not be less than ¾" FPT fitting securely flush mounted to the corner post. Piping connections at the unit which require brazing or soldering by the installer shall not be allowed.
 - .5 Unit shall utilize a corrosion resistant, stainless steel insulated drain pan. A stub out connection shall be provided. The drain pan shall be internally sloped to ensure no pooling of condensate water per ASHRAE 62.2. Units without internally sloped drain pans will not be accepted. The unit will be supplied with solid-state electronic condensate overflow protection as standard. Mechanical float switches will not be accepted.
 - .6 All ceiling units shall be provided with hanger bracket and rubber isolator kit for field installation.
 - .7 All vertical units shall be left or right hand piping connections as required on the drawings.
- .4 Refrigeration Circuit
 - .1 Provide units with single-stage compressors as noted on the schedules.
 - .1 Units less than 2-tons shall have high efficiency rotary compressors.
 - .2 Units 2-tons and larger shall have Copeland hermetic scroll compressors. A minimum of two refrigeration circuits shall be provided for units larger than 5-tons.
 - .2 All units shall have double isolation plates in the compressor section for added mass and improved noise attenuation. Two sets of neoprene isolators shall be provided to separate the bottom mass plate from the unit casing, and between the compressor. Provide high density insulation between the mass plate and the unit casing. Equipment without the double mass plates will not be accepted.

- .3 Units shall have a sealed refrigerant circuit which includes a non-CFC depleting R410A refrigerant. Refrigeration circuit shall include a compressor; reversing valve; aluminum fin and rifled copper tube refrigerant-to-air heat exchanger; thermostatic expansion device; and airside coil. The coaxial coils shall be rated for 600 psig on the refrigerant side and 500 psig on the water side. Heat exchanger shall be manufactured from copper.
 - .4 Refrigeration safeties and specialties shall include high and low pressure switches, internal compressor overload protection, low refrigerant suction temperature switch for freeze protection, and high / low side refrigerant service ports for gauge connection.
 - .5 Refrigerant metering devices shall be arranged for reversing refrigerant flow. Reversing valve shall have a pilot operated sliding piston.
 - .6 Two-way motorized isolation valves shall be factory installed inside the compressor compartment. The valve actuator shall be factory wired to the Microtech III controller.
- .5 Fan
- .1 Units 6-tons or less: Unit shall have a direct drive centrifugal fan motor assembly. The fan housing shall have a removable orifice ring to facilitate fan motor and fan wheel removal. Blower shall have inlet rings to allow removal of wheel and motor from one side without removing housing. The fan motor shall be permanently lubricated, constant CFM electronically commutated for improved operation. Field adjustable CFM settings shall be accomplished from a 4-position switch in the control box. Units supplied without permanently lubricated motors must provide external oilers for easy service. Four legged fan mounts shall be used for added stability and vibration control.
 - .2 Units larger than 6-tons: Belt drive centrifugal fans shall be provided with an adjustable base for proper belt tension. A high efficiency TEFC blower motor shall be provided. Factory adjustable sheaves shall be set for optimum fan performance. The fan housing shall protrude through the cabinet to facilitate field duct connection. Unit shall have a Variable Frequency Drive (VFD) capable of softstart and programable for air balance, controlled by a 0-10 vdc input. Large vertical units shall have multiple blower assemblies.
- .6 Filters
- .1 Provide flat arrangement filter boxes designed for 4-inch deep pleated panel filters.
 - .2 Filter efficiency shall be MERV 8.
 - .3 Filter sections shall be gasketed to provide leakage rates less than 4 cfm/sqft at 0.5" static pressure, in order to meet LEED-NC EQ credit 5.
- .7 Electrical
- .1 The control box shall be located within the unit and shall contain controls for compressor, reversing valve and fan motor operation and shall have either, a 50VA transformer and a terminal block for low voltage field wiring connections. Unit shall be name-plated to accept time delay fuses or HACR circuit breaker for branch over-current protection of the power source.
 - .2 Unit control system shall provide heating or cooling as required by the set points of the wall thermostat. The unit control scheme shall provide for fan operation simultaneous with compressor operation regardless of the thermostat type.

- .3 All units shall have factory-mounted, non-fused disconnect switch located on the unit front corner post to break main power to the unit for ease of field service. The switch shall have a lockout/tag out feature.
- .4 All units shall have a Short-Circuit current rating of 5kA rms symmetrical, 600V maximum.
- .8 Controls
 - .1 Provide microprocessor controls. Operating and safety controls shall include:
 - .1 low suction temperature (freezestat) switch;
 - .2 high refrigerant pressure switch;
 - .3 low refrigerant temperature sensor;
 - .4 compressor overload protection;
 - .5 and supply fan overload protection.
 - .2 Reset of automatic lockouts shall be by interrupting the power supply to the unit, or by the remote reset feature.
 - .1 An intelligent reset controller shall minimize nuisance trips by automatically clearing the first two faults in a 24 hour period. An automatic lockout will only occur on the third fault. The reset counter shall be reset to zero every 24 hours.
 - .3 In addition to the features provided by the microprocessor, the control box shall contain the following components:
 - .1 controls for compressor, reversing valve, and fan motor;
 - .2 control transformer, and
 - .3 a terminal block for low voltage field wiring connections.
 - .4 Unit control logic shall provide heating and cooling operation as required by the thermostat. Control system shall provide the following:
 - .1 fan speed increase based on stage of cooling
 - .2 dehumidification mode
 - .3 time delay compressor operation
 - .4 low pressure switch bypass
 - .5 unit reset at the thermostat
 - .6 delayed de-energization of the reversing valve
 - .7 short cycle protection and random unit start
 - .8 high refrigerant pressure alarm
 - .9 low suction pressure alarm
 - .10 condensate overflow alarm

- .11 brownout alarm
- .12 service diagnosis via 6 external LED's
- .13 The microprocessor shall include the following functions based on remote signals:
 - .1 load shed
 - .2 emergency shutdown
 - .3 night setback and override
 - .4 pump restart on night setback
- .9 Hoses and Ball Valves
 - .1 All units shall be supplied with hose kits. Condensate hose shall be 24 inches long. Supply and return hoses shall be 24 inches long with NPT at both ends and a swivel at one end. Hoses shall have braided stainless steel outer covering. Complete hose kit shall be flame retardant. Components shall meet the requirements of ASTM E84-81a, NFPA 225 and UL 723.

3 EXECUTION

3.1 INSTALLATION

- .1 Installation Of Water-To-Air Heat Pumps:
 - .1 Provide water-to-water heat pump(s) where shown. Ensure adequate maintenance clearance around each unit.
 - .2 Secure the unit in place, level, and plumb, on vibration isolation.
 - .3 Complete all required piping connections, including condensate drainage piping extended from refrigerant to air heat exchanger(s) to an indirect drain point.
 - .4 Hand an identified spare set of air filters and an identified spare drive belt for belt driven fans to the Owner at the site prior to Substantial Performance.
 - .5 Do all required control wiring (except the building automation system connection) in conduit in accordance with the manufacturer's control wiring schematics and wiring standards of the electrical work. Ensure that each unit is properly electrically grounded.
 - .6 Equipment and System Manufacturer's Certification: Refer to the article entitled Equipment and System Manufacturer's Certification in the Mechanical Work General Instructions Section.
 - .7 Start-Up: Refer to the article entitled Equipment and System Start-up in the Mechanical Work General Instructions Section.
 - .8 Commissioning: Refer to commissioning requirements specified in the Mechanical Work General Instructions Section.
 - .9 Demonstration and Training: Refer to the article entitled Equipment and System O & M Demonstration & Training in the Mechanical Work General Instructions Section. Include for 8 hours of on-site operation demonstration and training for 2 groups of 6 people.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

- .1 Section includes: Provide a complete building automation system as further described in this Section including but not limited to the following:
 - .2 Products furnished/supplied but not installed under this section:
 - .1 Supply to Division 23 the following
 - .1 Control valves
 - .2 Control dampers
 - .3 Thermowells.
 - .3 Related sections: The following is included for reference only and shall not be presumed complete:
 - .1 Section 23 21 13 – Hydronic Piping and Valves
 - .2 Section 23 22 13 – Steam and Condensate Piping and Valves
 - .3 Section 23 33 00 – Duct System Dampers and Accessories

1.3 REFERENCES

- .1 Abbreviations used in this Specification are as follows:
 - .1 AI: analog input
 - .2 AO: analog output
 - .3 BAS: building automation system
 - .4 CPU: central processing unit
 - .5 DDC: direct digital controls
 - .6 DC: digital controller
 - .7 DI : digital input
 - .8 DO: digital output
 - .9 EEPROM: electronically erasable programmable read only memory
 - .10 Ethernet: a family of computer networking technologies commonly used in LAN's
 - .11 I/O: input/output
 - .12 LAN: local area network

- .13 LCD: liquid crystal display
- .14 LED: light Emitting diode
- .15 OWS: operator's workstation
- .16 PC: personal computer
- .17 RAM: random access memory
- .18 TCP/IP: transmission control panel/internet protocol
- .19 WAN: wide area network
- .2 Definitions used in this Specification are as follows:
 - .1 Analog: a continuously variable system or value having discrete levels, and typically exists within a defined range of limiting values
 - .2 Binary: a 2-state system where an "ON" condition is represented by one discrete signal level and an "OFF" condition is represented by a second discrete signal level
 - .3 Direct Digital Control: the digital algorithms and pre-defined arrangements included in the BAS software to provide direct closed-looped control for the designated equipment and controlled variables
 - .4 BAS Network: the total digital on-line real-time interconnected configuration of BAS digital processing units, workstation(s), panels, sub-panels, controllers, devices, and associated elements individually known as network nodes, which may exist as one or more fully interfaced and integrated sub-networks, LAN, AN, or the like
 - .5 Node: a/ digitally programmable entity existing on the BAS network
 - .6 Protocol: a defined set of rules and standards governing the on-line exchange of data between BAS network nodes
- .3 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction
 - .1 American National Standards Institute (ANSI):
 - .1 ANSI/ASHRAE Standard 135 – BACnet A Data Communications Protocol for Building Automation and Control Network
 - .2 ANSI/UL 2017 – Standard for General-Purpose Signaling Devices and Systems
 - .3 ANSI/UL 2034 – Standard for Single and Multiple Station Carbon Monoxide Alarms
 - .4 ANSI/UL 2075 – Standard for Gas and Vapor Detectors and Sensors
 - .5 ANSI/ASHRAE Standard 135 – Data Communication protocol for Building Automation and Control Systems
 - .6 ANSI/AMCA Standard 610 – Laboratory Methods of Testing Airflow Measurement Stations for Performance rating
 - .2 Canadian Standards Association (CSA):

- .1 CAN/CSA C22.2 No. 24 – Temperature-Indicating and Regulating Equipment
- .2 CSA C22.2 No. 24 – Temperature-Indicating and Regulating Equipment
- .3 Underwriters Laboratories (UL):
 - .1 UL 916 – Standard for Energy Management Equipment

1.4 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.
- .2 Shop Drawings/Product Data: Submit shop drawings/product data sheets for all BAS components. As a minimum, submit the following:
 - .1 BAS network architecture diagrams, including all nodes and interconnections
 - .2 systems schematics, sequences, and flow diagrams
 - .3 points schedule for each point in the BAS, including point type, object name, expanded ID, display units, controller type, and address
 - .4 samples of graphic display screen types and associated menus
 - .5 a detailed Bill of Materials for each system or application, identifying quantities, part numbers, descriptions, and optional features
 - .6 control damper schedules including a separate line for each damper and a column for each of the damper attributes including code number, fail position, damper type, damper operator, duct size, damper size, mounting and actuator type
 - .7 control valve schedules including a separate line for each valve and a column for valves as for control dampers
 - .8 a room schedule including a separate line for each HVAC terminal unit indicating type, location and address
 - .9 details of all BAS interfaces and connections to other systems
 - .10 product data sheets or marked catalogue pages including part number, photograph and description for all BAS hardware and software
- .3 Manufacturer Reports:
 - .1 Site Inspection and Start-Up Report: Submit a site inspection and start-up report from the manufacturer's representative as specified in Part 3 of this Section.

1.5 CLOSEOUT SUBMITTALS

- .1 Submittals under this Section shall be in conformance with Section 01 77 00 and the Mechanical Work General Instructions Section.
- .2 Record "As-Built" drawings are to include:
 - .1 A schematic outline of the BAS for quick reference of the overall system scope.
 - .2 An adequate record of the work as installed, including the locations and routing of system wiring.

- .3 The Operation and Maintenance Manual is to contain:
 - .1 A hardware specification manual which gives a functional description of all hardware components.
 - .2 An operator's manual which outlines concise instructions for operation of the system and an explanation and recovery route for all system alarms.
 - .3 An engineering manual which outlines and defines system set-up, definition and application.
 - .4 A data manual which indicates the applications data programmed into the system.
 - .5 System software documentation.

1.6 QUALITY ASSURANCE

- .1 All BAS components and associated enclosures and hardware must be suitable in all respects for the installation location and application.
- .2 The BAS hardware and software is to be installed by experienced personnel employed and trained by the system equipment manufacturer/supplier. All system wiring is to be installed by journeyman electricians or under direct on-site supervision of journeyman electricians.
- .3 The BAS supplier/installer is to have a branch facility with parts within a 100 km radius of the building and have available complete maintenance and support services on a 24 hour, 7 day-a-week basis.
- .4 All network controllers are to include a lifetime license for free software upgrades.
- .5 Codes and Standards: BAS work is to be in accordance with requirements of all applicable Codes and Standards.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:
 - .1 Acceptable Manufacturers:
 - .1 Energy Controls Inc.
 - .2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.
 - .3 Substitution Limitations:
 - .1 No further substitutions will be permitted.
 - .4 Single source responsibility: Obtain each type of sensor, valve, and control actuator from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 DESCRIPTION

- .1 The building automation system is to consist of a modular, BACnet protocol, open architecture system incorporating direct digital control and monitoring of equipment and systems and consisting of all hardware and software required for the complete system.
- .2 The BAS is to be accessible through standard personal computers within the building through a wireless application protocol device, or remotely through the Internet by means of a standard web browser.
- .3 The BAS is to be field expandable, with an architectural design to eliminate dependence upon any single device for alarm reporting and control execution. Failure of any single component or network connection is not to interrupt the execution of control strategies at other operational devices.
- .4 The BAS is to maintain all settings and overrides through a system re-boot, and is to incorporate, as a minimum, the following integrated features, functions and services:
 - .1 operator information, alarm management, and control features
 - .2 enterprise-level information and control access
 - .3 information management including monitoring, transmission, archiving, retrieval, and reporting functions
 - .4 diagnostic monitoring and reporting of BAS functions
 - .5 off-site monitoring and management access
 - .6 energy management
 - .7 standard applications for terminal HVAC systems
 - .8 fault detection and diagnostics software
 - .9 The BAS is to include, but not be limited to, the following:
 - .10 a personal computer based operator work station with colour monitor for colour graphic displays, and a colour printer
 - .11 standalone network automation engine(s)
 - .12 field equipment controllers
 - .13 input/output modules
 - .14 local display devices
 - .15 distributed user interfaces
 - .16 network processing, data storage and communication equipment
 - .17 all other components required for a complete and operating BAS

2.3 MATERIALS

- .1 General RE: Building Automation System:

- .1 Control System Components: Control system components (field devices) other than those specified in this Section are generally specified in the mechanical work Section entitled Automatic Control Systems. Components factory installed with equipment or supplied with equipment are specified in mechanical work Sections with the equipment.
- .2 BAS Architecture:
 - .1 Automation Network: The BAS is to be based on a PC industry standard of Ethernet TCP/IP. Where used, LAN controller cards are to be standard "off-the-shelf" products available through normal PC vendor channels. The BAS is to be capable of operating at a communication speed of 100 Mbps, with full peer-to-peer network communication. The BAS is to be compatible with other enterprise-wide networks, and where indicated, the BAS is to be connected to the enterprise network and share resources with it by way of standard networking devices and practices.
 - .2 Control Network: Network automation engines are to provide supervisory control over the control network and are to support the BACnet Standard MS/TP bus communication protocol (ASHRAE SSPC-135, Clause 9). The control networks are to provide either a "peer-to-peer", master-slave, or supervised token passing communications and are to operate at a minimum communication speed of 9600 baud. DDC controllers are to reside on the control network.
 - .3 Integration: The BAS is to include appropriate hardware and software to allow BACnet bi-directional data communications between the BAS and building equipment/system control panels. The BAS is to receive, react to, and return information from the equipment and systems. All data required by the application is to be mapped into the automation engine's data base and is to be transparent to the operator. Point inputs and outputs from building equipment/system control panels is to have real-time inter-operability with BAS software features such as control software, energy management, custom process programming, alarm management, historical data and trend analysis, totalization, and local area network communications.
- .3 Control Valves And Operators:
 - .1 General RE: Valves: Unless otherwise specified, valves are to generally conform to requirements specified in the appropriate mechanical work piping and valve specification sections, and are to be in accordance with the following requirements:
 - .1 Each control valve must be suitable in all respects for the application, including system temperature and pressure.
 - .2 Valve design output and flow rates with maximum pressure drops are to be as follows:
 - .1 Heating water/glycol solution valves for coils: 17.5 kPa (2.5 psi).
 - .3 Unless otherwise indicated, control valves for proportional operation are to have equal percentage characteristics, and control valves for open/shut 2 position operation are to have straight line flow characteristics.
 - .4 All valves are to have position indicators .
 - .5 Heating valves are to be normally open unless otherwise specified/required.
 - .6 Cooling valves are to be normally closed unless otherwise specified/required.
 - .2 Operators: Electronic, direct coupling design, spring return type for fail safe operation, sized for the torque required to tightly shut the control valves against differentials imposed by the system, equipped with position indicators, enclosures suitable in all respects for the environment in which they are located, and the following:

- .1 Double insulated construction requiring no ground connection.
 - .2 Factory installed colour coded and numbered wiring leads for site connection.
 - .3 Reversible mounting for either clockwise or counter-clockwise operation.
 - .4 Capable of being mechanically or electrically paralleled where required.
 - .5 Overload protected dc motor, microprocessor controlled brushless type for modulating control, brush type for on-off control.
- .4 Control Dampers And Operators:
- .1 Dampers: Flanged, 100 mm (4') deep, AMCA low leakage certified aluminium dampers, parallel blade type for modulating and mixing applications, opposed blade type for open-shut service, and additional requirements as follows:
 - .1 Maximum blade length is to be 1 m (4'), and dampers greater than 2 sections wide are to be complete with a jackshaft.
 - .2 Extruded 6063T5 aluminum frame and airfoil blades, each with an integral slot to receive a gasket.
 - .3 Extruded TPE frame gaskets and extruded EPDM blade gaskets.
 - .4 Slip-proof aluminium and corrosion resistant plated steel linkage of a metal thickness to prevent warping or bending during damper operation, concealed in the frame, equipped with seal-sealing and self-lubricating bearings consisting of a Celcon inner bearing fixed on the hexagonal blade pin and rotating in a polycarbonate outer bearing inserted in the frame.
 - .2 Electronic Damper Operators: Damper shaft mounted, spring return, fail safe in the normally open or normally closed position, sized to control the damper against maximum pressure or dynamic closing pressure, whichever is greater, to suit the sizes of dampers involved, and to provide sufficient force to maintain the damper rated leakage characteristics. Each operator is to be complete with:
 - .1 A damper position indicator.
 - .2 External adjustable stops to limit the length of stroke in either direction.
 - .3 A corrosion resistant adjustable mounting bracket.
 - .4 Operating arms with double yoke linkages and double set screws for fastening to the damper shaft.
 - .5 Double insulated construction requiring no ground connection.
 - .6 Factory installed colour coded and numbered wiring leads for site connection.
 - .7 Reversible mounting for either clockwise or counter-clockwise operation.
 - .8 Capable of being mechanically or electrically paralleled where required.
 - .9 Overload protected DC motor, microprocessor controlled brushless type for modulating control, brush type for on-off control.

- .10 For operators for dampers to be connected to the building fire alarm system or to freeze protection devices, additional relays to permit the dampers to respond and go to the required position in less than 15 seconds upon receipt of a signal.
- .11 Enclosures suitable in all respects for the environment in which they are located.
- .5 Sensors And Transmitters:
 - .1 Sensors and transmitters must be suitable in all respects for the application and mounting location. Devices are to be as follows:
 - .2 General Re: Temperature Sensors: Resistance type, either two-wire 1000 ohm nickel RTD or two-wire 1000 ohm platinum RTD, equipped with type 316 stainless steel thermowells with CRN for pipe mounting applications, and with accuracy values (includes errors associated with the sensor, lead wire, and A to D conversion), as follows:
 - .1 Chilled water, room temperature, and duct temperature points, $\pm 1^{\circ} \text{C}$ ($\pm 0.5^{\circ} \text{F}$).
 - .2 All other points, $\pm 0.75^{\circ} \text{C}$ ($\pm 1.3^{\circ} \text{F}$).
 - .3 Room Temperature Sensors: Constructed for surface or recessed wall box mounting, 24 volt, and complete with the following capabilities
 - .1 An integral LCD display and either a set-point adjustment dial or set-point adjustment pushbuttons.
 - .2 Display and adjust fan operation status via push button.
 - .3 Override request via Occupancy Override pushbutton with LED status for activation of after-hours operation.
 - .4 Toggle pushbutton for either $^{\circ}\text{F}$ or $^{\circ}\text{C}$ temperature indication.
 - .4 Duct/Plenum Mounting Sensors: Insertion type with lock nut and mounting plate, designed to mount in an electrical box (weather-proof with gasket and cover where outside) through a hole in the duct/plenum, and easily accessible for repair or replacement.
 - .5 Duct/Plenum Averaging Sensors: For ducts greater than 1.2 m (4') or for ducts where air temperature stratification occurs, averaging type sensors with multiple sensing points, and for plenums for applications such as mixed air temperature measurement to account for air turbulence and/or stratification, a continuous averaging sensor or a string of sensors with a minimum of 4 sensing points per 3.65 m (12'), and capillary supports on the sides of the duct/plenum.
 - .6 Humidity Sensors: Solid-state relative humidity sensors of the Thin Film Capacitance or Bulk Polymer Design with factory pre-calibrated transmitters, and:
 - .1 Non-interactive span and zero adjustments, and a two-wire isolated loop powered, 4-20 mA, 0-100% linear proportional output.
 - .2 A factory calibrated humidity transmitter which is accurate (including lead loss and analog to digital conversion) to 3% between 20 to 80% RH at 25°C (77°F).
 - .3 An element that resists contamination.
 - .4 For duct mounting applications, a type 304 stainless steel sensing probe with neoprene grommet, bushings, mounting bracket and hardware.

- .6 Status And Safety Switches
 - .1 Designed and constructed to monitor equipment status, safety conditions, and generate alarms at the BMS when a failure or abnormal condition occurs. each equipped with 2 sets of contacts for site interlock wiring for equipment shutdown. Switches are to be as follows:
 - .1 Current sensing switches: for run status for motor loads, each consisting of a current transformer, a solid-state current sensing circuit, adjustable trip point, solid-state switch, SPST relay, and a LED to indicate on-off status, capable of accepting overcurrent up to twice its trip point range, and calibrated to show a positive run status when a motor is operating under load and a negative status when a broken drive belt or drive coupling condition occurs.
- .7 User Interface Application Components:
 - .1 Operator Interface: An integrated browser based client application is to be used as the user operator interface program. The system is to employ an event-driven rather than a device polling methodology to dynamically capture and present new data to the user. Additional features are as follows:
 - .1 All inputs, outputs, set-points, and other parameters as defined in Part 3 of this Section, shown on the drawings, or required as part of the system software are to be displayed for operator viewing and modification from the operator interface software
 - .2 The user interface software is to provide help menus and instructions for each operation and/or application
 - .3 The system is to support customization of the user interface configuration and a home page for each operator
 - .4 The system is to support user preferences in alarm, trend, display, and applications screen presentations
 - .5 All controller software operating parameters are to be displayed for the operator to view/modify from the user interface, and these parameters are to include set-points, alarm limits, time delays, PID tuning constants, run times, point statistics, schedules, etc.
 - .6 The operator interface is to incorporate comprehensive support for functions including but not limited to the following:
 - .1 User access for selective information retrieval and control command execution.
 - .2 Monitoring and reporting.
 - .3 Alarm, non-normal, and return to normal condition annunciation.
 - .4 Selective operator override and other control actions.
 - .5 Information archiving, manipulation, formatting, display and reporting.
 - .6 BAS internal performance supervision and diagnostics.
 - .7 On-line access to HELP menus.
 - .8 On-line access to current BAS as-built records and documentation.

- .9 Means for controlling, re-programming, and re-configuration of the BAS operation and for the manipulation of the BAS database information in compliance with applicable Codes and Regulations for individual BAS applications.
- .7 The system is to support a list of application programs configured by the users that are called up by the Tools Menu, hyperlinks within the graphic displays, and key sequences.
- .8 The operation of the control system is to be independent of the user interface, which is to be used for operator communication only.
- .2 Navigation Trees: The system is to have a minimum of five levels of nesting, and the capability of displaying multiple navigation trees to aid the operator in navigating throughout all systems and points connected, adding custom trees, defining any logical grouping of points and arranging them on a tree in any order, and nesting groups within other groups. The navigation trees are to be "dockable" to other displays such as graphics, meaning that the trees will appear as part of the display but can be detached and then minimized to the Windows task bar or closed altogether, however, a simple keystroke will reattach the navigation to the primary display of the user interface.
- .3 Alarms: Alarms are to be routed directly from network automation engines to PC's and servers, and it is to be possible for specific alarms from specific points to be routed to specific PC's and servers. The BAS is to annunciate diagnostic alarms indicating system failures and non-normal operating conditions annunciate application alarms as required by points lists and sequences, and as a minimum, permit four categories of alarm sounds customizable through user defined wav files. The alarm management segment of the user interface is to provide, as a minimum, the following alarm functions:
 - .1 Log, date, and time of alarm occurrence.
 - .2 Generate a "pop-up" window with audible alarm to inform a user that an alarm has been received.
 - .3 Permit a user with the appropriate security level to acknowledge, temporarily silence, or discard an alarm.
 - .4 Provide an audit trail on the PC hard drive for alarms by recording user acknowledgement, deletion or disabling of an alarm, the name of the user, the alarm, the action taken, and the time/date of the alarm.
 - .5 Facilitate the ability to direct alarms to an email address or alphanumeric pager, in addition to the pop-up window described above.
 - .6 Any attribute of any object in the system may be designated to report an alarm.
- .4 Reports and Summaries: Reports and summaries are to be generated and directed to the user interface displays with subsequent assignment to printers or discs. Summaries and reports are to be accessible via standard user interface functions, and selection of a single menu item, tool bar item, or tool bar button is to print any displayed report or summary. The system is to permit the creation of custom reports and queries via a standard web services XML interface and commercial off-the-shelf software such as Microsoft Access, Microsoft Excel, or Crystal Reports. As a minimum the BAS is to provide the following reports and summaries:
 - .1 All points in the BAS.
 - .2 All points in each BAS application.
 - .3 All points in a specific controller.

- .4 All points in a user-defined group of points.
 - .5 All points currently in alarm.
 - .6 All points locked out.
 - .7 All BAS schedules
 - .8 All user defined and adjustable variables, schedules, interlocks, etc.
- .5 Schedules: A graphical display for time-of-day scheduling and override scheduling of building operations is to be provided, with weekly schedules for each group of equipment with a specific time use schedule, and it is to be possible to define one or more exception schedules for each schedule including reference to calendars, with monthly calendars provided to permit simplified scheduling of holidays and special days for a minimum of five years in advance, user selected with the pointing device or keyboard. Changes to schedules made from the user interface are to directly modify the network automation engine schedule database. Selection of a single menu item or tool bar button is to print any displayed schedule. As a minimum the following functions are to be provided:
- .1 Weekly schedules.
 - .2 Exception schedules.
 - .3 Monthly calendars.
- .6 Passwords: The BAS Is to be complete with multiple-level password access protection to permit the user/manager to user interface control and display, database manipulation capabilities deemed appropriate for each user, based on an assigned password. Password access protection features are to include:
- .1 Each user is to have a user name (24 characters minimum), a password (12 characters minimum), and access levels.
 - .2 Each user may change his or her password at any time.
 - .3 When editing or entering passwords the system is not to echo the actual characters for display on the monitor.
 - .4 A minimum of one hundred unique password is to be supported.
 - .5 Operators are to be able to perform only those commands available for their respective passwords, and display of menu selections is to be limited to only those items defined for the access level assigned to the password of each use.r
 - .6 The bas is to automatically generate a report of log-on/log-off and system activity for each user, and any action that results in a change in the operation or configuration of the control system is to be recorded, including the acknowledgement and deletion of alarms.
 - .7 A minimum of five levels of access is to be supported individually or in any combination of the following:
 - .1 Level 1 – view data
 - .2 Level 2 – command
 - .3 Level 3 – operator overrides

- .4 Level 4 – database modification
- .5 Level 5 – database configuration
- .6 Level 6 – all privileges including password add/modify
- .7 Screen Manager: The user interface is to be equipped with screen management capabilities that allow the user to activate, close, and simultaneously manipulate a minimum of four active display windows plus a network of user defined navigation trees.
- .8 Dynamic Colour Graphics: The graphics application program is to be an integral part of the user interface and is to include a create/edit function and a runtime function, and the system architecture is to support an unlimited number of graphic documents (graphic definition files) to be generated and executed. The graphics are to be capable of displaying and providing animation based on real-time data that is acquired, derived, or entered. Additional features include the following:
 - .1 Graphics runtime functions: a maximum of sixteen graphic applications are to be able to be executed at any one time on a user interface or workstation with four visible to the user, and each graphic application is to capable of the following functions:
 - .1 All graphics are to be fully scalable.
 - .2 Graphics are to support a maintained aspect ratio.
 - .3 Multiple fonts are to be supported.
 - .4 A unique background is to be assigned on a per graphic basis.
 - .5 The colour of all animations and values on displays is to indicate the status of the object attribute.
 - .2 Operation from graphics: it is to be possible to change values (set-points) and states in the system controlled equipment by using drop-down windows accessible via the pointing device.
 - .3 Graphic editing tool: a graphic editing tool is to be provided to permit the creation and editing of graphic files, and the graphic editor is to be capable of performing/defining all animations, defining all runtime binding, and:
 - .1 In general, facilitate the creation and positioning of point objects by dragging from tool bars or drop-downs and positioning where required.
 - .2 Be capable of adding additional content to any graphic by importing backgrounds in the SVG, BMP, or JPG file formats.
 - .4 Aliasing: many graphic displays representing part of the building and various building components are exact duplicates, with the exception that the various variables are bound to different field values, consequently, it is to be possible to bind the value of a graphic display to aliases, as opposed to physical field tags.

- .9 Historical Trending and Data Collection: Trend and change of value data is to be stored within the automation engines and uploaded to a dedicated trend database or exported in a selectable data format via a data export utility. Uploads to a dedicated database are to occur based on one of user-defined interval, manual command, or when the trend buffers are full. Exports are to be as requested by the user or on a time scheduled basis. The system is to be equipped with a configurable data storage sub-system for the collection of historical data which can be stored in either Microsoft Access or SQL database format. Each automation engine is to store, trend, and point history data for all analog and digital inputs and outputs as follows:
 - .1 Any point, physical or calculated, may be designated for trending, and methods of collection are to be defined time interval or a change of value.
 - .2 Each automation engine is to capable of storing multiple samples for each physical point and software variable based on available memory, including an individual sample time/date stamp, and points may be assigned to multiple history trends with different collection parameters.
- .10 Trend Data Viewing and Analysis: A trend viewing utility with access to all data points and the capability of defining trend study displays to include multiple trends is to be provided, and is to include:
 - .1 The capability of retrieving any historical database point for use in displays and reports by specifying the point name and associated trend name.
 - .2 Displays which are able to be single or stacked graphs with on-line selectable display characteristics such as ranging, colour, and plot style.
 - .3 Display magnitude (zoom capability) and units selectable by the operator at any time without reconfiguration the processing or collection of data.
 - .4 Display magnitude is to be automatically scaled to show full graphic resolution of the data being displayed.
 - .5 Trend studies are to be capable of calculating and displaying calculated variables including highest value, lowest value, and time based.
 - .6 The display is to support the user's ability to change colours, sample sizes, and types of markers.
- .11 Database Management: The BAS is to be equipped with a database manager that separates the database monitoring and management functions by supporting two separate windows. Database secure access is to be accomplished using standard SQL authentication including the ability to access data for use outside of the BAS application. Additional features are as follows:
 - .1 The database management function is to include summarized information on trend, alarm, event, and audit for backup, purge, and restore database management functions.
 - .2 The database manager is to support four tabs as follows:
 - .1 Statistics, which is to display database server information and trend, alarm (event), and audit information on the bas database.
 - .2 Maintenance, which is to be an easy method of purging records from the BAS server trend, alarm (event), and audit databases by supporting separate screens for creating a backup prior to purging, selecting the database, and allowing for the retention of a selected number of day's data.

- .3 Backup, which is to provide the means to create a database backup file and select a storage location.
- .4 Restore, which is to provide a restricted means of restoring a database by requiring the user to log into an expert mode in order to view the Restore Screen.
- .3 The status bar is to appear at the bottom of the BAS database manager tabs and is to indicate information on the current display activity with icons as follows:
 - .1 Ready
 - .2 Purging Record From Database
 - .3 Action Failed
 - .4 Refreshing Statistics
 - .5 Restoring Database
 - .6 Shrinking A Database
 - .7 Backing-Up A Database
 - .8 Resetting Internet Information Services
 - .9 Shutting Down The BAS Deice Manager
 - .10 Action Successful
- .4 The database manager monitoring functions are to be accessed through the Monitoring Settings window and are to continuously read database information once after the user has logged in.
- .5 The system is to advise the user via task bar icons and email messages when a database value has exceeded a warning or alarm limit.
- .6 The Monitoring Settings window is to have the following sections:
 - .1 General, to allow the user to set and review scan intervals and start times.
 - .2 Email, to allow the user to create and review email and telephone text messages to be delivered when a Warning or Alarm is generated.
 - .3 Warning, to allow the user to define the warning limit parameters, set the Reminder Frequency, and link the email message.
 - .4 Alarm, to allow the user to define the alarm limit parameters, set the Reminder Frequency, and link the email message.
 - .5 Database Login, to protect the system from unauthorized database manipulation by creating a Read Access and Write Access for each of the trend, alarm (event), and audit databases as well as an Expert Mode required to restore a database.
- .7 The Monitoring Settings taskbars to display the following informational icons:
 - .1 Normal, which indicates by colour and size that all databases are within their limits.

- .2 Warning, which indicates by colour and size that one or more databases have exceeded their warning limit.
- .3 Alarm, which indicates by colour and size that one or more databases have exceeded their alarm limit.
- .8 The BAS is to indicate via taskbar icons and email messages when a database value has exceeded a warning or alarm limit.
- .12 Demand Limiting and Load Rolling: The BAS is to be equipped with a demand limiting and load rolling program for the purpose of limiting peak energy usage and reducing overall energy consumption. The program is to support both Sliding Window and Fixed Window methods of predicting demand. Additional features are as follows:
 - .1 The system is to support three levels of sensitivity in the Sliding Window demand calculations for fine tuning the system, as follows:
 - .1 Low Setting, which sheds loads later and over the shortest period of time and maximizes the period of time the equipment is on.
 - .2 Medium Setting, which sheds loads earlier over a period of time greater than the Low Setting, and increases the time the equipment is on and decreases the probability of exceeding the "Tariff Target".
 - .3 High Setting, which sheds loads earlier and over a longer period of time than the Medium Setting to minimize the probability of exceeding the "Tariff Target".
 - .2 The system is to have both a Shed Mode and a Monitor Only Mode of operation, as follows:
 - .1 When the Shed Mode is engaged the system is to actively control the demand.
 - .2 When the Monitor Mode is engaged the system is to simulate the shedding action but will not take any action.
 - .3 The Demand Limiting Program is to monitor the energy consumption rate and compare it to a user defined "tariff Target", and maintain the consumption below the target by selectively shedding loads based on a user defined strategy.
 - .4 The Demand Limiting Program is to be capable of supporting a minimum of ten separate load priorities, with each load user assigned, and a minimum of twelve separate "Tariff Targets" defining the maximum allowed average power usage during the current interval.
 - .5 The system is to support a maximum shed time for each load as determined by the user, and the system is to restore the load before the maximum shed time has expired.
 - .6 The system is to support a minimum shed time for each load as determined by the user, and the system is not to restore the load before the minimum shed time has expired.
 - .7 The system is to support a minimum release time for each load as determined by the user, and the system is not to shed the load until it has been off for the minimum release time.
 - .8 The system is to support three user defined options if the meter does not function properly, as follows:
 - .1 Shedding – the currently shed loads will be released as their maximum shed time expires.

- .2 Maintain the current shed rate – the system will use the demand limiting shed rate that was present when the meter began to function improperly.
- .3 Use unreliable meter shed rate – the system is to control to a user defined unreliable shed rate target.
- .9 The Load Rolling Program is to sum the loads currently shed and compare the sum to a user defined load rolling target, and the system is to maintain consumption below the target by selectively shedding loads based on a user defined load priority.
- .10 The Load Rolling Program is to be capable of supporting a minimum of ten separate load priorities with each load user defined to a load priority.
- .11 The Load Rolling Program is to be capable of supporting a minimum of twelve separate "Tariff Targets" defining the amount of energy by which the demand must be reduced
- .12 The system is to equip the user with a Load Tab that displays all the demand limiting and load rolling parameters for any selected load.
- .13 The system is to be complete with a Load Summary that displays all of the loads associated with the demand limiting and load rolling program, and status icons for each load are to indicate:
 - .1 Load Is Offline
 - .2 Load Is Disabled
 - .3 Load Is Shed
 - .4 Load Is Locked
 - .5 Load Is In Comfort Override
- .14 The Load Summary is to include a load summary runtime view listing the following load conditions:
 - .1 Load Priority
 - .2 Shed Strategy
 - .3 Load Rating
 - .4 Present Value
 - .5 Ineligible Status
 - .6 Active Timer
 - .7 Time Remaining
 - .8 Last Shed time
- .8 Network Automation Engines:
 - .1 Network automation engines are to be UL/ULC listed and labelled; BACnet Testing Labs certified and labelled, fully user programmable supervisory controllers to monitor a network of a minimum of one hundred distributed application-specific controllers for a global strategy and direction and to communicate on a peer-to-peer basis with other network automation engines.

- .2 User Interface: Each network automation engine is to have the ability to deliver a web based user interface as specified above, and all computers connected physically or virtually to the automation network are to have access to the web based user interface. Additional characteristics/requirements are as follows:
 - .1 The web based user interface software is to be imbedded in each network automation engine.
 - .2 Each network automation engine is to support a minimum of four concurrent users.
 - .3 The user is to be capable of accessing all system data through one network automation engine.
 - .4 Remote users connected to the network through an internet service provider or by telephone dial-up are also to have total system access through one network automation engine.
 - .5 Each network automation engine is to be capable of generating web based user interface graphics, and this capability is to be imbedded in the network automation engine.
 - .6 The user interface is to support the following functions using a standard version of Microsoft Internet Explorer:
 - .1 Configuration
 - .2 Commissioning
 - .3 Data archiving
 - .4 Monitoring
 - .5 Commanding
 - .6 System diagnostics
 - .7 Each network automation engine is to permit temporary use of portable devices without interrupting the normal operation of permanently connected modems.
- .3 Processor: Each network automation engine is to be a multi-tasking, multi-user, microprocessor based real time digital control processor sized to meet requirements of the system with a minimum word size of 32 bits, and standard operating systems.
- .4 Memory: Each network automation engine is to have sufficient memory to support its own operating system, databases, and control programs to provide supervisory control for all control level devices.
- .5 Real Time Clock: Each network automation engine is to include an integrated, hardware based real time clock.
- .6 LED Indicators: Each network automation engine is to be equipped with LED indicators to identify the following conditions:
 - .1 Power, On/Off
 - .2 Ethernet Traffic, Ethernet Traffic/No Ethernet Traffic
 - .3 Ethernet Connection Speed, 10 Mbps/100 Mbps
 - .4 FC Bus A, Normal Communications/No Field Communications

- .5 FC Bus B, Normal Communications/No Field Communications
- .6 Peer Communication, Data Traffic Between Network Automation Engines
- .7 Run, NAE Running/NAE in Start-up/NAE Shutting Down/Software Not Running
- .8 Battery Fault, Battery Defective/Data Protection Battery Not Installed
- .9 24 VAC, 24 VAC Present/Loss of 24 VAC
- .10 Fault, General Fault
- .11 Modem RX, NAE Modem Receiving Data
- .12 Modem TX, NAE Modem Transmitting Data
- .7 Communications Ports: Each network automation engine is to be equipped with ports for operation of operator input/output devices such as industry standard computers, modems, and portable operator's terminals. Ports are to be as follows:
 - .1 Two USB ports.
 - .2 Two URS-232 serial data communication ports.
 - .3 Two RS-485 ports.
 - .4 One Ethernet port.
- .8 Diagnostics: Each network automation engine is to continually perform self-diagnostics, communications diagnostics, and diagnostics of all pane components, and transmit both local and remote annunciation of any detected component failure, low battery condition, and repeated failures to establish communication.
- .9 Power Failure: In the event of loss of normal power each network automation engine is to continue to operate for a user adjustable period of up to ten minutes after which there is to be an orderly shut-down of all programs to prevent the loss of database or operating system software, and:
 - .1 During a loss of normal power the control sequences are to go to the normal system shutdown conditions, and all critical configuration data is to be saved into Flash memory.
 - .2 Upon restoration of normal power and after a minimum off-time delay the controller is to automatically resume full operation through a normal soft-start sequence without manual intervention.
- .9 Field Equipment Controllers:
 - .1 Each field equipment controller is to be a fully user programmable BACnet Testing Labs certified and labelled digital controller that communicates via BACnet MS/TP protocol. Each controller is to be housed in a plenum rated plastic housing with removable base to permit pre-wiring of analog and binary input/output field points without the controller in place.
 - .2 Each controller is to employ a finite state control engine to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences, and are to be factory programmed with a continuous adaptive tuning algorithm that sense changes in the physical environment and continually adjusts loop tuning parameters appropriately.

- .3 Each field equipment controller is to:
 - .1 Include troubleshooting LED's to identify the following conditions:
 - .1 Power On
 - .2 Power Off
 - .3 Download or Start-Up In Progress-Not Ready For Normal Operation
 - .4 No Faults
 - .5 Device Fault
 - .6 Field Controller Bus-Normal Data Transmission
 - .7 Field Controller Bus-No Data Transmission
 - .8 Field Controller Bus-No Communication
 - .9 Sensor Actuator Bus-Normal Data Transmission
 - .10 Sensor Actuator Bus-No Data Transmission
 - .11 Sensor Actuator Bus-No Communication
 - .2 Support universal inputs, configured to monitor any of the following:
 - .1 Analog Input, Voltage Mode
 - .2 Analog Output, Current Mode
 - .3 Analog Input, Resistive Mode
 - .4 Binary Input, Dry Contact Maintained Mode
 - .5 Binary Input, Pulse Counter Mode
 - .3 Support binary inputs configured to monitor either of the following:
 - .1 Dry Contact Maintained Mode
 - .2 Pulse Counter Mode
 - .4 Support analog outputs configured to output either of the following:
 - .1 Analog Output, Voltage Mode
 - .2 Analog Output, Current Mode
 - .5 Support binary outputs, 24 VAC Triac.
 - .6 Support configurable outputs capable of the following:
 - .1 Analog Output, Voltage Mode
 - .2 Binary Output Mode

- .7 Have the ability to reside on a master-slave/token-passing field controller bus supporting BACnet standard protocol as follows:
 - .1 Support communications, including input/output communications between the field controllers and the network automation engines.
 - .2 Support a minimum of one hundred input/output modules and field equipment controllers in any combination.
 - .3 Operate at a maximum distance of 4560 m (15,000') between the field controller and the furthest connected device.
- .8 Have the ability to monitor and control a network of sensors and actuators over a master-slave/token-passing sensor-actuator bus supporting BACnet standard protocol as follows:
 - .1 The bus is to support a minimum of ten devices per trunk.
 - .2 The bus is to operate at a maximum distance of 365 m (1200') between the field controller and the furthest connected device.
- .9 The capability of executing complex control sequences involving direct wired input/output points as well as input and output devices communicating over the field controller bus or sensor-actuator bus
- .10 Support, but not limited to, the following:
 - .1 Hot water, chilled water/central plant applications.
 - .2 Custom air handling units for special applications.
 - .3 Terminal units.
 - .4 Special programs as required for systems control.
- .11 Support a password protected local controller LCD back-lit display with six key keypad as an integral part of the field controller or as a remote device communicating over the sensor-actuator bus to permit the user to view monitored points without logging into the system, and to view and change set-points, modes of operation, and parameters
- .10 Input/Output Modules:
 - .1 Input/output modules to facilitate additional inputs and outputs for use in the field equipment controllers are to be similar to the field equipment controllers but less the display and with a minimum of four and a maximum of seventeen points.
- .11 System Configuration Tools:
 - .1 System Configuration Tool: The system configuration tool is a software package supplied with the BAS to enable a computer platform to be used as a stand-alone engineering configuration tool for a network automation engine and to permit programming of field equipment controllers. The configuration tool is to provide an archive database for the configuration and application data and is to have the same look and feel at the user interface regardless of whether the configuration is being done online or offline. Additional features and characteristics are as follows:
 - .1 The tool is to include:
 - .1 Basic system navigation tree for connected networks.

- .2 Integration of system enabled devices.
 - .3 Customized user navigation trees.
 - .4 Point naming operator parameter setting.
 - .5 Graphic diagram configuration.
 - .6 Alarm and event message routing.
 - .7 Graphical logic connector tool for custom programming.
 - .8 Downloading, uploading, and archiving databases.
- .2 The tool is to have the capability to automatically discover field devices on connected buses and networks.
 - .3 The tool is to be capable of configuring from a library of standard applications, simulating to verify applications, and commissioning field equipment controllers and field devices.
 - .4 The tool is to be complete with a Bluetooth Wireless Technology wireless access point to enable a wireless enabled portable computer to make a temporary Ethernet connection to the automation network.
- .2 Wireless MS/TP Converter: The Bluetooth Wireless Technology converter is to provide temporary wireless connection between the sensor-actuator bus or field-controller bus and a wireless enabled portable computer. The converter is to be powered through a connection to either the sensor-actuator bus or the field-controller bus and is to support downloading and troubleshooting field equipment controllers and field devices from the portable computer over the wireless connection. The converter is to be complete with LED indicators for the following conditions:
 - .1 Power: On/Off
 - .2 Fault: Fault/No Fault
 - .3 SA/FC Bus: Bus Activity/No Bus Activity
 - .4 Bluetooth: Bluetooth Communication Established/Bluetooth Communication Not Established
- .12 Wiring Materials :
 - .1 System wiring, conduit, boxes, and similar materials are to be in accordance with requirements specified in the appropriate Section(s) of the Electrical Work Division of the Specification.

3 EXECUTION

3.1 INSTALLATION

- .1 General: Installation Of The BAS:
 - .1 Provide a complete building automation system in accordance with requirements of this Section of the Specification, the mechanical work Section entitled Automatic Control Systems, the drawings, and the input/output points list(s).
 - .2 Unless otherwise specified do all BAS work in accordance with the system manufacturer's instructions.
- .2 Direct Digital Control System Components:

- .1 Provide all required direct digital control hardware, software, accessories, and wiring for a complete BAS. Refer to drawing control diagrams and sequences, the points list(s), and the mechanical work Section entitled Automatic Control Systems.
- .2 Surface mount control units in mechanical, etc., rooms housing the equipment/systems to be controlled and monitored. Connect a maximum of two major mechanical systems to each field controller. Ensure that mounting surfaces do not vibrate.
- .3 Consult with the Owner and Consultant to ensure that all required input/output points are entered into the system.
- .3 Implementation of Energy Management Programs:
 - .1 Implement all energy management programs indicated for building equipment and systems.
 - .2 Ensure that all energy management program adjustable parameters are accessible to and adjustable by the building operations personnel at the operator's workstation.
 - .3 Configure energy management programs so that they may be enabled/disabled on an individual basis for each system to which they apply.
- .4 Control Wiring:
 - .1 Do all required BAS wiring from 15A-1P circuits terminated as part of the electrical work in junction boxes in equipment rooms/areas.
 - .2 Except as specified below, install all wiring in conduit. Unless otherwise specified the final 600 mm (2') connections to sensors and transmitters, and wherever conduit extends across flexible duct connections is to be liquid-tight flexible conduit.
 - .3 Control wiring in ceiling spaces and wall cavities may be plenum rated cable installed without conduit but neatly harnessed, secured, and identified.
 - .4 All wiring work is to be in accordance with the BAS manufacturer's certified wiring schematics and instructions, and the wiring standards specified in the electrical work Division of this Specification.
- .5 Identification and Labelling of Equipment And Circuits:
 - .1 Refer to the Basic Mechanical Materials and Methods Section.
 - .2 Identify BAS equipment as follows:
 - .1 Enclosures: engraved laminated nameplates with lettering such as BAS Panel CP2, or BAS Relays, or BAS E/P Transformers, with all wording listed and approved prior to manufacture of the nameplates.
 - .2 Panel points: a weather-proof input/output layout sheet for each controller with the name of each point connected to the controller, and the associated wire labelling information.
 - .3 Wiring: numbered sleeves or plastic rings at both ends of the conductor, with numbering corresponding to conductor identification on shop drawings and "as-built" record drawings.
 - .4 Interface components: a weather-proof layout sheet clearly illustrating/identifying the purpose of each component within the enclosure such that an operator or service technician can quickly identify the exact use of each relay, transducer, contactor, etc., with each sheet fastened securely to the back of the enclosure door.

- .6 System Startup:
 - .1 Testing, Adjusting, Certification, Start-Up, Commissioning:
 - .1 Equipment and System Manufacturer's Certification: Refer to the article entitled Equipment and System Manufacturer's Certification in the Mechanical Work General Instructions Section.
 - .2 Start-Up: Refer to the article entitled Equipment and System Start-up in the Mechanical Work General Instructions Section.
 - .3 Commissioning: Refer to commissioning requirements specified in the Mechanical Work General Instructions Section.
 - .7 Closeout Activities:
 - .1 Demonstrations and Training: Refer to the article entitled Equipment and System O & M Demonstration & Training in the Mechanical Work General Instructions Section. Include for demonstration and training sessions for each of 2 groups of 6 people as follows:
 - .1 3 full day orientation sessions at the system manufacturer's office to educate personnel on BAS architecture, hardware, and software, with an overview of BAS operation and capabilities including but not limited to operational programmes, equipment functions (both individually and as part of a total integrated system), BAS commands, advisories, alarms, and appropriate operator intervention required in responding to the BAS operation.
 - .2 2 full day sessions at the site using the BAS for a "hands-on" demonstration of all BAS functions and features with instruction regarding the chronological flow of information from field devices, contacts and sensors to the operator's work station, an overview of the communications network describing the interplay between initiating devices, field hardware panels, systems communications, and their importance within the operating BAS, and alarm indications and appropriate responses.
 - .3 2 full day seasonal (summer-winter) site sessions to perform additional instruction regarding seasonal changes and how they affect the BAS.
 - .2 Additional Training: Include for 2 follow-up site training and troubleshooting visits, 1 six months after Substantial Performance and the other at the end of the warranty period, both when arranged by the Owner and for a full day to provide additional system training as required.

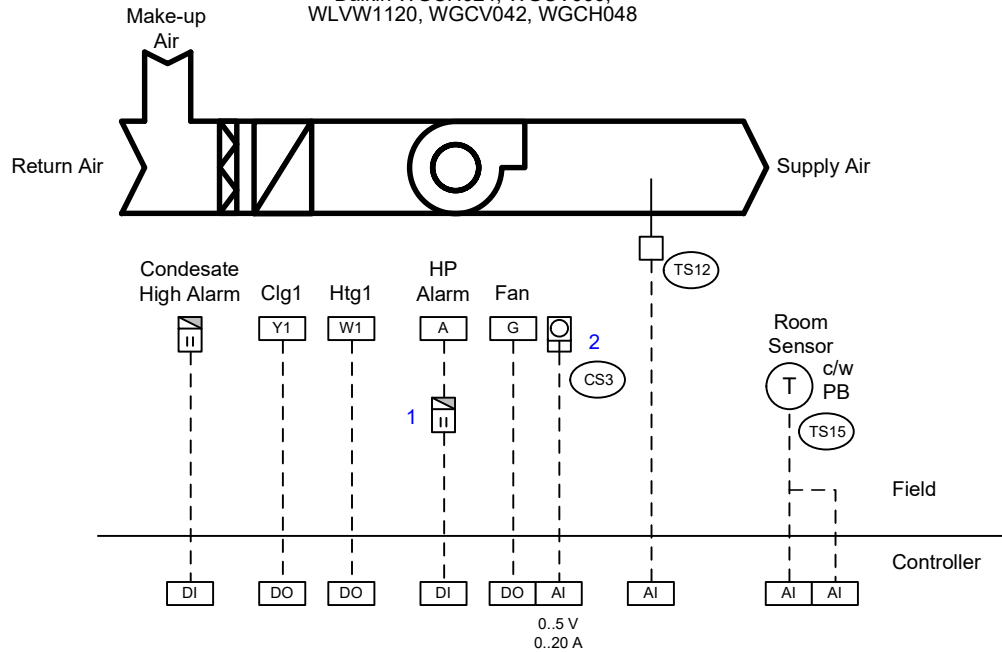
4 ATTACHMENTS

4.1 CONTROL SCHEMATICS (5 PAGES)

END OF SECTION

HEAT PUMPS

Daikin WGCH024, WGCV060,
WLVW1120, WGCV042, WGCH048



Notes

- 1) Alarm output from the heat pump is to be wired into a relay.
- 2) Current sensor (CS3) shall monitor the current for the entire heat pump unit.

Eleven Systems As Shown			
Unit	Serves	Floor	Notes
HP-1	Dressing Room	2	
HP-3	Music Room N232	2	
HP-5	Music Room N230	2	
HP-11	Computer Lab B N336	3	
HP-12	Classroom N334	3	
HP-13	Classroom N332	3	
HP-14	Computer Lab A N330	3	
HP-15	Exercise Room 328	3	
HP-16	Exercise Room 332	3	
HP-18		2	
HP-22		2	

SEQUENCE OF OPERATION

Unoccupied Mode

The heat pump fan and compressor cycle to maintain unoccupied setpoints for heating and cooling. If the pushbutton on the sensor is pressed, the system will revert to the occupied mode for a period of 2 hours.

Occupied Mode

Optimized start control is provided. The heat pump supply fan runs continuously. The room temperature sensor cycles heating stage 1 and cooling stage 1 to maintain setpoint. The compressor and reversing valve are controlled internally by the unit. Setpoint adjustment (+/-2°C) is provided at the sensor.

Limits & Safeties

- 1) The compressor has a 5 minute minimum off time.
- 2) The supply fan has a 30 second delay-off time.
- 3) On a fire alarm condition, the system turns off.
- 4) The supply air temperature sensor acts as a low limit, and will shut down the cooling if it falls below the low limit setpoint (initially 6/12°C).
- 5) The supply air temperature sensor acts as a high limit, and will shut down the heating if it rises above the high limit setpoint (initially 48/35°C).

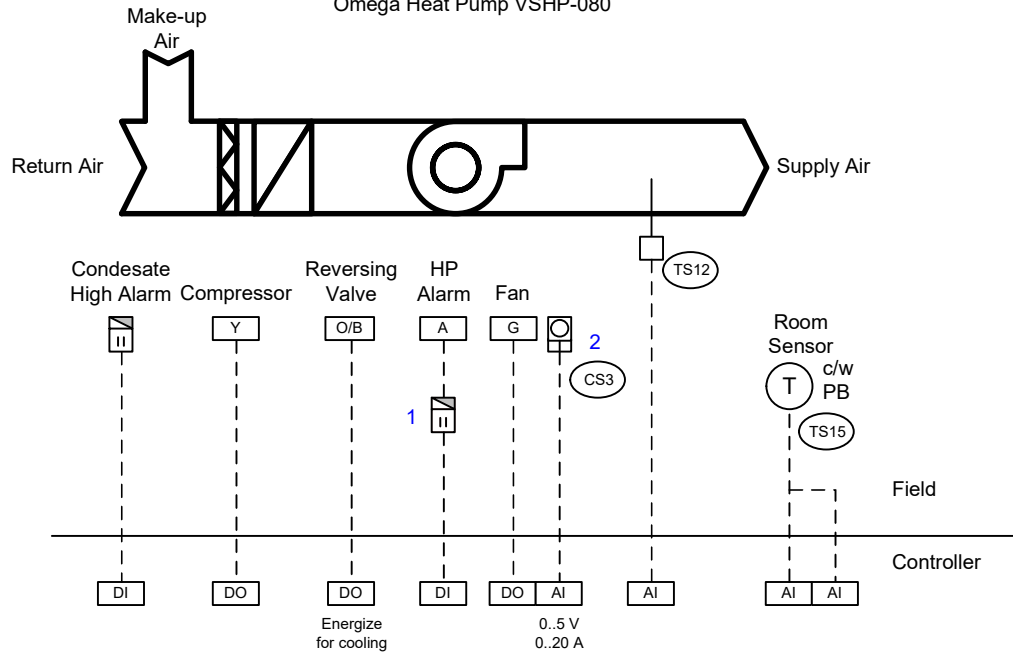
Alarms

- 1) Space temperature too low (14/15°C) or too high (38/36°C)
- 2) Supply air temperature too high (65/60°C) or too low (5/7°C).
- 3) Supply fan in wrong state.
- 4) Heat pump fault detected.

	Job #:	Owner: Waterloo Region District School Board	Drawn By:	Title: Daikin Heat Pumps	1
	Job Name: Jacob Hespeler SS Heat Pump Replacement		Revision Date: February 14, 2024		

HEAT PUMPS

Omega Heat Pump VSHP-080



Notes

- 1) Alarm output from the heat pump is to be wired into a relay.
- 2) Current sensor (CS3) shall monitor the current for the entire heat pump unit.

Four Systems As Shown			
Unit	Serves	Floor	Notes
HP-7	Resturant 223	2	
HP-8	Staff Dining 225	2	
HP-9	Staff Work Room NW214	2	
HP-10	ST AC Room N220	2	

SEQUENCE OF OPERATION

Unoccupied Mode

The heat pump fan and compressor cycle to maintain unoccupied setpoints for heating and cooling. If the pushbutton on the sensor is pressed, the system will revert to the occupied mode for a period of 2 hours.

Occupied Mode

Optimized start control is provided. The heat pump supply fan runs continuously. The room sensor cycles the heat pump compressor and reversing valve for heating or cooling to maintain setpoint. Setpoint adjustment (+/-2°C) is provided at the sensor.

Limits & Safeties

- 1) The compressor has a 5 min. minimum off time.
- 2) The supply fan has a 30 sec. delay-off time.
- 3) On a fire alarm condition, the system turns off.
- 4) The supply air temperature sensor acts as a low limit, and will shut down the cooling if it falls below the low limit setpoint (initially 6/12°C).
- 5) The supply air temperature sensor acts as a high limit, and will shut down the heating if it rises above the high limit setpoint (initially 48/35°C).

Alarms

- 1) Space temperature too low (14/15°C) or too high (38/36°C).
- 2) Supply air temperature too high (65/60°C) or too low (5/7°C).
- 4) Supply fan in wrong state.
- 5) Heat pump fault detected.

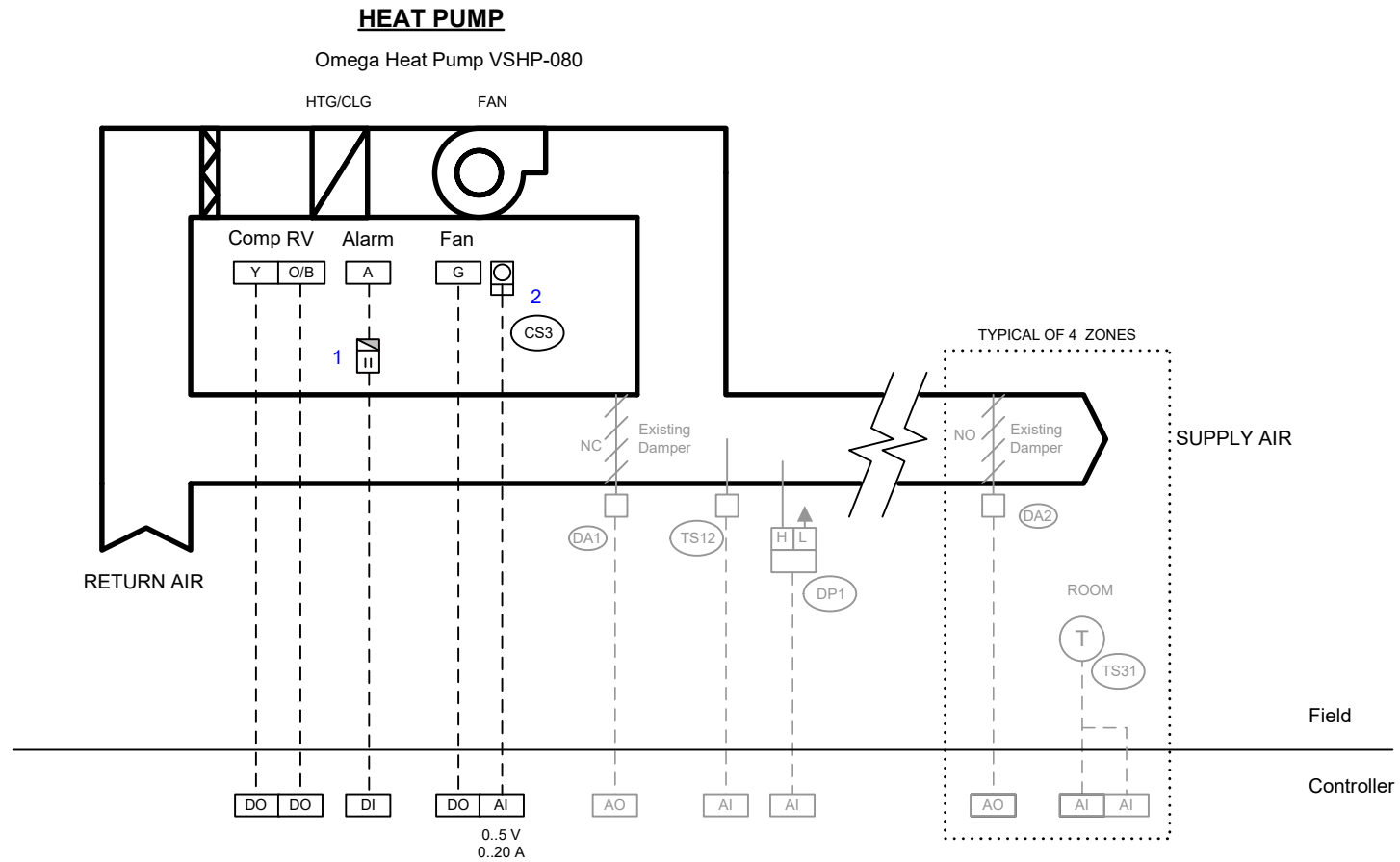
	Job #:	Owner: Waterloo Region District School Board	Drawn By:	Title: Omega Heat Pumps	2
	Job Name: Jacob Hespeler SS Heat Pump Replacement		Revision Date: February 14, 2024		

Scope of Work

Only the heat pump portion of the VVT system is being replaced. All existing temperature sensors, dampers and actuators remain unchanged.

Notes

- 1) Alarm output from the heat pump is to be wired into a relay.
- 2) Current sensor (CS3) shall monitor the current for the entire heat pump unit.



One System As Shown			
Unit	Serves	Floor	Notes
HP-4	Offices, music control room	2	

Job #:	Owner: Waterloo Region District School Board	Drawn By:	Title: HP-4 VVT	3

SEQUENCE OF OPERATION

UNOCCUPIED MODE

The supply fan and compressor is off. The bypass damper is in the 100% open position. The zone dampers are in the 50% open position. The system cycles on a call for unoccupied heating or cooling, with the supply air static pressure setpoint increased by 20%. If the override pushbutton is pressed, the system will switch to the occupied mode for 2 hours (adjustable).

OCCUPIED MODE

Fan Operation

The supply fan operates continuously. An optimized start routine is provided for heating and cooling.

Zone Damper

The room temperature sensor modulates the zone damper between min. and max. settings to maintain setpoint. The setpoint is adjustable +/-1°C at the sensor. The control is reverse acting when the supply air temperature is more than 1°C above room temperature and direct acting when the supply air temperature is more than 1°C below room temperature. If the system mode is different from the zone mode (e.g. system is in heating mode but zone requires cooling), the zone damper closes to a reduced minimum position to minimize overheating/overcooling.

System Heating/Cooling Decision Process

The system mode is determined by the number of zones that deviate from their respective zone heating/cooling setpoints. If the total number of zones requesting heating outnumber (or are equal to) the total number of zones requesting cooling, the system will go to heating mode. If the total number of zones requesting cooling outnumber the total number of zones requesting heating, the system will go to cooling mode. Once in the heating or cooling mode, the reference zone becomes the zone with the greatest call. The system will lock-in the selected mode until all zones are satisfied. If any zone is deprived of ventilation air for more than 20 minutes, the system will “unlock”, go into forced ventilation mode for 5 minutes, and then reselect the required mode of operation. Zones designated as “slave zones” (typically corridors) cannot request heating or cooling, but will utilize heating/cooling when it is available.

Ventilation Mode

The system operates in ventilation mode (no heating or cooling) under the following conditions:

- 1) No zones are calling for heating or cooling.
- 2) System is switching between heating and cooling (system operates in ventilation mode for 5 minutes).
- 3) One or more zones have been operating at a reduced min. position for more than 20 minutes (system operates in forced ventilation mode for 5 minutes).

System Heating Control

Stage 1 heating is controlled from the reference zone as follows:

	<u>Reference Zone Call for Heat</u>
Stage 1 On	1.0°C
Stage 1 Off	0.5°C

System Cooling Control

Stage 1 cooling is controlled from the reference zone as follows:

	<u>Reference Zone Call for Cooling</u>
Stage 1 On	1.2°C
Stage 1 Off	0.5°C

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SEQUENCE OF OPERATION (CONTINUED)

Bypass Operation

The supply air static pressure sensor modulates the bypass damper between minimum and maximum settings to maintain setpoint.

Limits & Safeties (VVT ver. 3)

- 1) The supply air temperature sensor acts as a high limit for heating (70/55°C, 60/45°C) and a low limit for cooling (5/10°C, 8/13°C).
- 2) The supply air temperature sensor acts as a software freezestat (1/5°C, 3 minute delay, auto reset after 5 minute delay).
- 3) The supply fan has a delay-off time of 90 seconds.
- 4) During ventilation mode, if the supply air temperature falls below 15°C for more than two minutes, stage 1 heating will turn on until the temperature exceeds 25°C (to improve comfort).
- 5) The default zone setpoint is increased by 1°C when mechanical cooling is enabled (providing heating is disabled).

Alarms

An alarm will be generated upon the following conditions:

- 1) Fan status does not match start/stop signal.
- 2) Supply air temperature too high (65/60°C) or too low (5/7°C).
- 3) Space temperature too high (38/36°C) or too low (14/15°C).
- 4) Supply air static pressure too low (10/15 Pa) or too high (240/220 Pa).
- 5) Weekly fan runtime limit exceeded.
- 6) Software freezestat tripped.
- 7) Heat pump fault detected.

	Job #:	Owner:	Drawn By:	Title: VVT Sequence 2	5
	Job Name: Jacob Hespeler SS Heat Pump Replacement	Waterloo Region District School Board	Revision Date: February 14, 2024		

1 GENERAL

1.1 INSTRUCTIONS

- .1 Comply with the General Conditions of the Contract, the Supplementary Conditions, and Division 01 – General Requirements.

1.2 SUMMARY

- .1 This Section specifies requirements and instructions that are common to electrical work Sections of the Specification, and it is a supplement to each Section and is to be read accordingly.
 - .1 Provide all wiring, conduit, materials, equipment, test/commissioning etc., shown or required to complete the electrical work unless otherwise specified. Any item or system which is shown, mentioned or reasonably implied on either the drawings or in the specifications shall be considered to be properly and sufficiently specified and shown, and must be provided. Include all labour, equipment, tools, etc., required to complete all installations as intended. Install all equipment according to the method indicated, manufacturer's instructions or according to standard industry practices if no installation technique is defined.
 - .2 Refer to Division 01 - General Requirements for specific instructions regarding staging of work and requirements for work in partially occupied areas. All work performed in an area which is to be partially occupied during construction is to be provided in co-ordination with other trades to minimize disturbance of the occupants and in accordance with the Contractor's instructions.

1.3 REFERENCES

- .1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction. Materials supplied to conform to minimum published requirements and recommendations, or better, of applicable standards of:
 - .1 CSA - Canadian Standards Association
 - .2 EEMAC - Electrical and Electronic Manufacturers' Association of Canada
 - .3 ULC - Underwriters Laboratories of Canada Ltd.
 - .4 NEMA - National Electrical Manufacturers' Association
- .2 Provide all materials and work in accordance with the latest editions of the Electrical Code, the Building Code, applicable CSA and ULC Standards, the Requirements of the Electrical Authority and all other applicable Municipal and Provincial Codes and Regulations. Any materials, equipment or installations not meeting all requirements of the appropriate regulatory agencies will not be accepted. Ensure these requirements are met and provide evidence of such as requested.
 - .1 Electrical Authority - Electrical Safety Authority
 - .2 Building Code - Ontario Building Code
 - .3 Electrical Code - Ontario Electrical Safety Code

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Determine the full scope of work by referring to all drawings and specifications.

- .2 It is the intent of these Specifications and Drawings, to provide sufficient information and details for construction of a complete and operational electrical installation.
- .3 Any item or subject which is shown, mentioned or reasonably implied on either drawings or in the specifications, is considered to be properly and sufficiently specified and shown; and must be provided. Provide all labour equipment tools, etc. required to complete all the work of this division.
- .4 Forward to the Consultant all correspondence and instructions from the Electrical Authority for clarification and action.
- .5 Arrange and pay for all permits and inspections by authorities having jurisdiction, required in undertaking of work under this Division. Modifications required by the above stated authorities to be made without any additional charge to the Owner.
- .6 Carry proper and adequate liability insurance to protect both himself and the Owner from all claims related to his work for this project.
- .7 Perform all work in such a manner as to cause as little disturbance or inconvenience as possible to the existing operations. Where deemed necessary by the Owner or Consultant/Project Manager, provide temporary measures as required to maintain specific services and/or provide work outside regular hours at no additional cost. Do not interrupt any electrical services without prior authorization.
- .8 It is the intention of the Owner to enter into an equitable contract with this Division. Having done so, it is the expectation of the Owner that the work of this Division will be carried out with the utmost precision and care. The standards of work quality and layout and organization of the installations as listed herein shall be strictly adhered to. Any work deemed unacceptable by the Consultant shall be removed and replaced at no additional cost to the Owner.
- .9 Conform to minimum requirements or better of provincial and local codes, where existing, and to requirements of local inspection authorities for execution of work under this Division.
- .10 Plan work well in advance to eliminate delivery and installation difficulties. Co-ordinate work with other trades to prevent conflicts on site and resolve interferences. Provide work in stages and at times required by the project schedule.
- .11 Drawings
 - .1 Drawings are diagrammatic and show the required distribution, number and locations of the electrical equipment, fixtures and outlets, and indicate suggested circuiting. Do not scale drawings but use only dimensions which are shown. Where exact building dimensions and details are required, use only dimensions from the Architectural Drawings or job site dimensions. Assemble reviewed shop drawings and operating and maintenance information into electronic files complete with table of contents and submit to the Consultant/Project Manager following completion of the project. Indicate in red on as-built drawings all deviations and approved changes from the Contract Drawings.
- .12 Coordination:
 - .1 In general, provide all power supply wiring, line voltage control wiring and Electrical Code required disconnect switches for any equipment installed by other trades. Verify the electrical characteristics and wiring requirements of all equipment before proceeding with the actual installations. Refer to the drawings for a description of equipment wiring and control requirements and components to be provided.
 - .2 Co-operate with all other trades on the job such that all equipment can be installed without any conflicts or delays. Provide and maintain temporary wiring, lighting and power supply installations as required by other trades during construction.

.3 Power Interruptions

- .1 Keep service and distribution system power interruptions to a minimum. Coordinate power interruptions with the Owner and all other Trades. Submit written application for electrical interruptions indicating the date, time, and estimated duration of the interruption to the Owners and Consultant/Project Manager at least two weeks prior to the requested shutdown date. Do not proceed with shutdown without written approval from Owner.

1.5 SUBMITTALS

- .1 Submittals under this Section shall be in accordance with Section 01 33 00 - Submittals.
- .2 Product Data/Shop Drawings:
 - .1 Submit for review shop drawings and data sheets in PDF format covering all items or equipment to be installed under the Contract. Show all relevant performance and installation information on shop drawings or product data sheets. Submit reviewed shop drawings and product data to other trades as required for completion of their related work.
 - .1 Distribution and control equipment
 - .2 Lighting Fixtures and Controls
 - .2 Equipment will not be accepted on site until review of shop drawings is complete.

1.6 CLOSEOUT SUBMITTALS

- .1 Submittals under this Section shall be in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Maintenance and Instruction Manual
 - .1 Provide digital Maintenance and Instruction Manuals at the completion of the project complete with table of contents and information sheets and subdivided into appropriate and identified file folders/bookmarks. Each manual shall contain, but not be restricted to, the following information:
 - .1 each shop drawing or product data (revised as per the reviewed drawings).
 - .2 equipment parts list.
 - .3 recommended list of spare parts.
 - .4 operating and maintenance instructions.
 - .5 equipment installation details, construction, and performance data.
 - .6 all manufacturing and equipment service depots including telephone numbers.
 - .7 Electrical Authority final inspection certificate.
 - .8 emergency lighting test results
 - .9 fire alarm verification certificate
 - .10 fire alarm audibility testing reports
 - .11 telecommunications cabling test results
 - .12 any other extended warranties, certificates, approval letters, etc.

- .2 Instruct the Owner's Representatives in the operation and maintenance of the systems and equipment included in this division by qualified technicians.
- .3 As-built Drawings:
 - .1 Always keep a complete and separate set of prints on site and note thereon clearly, neatly, accurately, and promptly all Civil, Architectural, Structural, Mechanical and Electrical changes, revisions and additions to the work and deviations from the Contract Documents. Include accurate locations, depth, size, and type of underground utilities in these as-built drawings.
 - .2 Indicate also on the as-built drawings the location of access panels or removable ceiling tiles which cover equipment or junction boxes which may require future access or where conduit or wiring for future use is located.
 - .3 Prepare the final as-built drawings by a qualified draftsman in AutoCAD at this trade's expense in both DWG and PDF formats to be submitted to the Consultant/Project Manager at the completion of the project with an application for a Certificate of Total Performance.

1.7 WARRANTY

- .1 Manufacturer Warranty:
 - .1 Guaranty all materials and installations of this division for a period of two years from the date of final acceptance of the work unless otherwise specified, regardless of the extent of equipment manufacturer's warranties. Arrange with each manufacturer/supplier to extend warranties as necessary to coincide with warranty period or those periods specified.
 - .2 Make submissions necessary to register product warranties to the benefit of the Owner.

2 PRODUCTS

2.1 MATERIALS

- .1 Install all items approved by a certification organization accredited by the Electrical Authority (CSA, ULC, etc.) or field approved for the application by the Electrical Authority or an accredited certification organization. All work and installations to be acceptable to the equipment manufacturer or system supplier and be approved by the Electrical Authority. All materials specified with manufacturer's name, type, bulletin number, etc., are to establish type and quality of materials required and first choice of manufacturer. Equivalent materials by other manufacturers may be used, but only after obtaining approval from the Consultant. Unless otherwise indicated, supply new equipment and materials.
- .2 Generally, mount equipment as close as practical to the location shown on the drawings taking into consideration site conditions. Ensure all equipment is located in a manner allowing easy access for maintenance, repair or adjustment. Confirm all architectural conditions such as glazing, door swings, furniture, and equipment types and layouts, on site prior to installing any related item or wiring.
- .3 The Consultant reserves the right to relocate any fixture, outlet, device, equipment, etc., up to 3 m (10 ft) prior to installation without incurring any extra cost. Confirm locations, mounting height and arrangement of all outlets on site prior to installation.
- .4 Conduit systems
 - .1 Supply conduit for conductors except armoured cable, mineral insulated cable, and except where cable tray, cable duct, or a similar raceway is used.

- .2 Conduit for main distribution wiring in electrical rooms and similar areas, exposed conduit from floor level to 1.2 m (4 in) above the floor in mechanical and other service rooms, concealed conduit in exterior walls, and exposed outside the building, except where rigid PVC conduit is permitted – rigid galvanized steel to CSA C22.2 No. 45.
 - .3 Conduit for short (minimum 450 mm (18 in), maximum 600 mm (24 in), with a 180° loop wherever possible) runs of conduit to electric motors, distribution transformers, and vibration isolated equipment – flexible galvanized steel liquid-tight conduit to CSA C22.2 No. 56, complete with liquid-tight connectors at terminations.
 - .4 Conduit at points where exposed conduit crosses building expansion joints – galvanized steel flexible conduit to CSA C22.2 No. 56, complete with proper and suitable squeeze type connectors at terminations.
 - .5 Conduit for all conduit except as specified above – EMT to CSA C22.2 No. 83, complete with joints and terminations made with steel couplings and set screw type connectors, concrete tight where required.
 - .6 Conduit fittings are to be of the same material as the conduit. Generally, conduit is sized on the drawings. Conduit not sized on the drawings is to be sized in accordance with the governing Codes/Regulations. Do not use conduit less than 13 mm (½ in) diameter.
- .5 Line voltage conductors
- .1 Supply copper, colour coded and factory identified conductors. Conductors to and including 10 AWG are to be solid or stranded. Conductors larger than 10 AWG are to be stranded. Minimum size 12 AWG, sized and colour coded according to the Electrical Code where not indicated.
 - .2 Non-fire rated conductors are to be as follows:
 - .1 conductors in accessible ceiling spaces, within stud wall construction, and in furniture systems to luminaries and wiring devices – AC90 (BX) flexible armoured cable to CSA C22.2 No. 51, maximum 4 m (12 ft) run permitted and be suitably clipped and supported every 900 mm (3 ft).
 - .2 for conductors except as specified above or elsewhere in the Specification or on drawings – RW90 single conductor in accordance with CAN/CSA C22.2 No. 38, 90°, X-link polyethylene insulated. T90 nylon may be used in lieu of RW90 for interior installations up to size 10 AWG, however, conduit fill shall be based on RW90 rating.
 - .3 Aluminium Sheath Cable: Provide bare aluminium sheath cable where shown/specified. Cable is to be Nexans “Corflex” II” RA90 flexible cable in accordance with requirements of CSA C22.2 No. 123, or “Firex II” TECK 90 cable in accordance with requirements of CSA C22.2 No. 131. Install in accordance with the manufacturer’s instructions, including the following requirements:
 - .1 support and secure overhead suspended multiple cables on a system of cable tray, and secure individual cables directly to building surfaces by means of single screw non-ferrous clamps
 - .2 ground and bond single conductor cable at both ends where the sheath currents do not affect the cable ampacity, and for certain areas, where the sheath currents will reduce the cable ampacity, ground and bond the cable at the supply end and isolate the cable at the load end as recommended by the cable manufacturer, and supply a 3/0 AWG green RW-90 ground conductor for each cable, all as per Section 10 of the Electrical Code
 - .3 terminate cable with lugs and termination kits supplied with the cable

- .4 Conductor Sizing: Generally, conductor sizes are indicated on the drawings. Unless otherwise specified, do not use conductors smaller than 12 AWG in systems over 30 volts. Unless otherwise specified, do not use conductors smaller than 6 AWG for exterior luminaire wiring. Conductor sizes indicated on the drawings are minimum sizes and must be increased, where required, to suit length of run and voltage drop (2% for feeders, 3% for branch). All branch circuit wire feeding a 20 A protected lighting circuit shall be minimum 10 AWG wire. All branch circuit wiring feeding a 15 A protected circuit which is over 50 m (150 ft) in length shall be minimum 10 AWG wire. All 120 V (single phase) branch circuits shall be supplied with a separate neutral conductor for each circuit.
- .5 Conductor Colour Coding: Colour code conductors to identify phases, neutral, and ground by means of self-laminating coloured vinyl tape, coloured conductor insulation, or properly coloured plastic discs. Colours are to be phase A - red, phase B - black, phase C - blue, identified (neutral) - white, Bond – Green, and control - orange.
- .6 Low voltage (24 volt) conductors
 - .1 Unless otherwise specified, supply T-90 or RW90 stranded copper conductors in conduit as specified above, for low voltage wiring.
 - .2 For fire alarm signal wiring, security system and communication system wiring in conduit, provide conductors equal to Nexans “Securex II” FAS/LVT/FT1300 volt wire to CSA C22.2 No. 208, and if required for the application, interlocking aluminium armour with or without an overall jacket.
- .7 Grounding and bonding
 - .1 Do all required grounding and bonding work. Supply a green insulated ground conductor in every raceway, sized in accordance with the Electrical Code and CSA C22.2 No. 41, or, for health care projects, in accordance with CAN/CSA Z32.
 - .2 Use exothermic welds or compression connectors for underground conductor connections. Use 2-hole compression type copper lugs for connections to ground bus.
 - .3 For natural gas service piping provide a 6 AWG green insulated ground conductor installed in accordance with the Electrical Code the Gas Utilization Code.
 - .4 Grounding bus bars to be tin-plated copper with multiple standard spacing for 2-hole lugs.
- .8 Distribution and control equipment
 - .1 Alter and extend the existing electrical distribution system as shown on the drawings to meet the requirements of the project. Provide all new distribution equipment and wiring indicated. Refer to the power distribution schematic and associated schematics for further details.
 - .2 Panelboards: Dead front, factory assembled, designed for sequence phase connection of branch circuit devices, in accordance with CAN/CSA- C22.2 No. 29. Comply with Electrical Code Rule 14-014 with regards to series rated combinations of over-current protective devices and ensure that equipment in which the lower rated devices are installed are marked with a series combination interrupting rating at least equal to the available fault current. Each panelboard is to be complete with silver plated, electrical grade, 95% conductivity copper bus mains, a removable cover for main lugs, an EEMAC 2 enclosure equipped with, for panelboards in areas other than secure Electrical Rooms, a concealed hinged door and flush latch with keyed alike lock, and circuit breakers or fused switches (as scheduled) as per CSA-C22.2 No. 5, and for dedicated breakers, handle lock devices. Acceptable manufacturers are Eaton, Schneider Electric, and Siemens Electric.

- .1 Distribution Panelboards: Each panelboard is to be complete with main and branch circuit conductor solderless lugs approved for copper conductors, neutral bus and main lugs at the same end, and a removable cover for main lugs.
 - .2 Branch Circuit Panelboards: Breaker type branch circuit panelboards are to be complete with double neutral, main and branch circuit conductor solderless set-screw type lugs approved for copper conductors, and Mylar circuit breaker identification strips secured in place.
 - .3 Panels shall be of the type with voltage and current rating as shown on the drawings, sized to accommodate branch circuit breakers and spaces as indicated. Bus bracing shall be provided to suit the short circuit capacity rating indicated on the drawings or minimum 10 kA at 208 V, 3 phase or 14 kA at 600 V, 3 phase as applicable. Restrictive dimensions shall be as shown. Supply locking doors for all panels. Supply all panel doors, trim and surface mount tubs in a light gray enamel paint. Supply galvanized tubs for flush mount panels.
 - .4 Unless otherwise noted all breakers shall be rated minimum 14 kA symmetrical interrupting capacity at 600 volts, 3 phase or 10 kA symmetrical interrupting capacity at 208 volts, 3 phase as appropriate and not less than the short circuit capacity as shown on single line diagram drawings.
 - .5 Supply breaker lock-on devices for all essential and emergency loads. Connect all single-phase loads such that there is the least possible imbalance of phases under normal conditions. Supply panel labels and a neatly printed and appropriately labelled directory card for each panelboard.
 - .6 Fusible switch units: quick make-quick break mechanism with provisions for locking in the open or closed position and door/switch interlock with override.
 - .7 Disconnect switches: heavy duty type with visible blades in the off position, quick- make quick-break operating mechanism, lock-off provision, door/handle interlock with override and shall be horsepower and electric heat rated. Switch fuse holders shall have reinforced clips. Fuses shall be easily removable when the switch is in the off position. All switches shall have ample gutter space for top or bottom wiring and be provided with enclosures to suit the specific application.
 - .8 Fuses: HRC-1 Class L (over 600 A) or Class J (under 600 A) as appropriate; time delay type unless otherwise indicated. Fuse rating shall be as noted for feeders or as required for proper motor protection, if not indicated. Provide as spares, 3 of each type and rating of fuses installed and turn over to Owner at time of building occupancy.
 - .9 Supply manual and magnetic motor starters for motors and equipment as indicated. Starters to include manual reset, adjustable thermal overload units with integral single phase protection and at minimum be complete with interlocks, auxiliary relays, control transformers, and terminals required for proper operation. Refer to the drawings for further details of mechanical equipment control and wiring requirements.
 - .10 Supply AC control relays and contactors with required coil and contact rating and pilot light for control of equipment and miscellaneous loads as shown. Provide auxiliary components, control transformers, terminals, switches, etc., required for control and connection.
- .9 Splitter trough, junction, pull and outlet boxes
- .1 Splitter Trough: Supply Type 1 steel splitter trough in accordance with CSA C22.2 No. 76 where indicated on drawing plans, schedules, and details. Enclosures are to be NEMA/EEMAC Type 2 in sprinklered areas and Type 1 elsewhere.

- .2 Pull Boxes and Junction Boxes: Supply CSA certified accessible pull box in conduit systems wherever shown on the drawings, and/or wherever necessary to facilitate conductor installations. Supply CSA certified accessible junction boxes wherever required and/or indicated on the drawings. Boxes in rigid conduit and EMT inside the building are to be stamped galvanized or prime coated steel. Boxes in exterior rigid conduit are to be "Condulet" cast aluminium gasketed boxes, and boxes in PVC conduit are to be rigid PVC boxes.
- .3 Outlet Boxes: Supply an outlet box for each luminaire, wiring device, fire alarm system component, communications systems components, and all other such outlets. Outlet boxes flush mounted in interior construction, surface mounted in concealed interior locations, and surface mounted in exposed interior locations where the connecting conduit is EMT are to be stamped galvanized steel outlet boxes. Outlet boxes for surface mounted for exterior lighting, receptacles, and other device outlets, boxes flush mounted in exterior building surfaces, and boxes mounted in interior device locations where the connecting conduit is rigid, and for boxes in perimeter walls where insulation and vapour barrier is present, are to be "FS" or "FD" Series cast boxes, cast iron inside the building, cast aluminium outside the building.

.10 Wiring Devices

- .1 Supply wiring devices where shown/specified. Wiring devices are to be CSA certified as a minimum, in accordance with CAN/CSA C22.2 No. 42, General Use Receptacle, Attachment Plugs and Similar Wiring Devices, CAN/CSA C22.2 No. 42.1, Cover plates for Flush Mounted Devices, and CSA C22.2 No. 111, General Use Snap Switches. Wherever possible, all wiring devices are to be supplied by the same manufacturer. Acceptable manufacturers are Hubbell Canada, Cooper Industries (Arrow Hart), Legrand/Pass and Seymour, and Leviton Canada.
- .2 Supply specification grade white wiring devices as shown on the drawings. Devices are indicated with Hubbell part numbers and noted below:
 - .1 Light Duty Devices
 - .1 15 A, 120 V Toggle Switch: 1201, 1203
 - .2 20 A, 347 V Toggle Switch: 18201, 18203
 - .3 15 A, 120 V Duplex Receptacle 5-15R: 5252
 - .4 20 A, 120 V Duplex Receptacle 5-20R: 5352
 - .5 15 A, 120 V GFCI Duplex Receptacle 5-15R: GF5252
 - .6 20 A, 120 V GFCI Duplex Receptacle 5-20R: GF5352
 - .7 Weatherproof in-use receptacle cover: WP826
 - .2 Decorator Style 120 Volt Devices
 - .1 15 A, 120 V Rocker Switch: DS115, DS315, DS415
 - .2 20 A, 120 V Rocker Switch: DS120, DS320, DS420
 - .3 15 A, 120 V Duplex Receptacle 5-15R: DR15
 - .4 20 A, 120 V, Duplex Receptacle 5-20R: DR20
 - .5 15 A, 120 V GFCI Duplex Receptacle 5-15R: GF15

- .6 20 A, 120 V GFCI Duplex Receptacle 5-20R: GF20
- .3 Supply vertically brushed stainless steel coverplates, coloured to match device, for flush mounted devices or galvanized steel type coverplates with rounded corners for surface mounted devices as appropriate for all outlets, ganged type for all grouped outlets. Supply special receptacles and outlet types as identified on the drawings.
- .4 Supply time switches for control of mechanical and electrical loads and systems as described below and identified on the drawings.
- .5 Supply individual single circuit, 120 V, 7 day/24 hour astrometric digital type time clocks complete with programming display interface, manual override control, rechargeable battery reserve power and 15 A, 120 V rated contacts.
- .6 Supply 120 V, SPST, 2 kW rated adjustable level setting photo control for control of exterior lighting.
- .11 Service columns
 - .1 Provide 2-compartment, barriered, extruded aluminium indoor service columns for power, extra low-voltage and communication service in locations as shown.
 - .2 Each column is to be complete with an anodized aluminium finish or a baked powder coat custom colour selected from the manufacturer's colour chart as directed, four 15 A, 125 V, Specification Grade, Premium Quality single U-ground receptacles with plates factory connected (including un-broken ground) to a 3 m (10 ft) plug and cord set or hard wired to a ceiling box, as indicated/required, facilities for required data and communication connectors/devices, a snap-on cover for the data/communication compartment, a baseplate for securing the column to the floor, and facilities at the top of the column for securing the column to ceiling construction, with trim plate for the ceiling opening.
 - .3 Accurately locate columns in accordance with furniture, etc., layouts and architectural/interior design drawings and secure in place, vertical and plumb. Extend circuits from panelboards to connect column receptacles. Provide junction boxes in the ceiling space and coordinate to suit column locations. Test columns to ensure electrical continuity of bonding and grounding connections.
- .12 Light Fixtures
 - .1 Supply all light fixtures as specified on the drawings complete with drivers, lenses, lamps, auxiliary components, and mounting hardware as required for a complete installation. Verify all catalog numbers with descriptions given.
 - .2 LED monochrome lighting fixture shall have lighting that shall a minimum CRI of 85 for regularly occupied spaces, a minimum CRI of 70 for exterior, and a minimum of 75 for all other spaces. Exterior and interior area lighting shall have a minimum efficiency of 80 lumens per watt.
 - .3 LED drivers shall have minimum lifespan equal or better than 50,000 hours. The L70 lifespan of the LED lamps shall be 80,000 hours or greater. Drivers shall be integrated into the fixture if serving only that fixture or remote if the driver serves more than one fixture or shown on drawings. All drivers shall be dimmable using 0-10 V or digital dimming technology unless noted otherwise. LED drivers shall have high power factor. All LED lighting and drivers used in exterior or unheated applications shall provide start-up and operation in temperatures from -30 °C to +50 °C (-22 °F to +122 °F).
 - .4 Fixtures shall not be released prior to review of the shop drawings. Cancellation charges will not be paid for changes to fixtures made before the fixture cuts have been reviewed.

.13 Lighting Control

- .1 Supply low voltage wired lighting control system for spaces indicated on the drawings to be compliant with lighting narrative, Building Code, and ASHRAE 90.1-2013. Use wall controls, occupancy sensors, photosensors in conjunction with relays and microcontrollers to enable a compliant lighting control system. System should have capability to incorporate plug-control in conjunction with lighting control. The use of wireless lighting control devices is not acceptable for this scope of work. Obtain lighting control system from a single source with resources to provide products of consistent quality in appearance and physical properties. Acceptable manufacturers are Legrand Wattstopper, Acuity Sensorswitch, Cooper Greengate, Signify Enlighted.
- .2 Primary occupancy sensing technology to be passive infrared (PIR) with vacancy sensing using PIR and, in regularly occupied spaces, one additional technology such as ultrasonic. Unless noted otherwise in lighting narrative or Building Code, default lighting control setting to initiate lighting brightness to 50% on sensing occupancy and to 0% after 15 minutes of vacancy.
- .3 In smaller spaces lighting control function can be incorporated into a single-gang line voltage device.

.14 Fire Alarm System

- .1 Supply fire alarm system devices where indicated on the drawings and described below.
 - .1 Manual Pull Stations - single stage, pull lever, extruded aluminum construction with NO/NC contacts. Where surface mounted, supply a surface wallbox.
 - .2 Fixed and ROR Heat Detector - 57 °C (135 °F) fixed and 9.5 °C (15 °F) per min rate of rise type with separate mounting base.
 - .3 Fixed Temperature Heat Detector - 57 °C (135 °F) fixed type with separate mounting base.
 - .4 Smoke Detector - photoelectric area type with LED alarm indicator and separate mounting base. Provide relay type base to perform auxiliary functions where shown.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions:
 - .1 Carefully examine the site and tender documents for the work in accordance with the Instructions to Bidders. Visit the existing building and become familiar with existing architectural and structural conditions, the location of existing electrical equipment and installations and other factors related to the work to be done. Review spaces above accessible ceilings. No extra charges will be considered for anything which could have been revealed during such examinations.

3.2 PREPARATION

- .1 Obtain and pay for all permits required for the execution and inspection of the electrical work. All work shall be provided by qualified journeyman electricians or apprentices holding valid Provincial Certificates of Qualification and be supervised by a competent foreman.

3.3 INSTALLATION

- .1 Cutting, drilling, and patching

- .1 In general, all necessary cutting and patching for the electrical work shall be completed by the appropriate trade at the expense of this Division unless indicated otherwise on the drawings. Holes through exterior walls and roof are to be properly flashed and made weatherproof. Repair any damage caused by this Division to existing buildings or equipment, etc., to the Consultant's satisfaction.
 - .2 Do cutting, drilling and patching of the existing building for the installation of your work. Patch surfaces, where required, to exactly match existing finishes using. Where new conduit and similar products penetrate existing construction, core drill an opening sized to leave 12 mm (½ in) clearance around conduit, etc. In poured concrete construction, determine the location, if any, of existing concealed services. Pack and seal the void between conduit, etc., openings for the length of the opening in interior construction with rock wool and seal both ends of the opening with non-hardening silicone base caulking. Seal sleeves in exterior walls below grade (and any other wall where water leakage may be a problem) with link type mechanical seals.
 - .3 Install all sleeves, inserts hangers and core drilling of slab required for the electrical work. All sleeves or holes piercing acoustical, weatherproof, or fire separations for installations of this Division shall be treated by the Contractor to maintain the applicable rating or seal.
 - .4 Install all sleeves, inserts, hangers and core drilling of slab required for work of this Division. Treat all sleeves or holes piercing acoustical separations for installations of this Division to maintain acoustical rating. All gaps shall be packed with acoustical insulation and sealed at both ends with acoustical caulking. Patch all openings around installations of this Division piercing fire or smoke separations with an approved watertight smoke and fire stop sealant such as manufactured by Dow Corning.
 - .5 Where conduit/conductors penetrate new concrete and masonry surfaces install proper sleeves. Sleeves in waterproofed slabs or walls are to be complete with a water stop. Size sleeves to leave 12 mm (1/2 in) clearance around the conduit/conductor. Pack and seal the void between sleeves and the conduit in interior non-fire rated construction for the length of the sleeves with mineral wool and seal both ends of the sleeve with silicone base caulking. Pack seals in fire rated construction as above but use rock wool and leave space at sleeve ends for fireproofing. Seal sleeves in exterior walls below grade (and any other wall where water leakage may be a problem) with mechanical seals equal to Thunderline (Power Plant Supply) "LINK SEAL" Model S-316.
 - .6 Where electrical work penetrates fire rated construction, use ULC listed and labelled firestopping and smoke seal materials installed in accordance with requirements of CAN4-S115 (ratings F, FT, FH, and FTH as required), CAN/ULC-S101, and other governing authorities.
 - .7 Terminate sleeves for exposed so that the sleeve is flush at both ends with the building surface concerned and install chrome plated brass or brushed stainless steel escutcheon plates tight against the building surface to completely cover both ends of the sleeve.
 - .8 Scan or x-ray floor slab or structural walls and submit results to the consultant for review and approval, complete with proposed locations of new penetrations, prior to drilling. Core drilling shall be carried out after normal working hours at a time acceptable to the Owner. All costs associated with this work shall be included in the bid price.
- .2 Fastening and securing hardware

- .1 Install fastening and securing hardware to maintain installations attached to the structure or to finished floors, walls and ceilings in a secure and rigid manner capable of withstanding the dead loads, live loads, superimposed dead loads, and any vibration of the installed products. Where construction is not suitable to support the loads, install additional framing or special fasteners to ensure proper securement to the structure. Do not attach fasteners to steel deck without written consent from the Consultant.
- .3 Conduit and Conductors
 - .1 Ensure all outlet boxes which pierce a building vapour barrier are installed with vapour barrier protection integral with specific wall or ceiling construction. Verify exact requirements on site with the Consultant prior to proceeding with installations.
 - .2 In areas with solid ceilings, electrical and systems junction boxes along with associated wire and conduit shall be relocated to areas where ceiling access is possible, or access panels. Install prime coated steel access panels for electrical work which may need maintenance or repair but which is concealed in inaccessible construction. Install access doors in fire rated construction are to be ULC listed and labelled and of a rating to maintain the fire separation integrity. Recessed door type access panels located in surfaces where special finishes are required are to be constructed of stainless steel with a #4 finish.
 - .3 Unless otherwise specified, locate and arrange horizontal conduits, raceways, and conductors above or at the ceiling on floors on which they are shown, arranged so that under consideration of all other work in the area, the maximum ceiling height and/or usable space is maintained. Install all exposed conduits, raceways, and conductors parallel to building lines and to each other. Conduit, raceway, conductors, etc., must be supported from the structure.
 - .4 Install proper adaptors for joining conduit of different materials.
 - .5 In all cases, use only conduit and raceways approved for the particular application and of adequate size to suit type and number of conductors being carried. Install a separate ground conductor in all conduits. Where indicated, use conduit as specified. Adequately secured every conduit or section of armoured cable using approved supports, clamps and fasteners to ensure a safe and sound installation. Conceal in walls, ceilings or furring all conduit or armoured cable run in finished areas, unless otherwise indicated or approved by the Consultant. Do not use armoured cable where exposed unless otherwise noted.
 - .6 Pigtail connect neutral conductors at all devices. Join all conductors using approved solderless wing nut pressure connectors. All wiring shall be installed according to manufacturer's recommendations, all regulatory requirements and shall satisfy all applicable codes. Check and replace, as required, any existing wiring being re-used.
 - .7 Feeders and branch circuits rated 100 A or greater shall be checked with a 1000 V meggar for 15 s before energization.
- .4 Power and control wiring for mechanical work
 - .1 Do all required line voltage wiring for mechanical work. Install receptacles for plug-in equipment. Install disconnect switches for motors that are more than 10 m (30 ft) from the starter location, or that cannot be seen from the starter location and associated power wiring. Install motor starter interlocking more than 24 volts. Install dedicated 120 V, 15 A, single pole identified circuits terminated in junction boxes in mechanical equipment rooms for automatic control wiring connections to be made as part of the mechanical work.
- .5 Wiring Devices

- .1 Confirm exact locations, including mounting heights prior to roughing-in. For accessible mounting heights for devices, conform to Building Code requirements. Confirm switch, receptacle and faceplate types, colours and finishes prior to ordering. Ensure that switches located adjacent to doors are located at the strike side of the door. Install fire rated gaskets in outlet boxes for switches and receptacles located in fire rated construction. When installation is complete, test operation of devices.
 - .2 Unless otherwise indicated or at the same location as another control device, mount light switches and control devices at 1100 mm (43 in) to the centre of the outlet box. Mount wall outlets and receptacles at 460 mm (18 in) or 150 mm (6 in) above countertop or back splash as applicable to centre of outlet box. Mount thermostat or a manual pull station at 1200 mm (47 in) above finished floor to centre of outlet box.
 - .3 All switches and outlet location shall be coordinated with furring, pipe chases, etc. prior to rough-in to ensure adequate space is available for device mounting.
- .6 Light Fixtures:
- .1 Ensure that all light fixtures are adequately supported. Fixtures must be supported directly from the building structural members. Co-ordinate the requirements of the light fixture supports with the other Divisions (where applicable) prior to fixture installation. Fixture safety chains or wires shall also be provided as required by regulatory agencies.
 - .2 The method of attaching suspension wires and safety chains to fixtures and building elements, shall be discussed with and approved by the Consultant prior to installation.
- .7 Lighting Control
- .1 Install lighting control sensors at maximum 75% of manufacturers rated range and install additional sensors if equipment or structural interference exclude line-of-sight coverage within the lighting control zone. In spaces that regularly occupied with more than 3 people reduce to maximum 50% of manufacturers rated range to increase sensitivity. Place sensors to reduce nuisance activation from adjacent corridors through open doors. Do not install occupancy sensors in rooms where sleeping occurs.
- .8 Distribution Equipment and Control
- .1 Install legible signs and barriers on or around all live panels and equipment during construction to prevent injury or shock.
 - .2 Include panel or breaker schedules to reflect changes and additions. Install labels for all new equipment.
- .9 Splitter trough, junction, and pull and outlet boxes
- .1 Rigidly secure the splitter trough in place, level and plumb. Ensure that the splitter trough itself, and all branch circuits, are properly identified.
 - .2 Install blank covers as required or shown for all wiring systems. Install all boxes to be accessible, if necessary, supply access panels. Secure all boxes independent of the conduit/wiring system. Accurately locate and identify concealed pull boxes and junction boxes on "as-built" record drawings.
- .10 Grounding and Bonding

- .1 Complete all grounding required by the Electrical Code or any local authorities regardless of whether it has been shown. This includes equipment grounding as well as system (service) and distribution grounding. Install additional specific provisions as indicated, including ground connections for main electrical room and building structure. Provide these installations according to Electrical Code regulations. Collect all ground connections at a common point in the main electrical room, which in turn is connected to the main service ground.
 - .2 All grounded feeders and branch circuits shall be provided with a separate ground conductor sized according to the Electrical Code regulations. The conduit system shall not be used as the ground path, however all conduits shall be solidly grounded.
 - .3 Arrange grounds such that under normal operating conditions current flow in any grounding conductor is not objectionable and will not harm personnel or equipment. Arrange service grounds and distribution grounds to provide ground resistance readings within values required by the Electrical Code and the Electrical Authority.
 - .4 For telecommunications grounding and bonding install ground bus, cabling and complete all bonding terminations in compliance with latest edition of ANSI/TIA 607.
- .11 Identification
- .1 Install identification nameplates for all electrical apparatus. All identification nameplates and nametags unless otherwise specified shall be engraved white letters on black Lamicoid stock with bevelled edges. The Lamicoid stock shall be 1.5 mm (1/16 in) minimum thickness. Identification tag is to follow drawing nomenclature unless otherwise specified. Label all junction boxes with black ink marker identifying circuits, source panel, and systems.
 - .2 Equipment Nameplates: Install Lamacoid identification nameplates for equipment and shall include equipment tag, voltage(s), phase, and electrical source. Secure nameplates to equipment with stainless steel screws unless such a practice is prohibitive, in which case use epoxy cement applied to cleaned surfaces. For multi-cell or multiple component equipment provide a main nameplate and a smaller nameplate for each cell or component.
 - .3 Terminal Cabinets, Pull Boxes, Junction Boxes: Clearly identify terminal cabinets, main pull and junction boxes by neatly spray painting the outside surface of the cover with a paint colour as specified for conduit and conductor identification. Supply a nameplate on terminal boxes, main pull and junction boxes. Nameplates must indicate the load source circuit, voltage, and phase.
 - .4 Panelboards: Nameplates must identify the panel tag, voltage, phase, and electrical source. Include a machine-printed door directory card indicating the load connected to each breaker.
 - .5 Motor Starters and Disconnect Switches: Supply Lamacoid nameplates for motor starters and disconnects. Nameplates must indicate the serving equipment tag, load source, voltage, and phase.
 - .6 Luminaires On Emergency Circuits: Identify luminaires on emergency circuit with a 15 mm (1/2 in) diameter self-adhesive red label secured to the T-bar ceiling component adjacent to the luminaire, or if not in a T-bar ceiling, to the frame of the luminaire.
 - .7 Extra-low voltage Equipment/Systems: Identify equipment, patch panels, pathways, outlets, cables (at terminations), and devices with appropriate self-adhesive machine-printed labels indicating tag numbers or system identification. Labels to be legible from standing position in room.

- .8 Wire and Cable Terminations: Identify both end of wire and cable terminations with the same unique number with appropriate self-adhesive labels. Where numbers or tags are not indicated or specified, assign a number and record them.

.12 Fire Alarm

- .1 The fire alarm system shall be installed in accordance with the requirements of all applicable regulatory agencies and codes including CAN/ULC S524, TSSA, Building Code, and Electrical Code.
- .2 Mounting heights to meet Building Code requirements:
 - .1 Manual Stations - 1200 mm (47 in). New stations installed at existing locations shall be re-positioned to new mounting height.
 - .2 Audible Signals - 2440 mm (8 ft) or 300 mm (12 in) below ceiling whichever is lower.
 - .3 Panels - 2000 mm (56 in) to top of trim.
 - .4 End of line resistors - 1800 mm (6 ft) AFF.
- .3 Locate detectors as shown considering spacing and mounting requirements contained in CAN/ULC-S524. Locate detectors away from radiating surfaces or positions affected by ventilation grilles. Smoke detectors located at controlled doors shall be installed within 1500 mm (5 ft) of door opening.
- .4 The manufacturer shall make a complete inspection of all installed fire alarm equipment including each and every component in accordance with CAN/ULCS537 using only safe, non-damaging tests in accordance with CAN/ULC S536 to ensure the following:
 - .1 That the system is complete and in accordance with the specifications.
 - .2 That the system is connected according to ULC requirements.
 - .3 That the system is installed in accordance with the manufacturer's recommendations.
 - .4 That the regulations concerning the supervision of components have been adhered to.
- .5 Third-Party Verification
 - .1 Verification shall be carried out in accordance with CAN/ULC-S537 Verification of Fire Alarm Systems. The Third-party verifier shall provide a Verification Certificate and Verification Report to show compliance with CAN/ULC-S537 Verification of Fire Alarm Systems.
 - .2 All fire alarm system testing and verification will use only safe, non-damaging test methods in accordance with CAN/ULC-S536. Open flame or smoke will not be used for any on-site testing of detection devices for proper operation.
- .6 On completion of the inspection the manufacturer shall supply the Consultant with a certificate together with detailed inspection record sheets, confirming that the system is installed in accordance with the above outlined requirements. Confirm in writing that all authorized building personnel have been instructed as to system operation and maintenance procedures.

- .7 All fire alarm system wiring shall be installed with a separate insulated ground conductor sized in accordance with Electrical Code regulations. All wiring for detection zones shall be installed as Class 'A' type obtained by wiring in a loop method around zone area such that wiring pairs (feed and return) are not installed in the same conduit and conduits are not run together. All other wiring shall be standard Class 'B' type in a separate conduit system in accordance with this specification and Electrical Code requirements complete with recessed device boxes for approved component mounting. End-of-line resistors are not shown on plan and shall be installed as directed by the manufacturer.

3.4 REPAIR / RESTORATION

- .1 Renovation Work
 - .1 Visit the site to determine the extent of demolition, removal, relocation, re-routing and reconnection of existing electrical equipment, fixtures, outlets and wiring required for the execution and completion of this project. In general, relocate existing services as required to accommodate new equipment and installations and architectural changes. In areas being totally renovated, provide all electrical demolition work and replace existing installations with new as shown. Extra charges for premium time labour, if required to complete the project as described, shall be included in the bid price.
 - .2 Where indicated on the drawings, disconnect and remove electrical work, including conduit, conductors, and similar items. Cut back obsolete conduit behind finishes, identify, and cap water-tight. Estimate the extent and cost of the work at the site during bidding period scheduled site visit(s). Perform demolition work in accordance with requirements of CAN/CSA-S350, Code of Practice for Safety in Demolition of Structures.
 - .3 Unless otherwise specified, remove and dispose of demolished materials which are not to be relocated or reused.
 - .4 Clean all existing products to be reinstalled.
 - .5 Sequence of disconnection and removal and/or relocation of existing equipment and wiring shall be co-ordinated with the Owner and other trades and shall conform to the requirements and conditions of the Project Manager.
 - .6 Wiring located in areas being altered but feeding outlets or equipment in other areas required to remain in service, shall be reworked, extended and re-routed as required to maintain the continuity of these services. Provide adequate protection to existing wiring and equipment which has become exposed to mechanical injury in the course of alterations or new installations.
 - .7 Install all conduit and feeders running through the existing building along routes approved on site by the Owner and Consultant. New installations will not necessarily be allowed along shortest routes but should follow corridors or routes of existing main runs where possible.
 - .8 Modify/upgrade existing installations affected by work of this project in accordance with the Electrical Authority requirements. New devices installed in existing equipment shall match type and quality of existing devices and be fully compatible with and be approved for use in the existing equipment. Provide all appropriate modifications to existing panels to allow installation of additional distribution breakers or fusible switch units in a manner acceptable to the Electrical Authority.
 - .9 Update existing panel or breaker schedules to reflect changes and additions. Label all breakers no longer in use as spare and place breaker in off position.

- .10 In some instances, new outlets and equipment are shown in the same location as the existing outlets. These may be fed through the existing conduits provided that the conduits are in good condition and are acceptable to the Electrical Safety Authority for re-use. All wiring to new outlets and equipment shall be new unless otherwise indicated. All unused conduit entrance openings shall be sealed.
- .11 Unless noted otherwise, all existing electrical equipment which is not to be re-used shall become the property of this Division (for disposal or removal from the site as applicable) and have an appropriate salvage value included in the contract. Existing electrical equipment to be re-used (relocated and reconnected) shall be cleaned, painted, refurbished and repaired as required before reinstallation. (Turn over existing light fixtures and electrical panels not to be re-used to the Owner.)
- .12 In finished areas of the existing building, as much wiring as possible shall be concealed. Where, in this Division's opinion it is necessary or advantageous to run wiring on the surface, (not simply to avoid cutting wall or floor) obtain approval from the Consultant before proceeding. All surface raceways installed shall be as manufactured by Wiremold unless otherwise indicated. Wiremold raceways shall be sized as indicated or to suit conductors being carried. Use only approved components, fittings and methods for securing, joining and supporting surface raceways and outlet boxes. Surface mount raceways shall be painted to match the adjacent wall or ceiling finish by the Project Manager.

3.5 SITE QUALITY CONTROL

- .1 General Electrical Work Testing:
 - .1 Satisfactorily perform testing required by governing authorities, Codes and Regulations to suit phasing of the work. Test to ensure that there are no leaks, grounds, or crosses, test and establish proper motor rotation, measure full load running currents, and check overload elements. Existing motors that have been disconnected and reconnected must be checked with rotation meter and be responsible for any damage caused by reverse rotation. Demonstrate to the Consultant that branch circuit voltage drop is within specified limits.
- .2 Grounding and Bonding System Testing:
 - .1 Provide visual and mechanical inspection of the grounding and bonding system and verify that the system follows Electrical Code requirements.
- .3 Branch Circuit Balancing:
 - .1 Connect branch circuits to panelboards to balance the actual loads (wattage) to within 5%. If required, transpose branch circuits to achieve this requirement. After the building is occupied and if requested by the Consultant, demonstrate that branch circuit balancing has been achieved.
- .4 Site Tests and Inspections:
 - .1 Test all equipment and wiring at any time requested by the Consultant as part of the Contract. Provide all meters, materials and labour required to carry out this work. Prior to connection of additional loads to existing sources, ensure through load measurement and monitoring that the required excess capacity is available.
 - .2 Upon completion of the electrical installations, trial operate all equipment, systems and devices to ensure correct functioning. Following satisfactory trial operation, instruct the Owner's representative regarding operation and maintenance of the systems and equipment installed.
- .5 Integrated Systems Testing:

- .1 Complete integrated testing compliant with CAN/ULC-S1001 for all applicable systems. A qualified Integrated Testing Coordinator shall complete an Integrated Testing Report sealed by the Integrated Testing Coordinator to show compliance with CAN/ULC-S1001 Standard for Integrated Systems Testing.
- .2 The Integrated Testing Coordinator is the person, firm, corporation, or organization responsible for the development and implementation of the integrated testing plan. Where a firm, corporation, or organization is responsible for integrated fire protection and life safety systems testing, a representative of that firm, corporation, or organization shall be designated as the integrated testing coordinator. Qualifications required for this position is a professional engineer licensed in the site jurisdiction.
- .6 Third-party Agencies:
 - .1 Technician performing Fire Alarm testing and verification to have a minimum of 5 years' continuous Canadian experience successfully testing projects similar in size and complexity as the Work of this Section. Technician to be a registered CFAA Fire Alarm Technician. Submit proof of experience and credentials upon Consultant's request.
 - .2 Fire Alarm Verification must be carried out by an agency (or individual) acceptable to the Authority Having Jurisdiction, who can demonstrate they have the sufficient training or experience, and who is not the installing contractor, supplier/integrator, fire alarm manufacturer, or involved in the design or installation of the fire alarm system.
 - .3 Employ fully trained mechanics who are regularly employed in the field of graphics design and/or sign production to create the fire alarm zoning graphic. Arrange for production of all graphic material. Fabrication of the graphic display shall be by an approved signage supplier or the fire alarm supplier.

3.6 CLEANING

- .1 Upon completion of the work, clean all equipment and remove from the site all electrical debris. Where work is being performed in occupied spaces, make safe, replace all removable ceiling tiles, clean all equipment and remove from the site all electrical debris at the end of each shift.
- .2 Separate and recycle waste materials in accordance with requirements of Canadian Construction Association Standard Document CCA 81, A Best Practices Guide to Solid Waste Reduction. Do not let waste materials accumulate at the site.

END OF SECTION

APPENDIX A

Asbestos Audit Report



March 15, 2013
MTE File No.: 34532-700

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

**Re: 2013 Asbestos Audit Update – Jacob Hespeler Secondary School
355 Holiday Inn Drive, Cambridge, ON**

1.0 INTRODUCTION & SCOPE OF WORK

MTE Consultants Inc. (MTE) was authorized by the Waterloo Region District School Board (WRDSB) to conduct the 2013 asbestos audit update of Jacob Hespeler Secondary School, located at 355 Holiday Inn Drive in Cambridge, Ontario.

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 2013 audit update 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), and required under section 8(5)a in order for WRDSB to meet regulatory requirements for an annual update. This report shall replace MTE's previous report entitled, "2010 Asbestos Audit Update Jacob Hespeler Secondary School, 355 Holiday Inn Drive in Cambridge, Ontario" dated March 5, 2010.

Authorization to proceed with the assignment was provided to MTE by the WRDSB.

The 2013 audit update process involved the following:

- Review of existing reports and documentation pertaining to ACM within the building;
- Visual inspection to confirm complete removal of all previously identified ACM; and
- Preparation of this report.

2.0 MTE BUILDING INSPECTION

Inspection of the building on a room-by-room basis was completed by MTE on January 18, 2013. The inspection was non-invasive, whereby ACM could be concealed by, but not necessarily limited to; ceilings, walls, bulkheads, floors, roof systems, and/or other similar features.

2.1 Building Characteristics

The three-storey building is comprised of a poured concrete foundation with concrete block walls an open web steel joist structure with a corrugated metal pan deck. The exterior finishes include a brick veneer with a steel roof (with fiberglass batting insulation). The original building was constructed in 1986 and additions and renovations were completed in 1991, 2002 and 2004.

Interior floor finishes include exposed concrete slab, 12" x 12" vinyl floor tiles, vinyl sheet flooring, ceramic tile and carpet. Wall finishes are comprised of drywall, concrete block and ceramic tile. Ceiling finishes include drywall, textured finish, 2' x 4' lay-in acoustic ceiling tile, exposed metal pan deck and concrete deck.

3.0 ASBESTOS-CONTAINING MATERIALS

3.1 Asbestos-Containing Materials Removed Since 2011 Audit

Table 1 provides a summary of ACM that has been removed since the previous inspection as a result of scheduled abatement work.

TABLE 1: REMOVED ACM

Room Number	Room Description	ACM	Approximate Quantity	Date Removed
1057	Mechanical Room C	Parging on Pipe Insulation	All	Unknown
2115	Classroom C214			
2114	Classroom C218			
3041	Mechanical Room A			

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on findings of this assignment, previously identified ACM has been completely removed, and no other ACMs are present. Asbestos audit updates and an Asbestos Management Plan (AMP) are no longer required for this building.

5.0 LIMITATIONS

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

This report was completed for the sole use of MTE and Waterloo Region District School Board. It was completed in accordance with the Scope of Work. As such, this report may not deal with all issues potentially applicable to the site and may omit issues, which 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.

Some areas could not be investigated due to non-destructive, non-invasive, inspection restrictions or prohibited access. Although the presence of asbestos-containing materials has been anticipated in these areas where reasonable, the accuracy of such information must be confirmed before any potential disturbance of materials which may contain asbestos. It is also possible that ACM may be visually or physically concealed by but not necessarily limited to ceilings, walls, bulkheads, floors, roof systems or other similar features or structures.


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 may 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.

Sincerely,
MTE CONSULTANTS INC.



Aisling Dennett, B.A., CET, LEEP AP O+M
Building Health Science Technologist
adennett@mte85.com



Martin Mielke, B.Sc., AMRT, CRSP
Senior Building Health Science Technologist
mmielke@mte85.com

AND:plw

24-7531-RFT - Jacob Hespeler Secondary School Heat Pump Replacement

Opening Date: February 29, 2024 4:00 PM

Closing Date: March 26, 2024 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	Jacob Hespeler Secondary School Heat Pump Replacement as per scope of work	Lump Sum	1		
Subtotal:					

Summary Table

Bid Form	Amount
Bid Price Form	
HST (13%)	\$ 0.00
Total Contract Amount:	

Bid Questions

Bill S-211 - This enactment enacts the Fighting Against Forced Labour and Child Labour in Supply Chains Act, which imposes an obligation on certain government institutions entities to ensure measures are taken to prevent and reduce the risk that forced labour or child labour is used by suppliers or in their supply chains. The Board principles align with Bill S-211. Please confirm that your organization will comply with this Act. YES or NO. If no, please explain.

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. By responding NO, you acknowledge the deadline requirement above. 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				*
Optional - Alternative Site Supervisor in the event the Site Supervisor listed above is assigned to another WRDSB Project.				

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 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.