Waterloo Region
District School Board

REQUEST FOR TENDER

24-7547-RFT

Suddaby Public School - New Elevator, Sprinklers, and Accessibility

ISSUE DATE: March 19, 2024

ELECTRONIC SUBMISSIONS will be received by the Bidding System no later than
2:00 p.m. local time, on April 10, 2024

DIVISION 00 – BIDDING AND CONTRACT DOCUMENTS

00 01 00 Consultant/Professional Seals

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

1.1.1 Architect

1.1.2 Structural

1.1.3 Mechanical

1.1.4 Electrical

END OF SECTION

DIVISION 00 – BIDDING AND CONTRACT DOCUMENTS

00 21 13 Instructions to Bidders

1. Designated Contact

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

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

Procurement Lead: Ardith Inapan
Title: 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: ABA Architects Inc.

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

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

3. Blackout Period

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

4. Communication and Question Protocol

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

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

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

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

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

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

5. Doing Business with the Waterloo Region District School Board

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

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

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

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

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

6. Anticipated Project Schedule

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

DESCRIPTION	DATE
Issue Date of Tender	March 19, 2024
Non-Mandatory Pre-Bid Site Examination	Date: Monday, March 25, 2024 Time: 3:45 PM 171 Frederick Street, Kitchener ON Side Door/Main Entrance
Deadline for Questions	April 4, 2024
Closing Date and Time	April 10, 2024, 2:00 pm local time
Anticipated Contract Start / Work begins	July 2, 2024
Occupancy Phase 1	August 27,2024 – Refer to Project Schedule on A1.3
Occupancy Phase 2	August 25, 2025 – Refer to Project Schedule on A1.3
Substantial Completion Date	October 24, 2025
Ready for Takeover	REFER TO PROJECT SCHEDULE ON A1.3.
Deemed Complete Date	December 1, 2025

7. Pre-Bid Site Examination

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

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

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

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

8. Secondary Site Examinations

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

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

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

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

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

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

9. Examination of Bid Documents and Work and Submitting Questions

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

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

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

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

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

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

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

10. Electronic Bid Submission Only / Electronic Bidding System

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

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

i. In order to submit a bid, bidders must be registered with bids&tenders. The sole onus is on the bidder to have the most current correct information set-up in Bids and Tenders including but not limited to plan taker contact information, categories, and agency.

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

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

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

v. The onus is on the Bidder to ensure that the Bid is received in the Bidding System on or before the Closing Time. The Closing Time shall be determined by the Bidding System's web clock. The timing of the Bid submission shall be based on

when the Bid is received by the Bidding System, not when a Bid is submitted by a Bidder.

vi. Bidders shall allow sufficient time to upload their Bid submission including all requirements as stated in this Procurement and to resolve any issues that may arise as Bid transmission can be delayed in an "internet traffic jam" due to file transfer size, transmission speed, and other electronic considerations

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

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

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

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

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

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

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

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

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

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

11. Bid Prices

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

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

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

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

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

vi. All information required on the forms shall be completed in full including references and subcontractors that it proposes to use for Work described. Changes made to the list of nominated subcontractors after the closing of the Bid, must have prior written approval of the Board'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 $121,200 or more, and in accordance with the Broader Public Sector Procurement Directive, once the Board is satisfied that all requirements are met, the project award notification will be posted in the same manner as the procurement documents were posted. The notification will be posted after the purchase order and/or agreement between the successful bidder and the Board has been issued/executed. The award notification will list the name of the successful bidder, agreement start and end dates, and any extension options.

END OF SECTION

00 21 14 – General Contractors and Subcontractors

1.0 General 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

ABA Architects Inc. was solicited to complete the design and act as the Prime Consultant for Suddaby Public School Phase 3 Renovation. This renovation includes, but is not limited to; sprinkler entire school, rework fire alarm for new fire route, limited site work to facilitate new fire alarm scope, elevator serving the main areas of all 3 school levels, universal and staff washrooms, staff lounge, new basement classroom, and a renovated academic storage room. Refer to all documents for complete scope of work. Schedule and delivery are clearly indicated on contract documents. All student/staff/teacher areas that are accessible must be complete at noted deadlines, and have occupancy granted. All work occurring between September 2024 and June 2025 is to be completed after hours, or in hoarded areas as indicated in Contract Documents. All after hours work is to be included in the overall contract cost.

END OF SECTION

00 31 34 – Subsurface Investigation Report

1.0 General

1.1. Related Sections

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

1.2. SUBSURFACE INVESTIGATION REPORT

.1 An investigation report with respect to the applicable building site and important immediate affected surroundings, is titled as follows:

.1 Title: GEOTECHNICAL INVESTIGATION PROPOSED ELEVATOR AT SUDDABY PUBLIC SCHOOL

.2 Dated: NOVEMBER 1, 2024

.3 Prepared By: CHUNG AND VANDER DOELEN ENGINEERING LTD.

GEOTECHNICAL REPORT INSERTED AT END OF SPECIFICATION BOOK

.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. REFER TO SUBSURFACE INVESTIGATION REPORT

00 41 13A – Asset and Warranty Card

WRDSB PROJECT ASSET & WARRANTY CARD

Instructions:

a. The WRDSB Project Asset & Warranty Card shall be filled out and completed for any project or work that calls for the replacement or new installation of any asset that has a warranty and requires ongoing preventative maintenance, as well any asset that is being removed.

b. The information for the WRDSB Project Asset & Warranty Card shall be collected and coordinated by the General Contractor responsible for the overall project. The WRDSB Project Asset & Warranty Card shall be filled out and submitted to the Board electronically to FAC_maintenance@wrdsb.ca and carbon copy the project coordinator at the point in time where the project is deemed "Substantially Complete" or at the start of the Warranty Period for said asset. For any project without a General Contractor, the Contractor or Trade responsible for the installation and/or removal of the asset shall complete the WRDSB Project Asset & Warranty Card and submit it to the Board in the same manner as mentioned above.

c. All items shall include the asset identifier, asset description, location, manufacturer, model, serial number, and warranty end date (refer to example at bottom of page).

d. NO Warranty Period shall start without the written permission of the Board prior to the point of Substantial Completion of the project.

e. The Contractor that is responsible for the coordination and completion of the WRDSB Project Asset & Warranty Card shall ensure that the contractor or trade responsible for the installation of the item understands that the contractor or trade is responsible for the preventative and general maintenance of that item for the minimum 2 year warranty period as noted on the WRDSB Project Asset & Warranty Card.

f. **All** items installed under this contract that require ongoing preventative maintenance (PM) shall be included on the WRDSB Project Asset & Warranty Card. The following list contains examples to be included but not limited to;

Air Compressor	Chiller	Grease Trap
Air Handler- ERV, Heat Pump, RTU	Cooling Tower	Gym Equipment
AC Split -Indoor/Outdoor Unit	Elevator/Lift	Hoods- Kitchen/Fume
Automatic Doors	Eyewash Station-location only	Operable Partitions
Backflow Preventer	Fire Panel	Sprinkler System -area covered
Boiler		Tech Equipment

g. All maintenance during the warranty period shall be the responsibility of the contractor. This shall include, but not be limited to: air handling unit filter changes (3x min.per year), or as per manufacturers recommendations; servicing testable backflow preventors, including fees; and any and all required maintenance.

Sample:

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

WRDSB Project Asset & Warranty Card

Project Name: _____

School / Location: _____

Date: _____

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

00 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 if 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
NA	

00 56 13 – Definitions Stipulated Price

1.1. Definitions Declaration

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

.2 These Definitions are bound to the CCDC 2 Definitions and CCDC 2 General Conditions.

1.2. Supplementary Words and Terms to CCDC 2-2020

.1 The following words and terms are additional to the CCDC 2 Definitions.

.2 Addendum: A document that amends the Bid Documents during the Bidding Period and becomes part of the Contract Documents when a Contract is executed. (Plural: Addenda).

.3 Agreement: The signed and sealed legal instrument binding parties in a Contract, describing in strict terms their mutual arrangement, roles and responsibilities, commencement, and completion responsibilities.

.4 Alternative Price: The amount stipulated by a Bidder for an Alternative and stated as an addition, a deduction, or no change to the Bid Price.

.5 Authorities: Those having jurisdiction under law over Work or Parts thereof.

.6 Bid: To offer as a Bid stating for what price a Contractor will assume a Contract.

.7 Bid Documents: A set of documents consisting of the Instructions to Bidders, Bid Form, Contract Documents, and other information issued for the benefit of Bidders to prepare and submit a Bid.

.8 Bid Form: The specific and detailed form used to collect information about a Bid.

.9 Bidding: The process of preparing and submitting a Bid.

.10 Construction Documents: The Drawings and Project Manual. When combined with a Contract and Contract conditions, these documents form the Contract Documents.

.11 Contingency Allowance: An additional monetary amount added to a Project cost estimate and designated to cover unpredictable or unforeseen items of Work. The amount is usually based on some percentage of the estimated cost and expended and adjusted by Change Order. It is not intended to cover additions to the scope of Work.

.12 General Conditions: That part of the Contract Documents which sets forth many of the rights, responsibilities and relationships of the parties involved in a Contract.

.13 Exposed: Visible at completion of Work, in usable areas as well as interior of closets, cabinets, drawers, storage and service rooms, stairwells and exterior surfaces.

.14 Instructions To Bidders: Instructions contained in the Bid Documents to convey an Owner's expectations and criteria associated with submitting a Bid.

.15 Ready for Takeover: *Ready-for-Takeover* shall have been attained when the conditions set out in GC12.1, SC 55.1 , 12.1.1

.16 Section: A portion of a Project Specification covering one or more segments of the total Work or requirements. Sections are included in a Project manual as required to meet Project requirements.

.17 Standard: A document describing a grade or a level of quality, which has been established by a recognized agency or organization, utilizing an internal voting process.

.18 Separate Price: A separate price for work to be added to the base price if selected by the Owner. This price type is not a part of the base bid price.

.19 Stipulated Price: An amount set forth in a Stipulated Price Contract as the total payment for the performance of the Work. Sometimes referred to as a stipulated sum or a lump sum stipulated price.

.20 Tender: Refer to definition of Bid.

.21 Unit Price: The amount payable for a single unit of Work as stated in a Schedule of Prices.

.22 Install: To remove from site storage, move or transport to intended location, install in position, connect to utilities, repair site caused damage, and make ready for use.

.23 Supply: To acquire or purchase, ship or transport to the site, unload, remove packaging to permit inspection for damage, re-package, replace damaged items, and safely store on-site.

.24 Provide: To Supply and Install

.25 Wherever words 'approved', 'selected', 'satisfactory', 'directed', 'permitted', 'inspected', 'instructed', 'required', 'submit', 'ordered', 'reviewed', 'reported to', or similar words or phrases are used in Contract Documents, it shall be understood, unless context provides otherwise, that words 'by Consultant' or 'to Consultants' follow.

.26 Words 'by others' when used in Specifications or on Drawings shall not mean by someone other than Contractor. Only means by which something shown or specified shall be indicated as not being in Contract is by initials 'NIC' or words 'not in Contract', 'by Owner', or 'by Other Contractor'.

END OF SECTION

00 72 13 – Standard Terms and Conditions

1. Applicable Terms and Conditions

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

2. Bankruptcy

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

3. Basis of Award (Price factor)

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

4. Bonding Requirements

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

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

i. Bid Amount

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

ii. Bid Deposit Bond & Agreement to Bond

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

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

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

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

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

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

iii. Performance and Labour & Materials Bonds

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

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

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

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

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

5. Business Code of Conduct for Board Employees

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

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

6. Code of Conduct for Vendors/Contractors

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

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

ii. **Language and Behavior**: vendors/contractors and their employees cannot engage in behavior that is rude, threatening, or offensive. Use of profane or insulting language is prohibited. Harassment of any type, including sexual harassment is strictly prohibited. Abusive, derogatory, obscene or improper

language, gestures, remarks, whistling, cat calls or other disrespectful behavior cannot be tolerated. Rough housing, fighting, fisticuffs, physical threats, destruction of property, vandalism, littering, or physical abuse of anyone on WRDSB property are not permitted under any circumstance.

iii. **No Weapons, Alcohol, or Drugs**: The use, possession, distribution, or sale of any weapon, alcohol, illegal drug, or controlled dangerous substance by any contractor or contractor's employee is prohibited. Offenders will be removed from WRDSB property and/or reported to the local Police Department.

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

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

vi. **Appearance**: Vendor/Contractors and their employees are required to wear appropriate work wear, hard hats and safety footwear, as the case may be, while on WRDSB property. Articles of clothing must be neat and tidy in appearance, and cannot display offensive or inappropriate language, symbols or graphics. WRDSB has the right to decide if such clothing is inappropriate.

vii. **Reporting**: The Vendor/Contractor is required to report any matter involving a violation of these rules of conduct, any matter involving health or safety, including any altercations, to WRDSB Facilities staff.

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

7. Compliance with Laws, Acts and Regulations

Vendor/Contractors shall abide by all applicable provincial and federal laws, as well as Board Policies. Some of the applicable laws are highlighted below for information purposes only. In case of any discrepancy between this Bid Solicitation Document and the provision of applicable laws, the latter shall prevail. This list is not intended to be a comprehensive summary of relevant laws or be a complete list of applicable regulations or interpretation of the provisions of any laws

i. Broader Public Sector Accountability Act, 2010
ii. Building Ontario Businesses Initiative Act, 2022
iii. Construction Act
iv. Architect Act
v. Canada Revenue Agency (CRA) regulations
vi. Accessibility for Ontarians with Disabilities Act (AODA)

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

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

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

The successful Bidder(s) will be required to comply with all applicable federal, provincial laws as well as Board policies in performing its obligations under the Contract including, without limitation, the Occupational Health and Safety Act, as amended, and the Workplace Safety and Insurance Act, 1997, as amended, and Accessibility for Ontarians With Disabilities Act, 2005, S.O. 2005, c.11, Accessibility Standards for Customer Services O. Reg. 429/07 requirements, under the Accessibility for Ontarians With Disabilities Act, 2005, as amended, or any successor legislation applicable, and to provide to the Board, upon request, periodic reports and evidences confirming such compliance.
By supplying the goods or equipment and/or providing services, the Vendor warrants that the goods or equipment supplied, and services provided to the Board conforms in all respects to the standards and codes set forth by federal and provincial agencies. Failure to comply with this condition will be considered a breach of this Contract.

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

8. Confidential Information and Municipal Freedom of Information and Protection of Privacy Act

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

Bidders shall identify any confidential information in their Bid Submission. The Board will make reasonable efforts to safeguard confidential information, subject to its disclosure requirements under MFIPPA or any other disclosure requirements imposed by law or by

order of a court or competent tribunal. Bidders are advised that their Bid submissions may be disclosed, on a confidential basis, to advisers retained by the Board to advise or assist with the Bid process, including the evaluation of Bid submissions.

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

9. Confirmation to Proceed

No work shall commence until the Board has issued a purchase order and/or contract, if applicable to the successful Bidder. Goods/Service or Work as described shall not commence until all the required documents have been submitted to Procurement Services and the Form of Agreement and/or the CCDC 2 - 2020 if applicable, are executed by the Successful Bidder and the Board. For payment purposes, a Purchase Order shall be generated and issued to the Successful Bidder. The Purchase Order number must appear on all invoices in order to ensure prompt payment.

10. Conflict of Interest

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

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

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

The Vendor/Contractor covenants and agrees that it will not hire or retain the services of any employee or previous employee of the Owner where to do so constitutes a breach by

such employee or previous employee of the Owner's conflict of interest policy, as it may be amended from time to time, until after completion of the Work/Services under the Contract.

It is of the essence of the Contract that the Owner shall not have direct or indirect liability to any Subcontractor or Supplier, and that the Owner relies on the maintenance of an arm's-length relationship between the Vendor/Contractor and its Subcontractors and Suppliers. Consistent with this fundamental term of the Contract, the Vendor/Contractor will not enter into any agreement or understanding with any Subcontractor or Supplier, whether as part of any contract or any written or oral collateral agreement, pursuant to which the parties thereto agree to cooperate in the presentation of a claim for payment against the Owner, directly or through the Vendor/Contractor, where such claim is, in whole or in part, in respect of a disputed claim by the Subcontractor or Supplier against the Vendor/Contractor, where the payment to the Subcontractor or Supplier by the Vendor/Contractor is agreed to be conditional or contingent on the ability to recover those amounts or a portion thereof from the Owner, failing which the Vendor/Contractor shall be saved harmless from all or a portion of those claims. The Vendor/Contractor acknowledges that any such agreement would undermine the required arm's-length relationship and constitute a conflict of interest. For greater certainty, the Vendor/Contractor shall only be entitled to advance claims against the Owner for amounts pertaining to Subcontractor or Supplier claims where the Vendor/Contractor has actually paid or unconditionally acknowledged liability for those claims or where those claims are the subject of litigation or binding arbitration between the Subcontractor or Supplier and the Vendor/Contractor has been found liable for those claims.

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

11. Construction Act Guidelines

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

12. Criminal Background Checks and Collection of Personal Information

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

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

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

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

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

13. Damage Responsibility of Contractor/Vendor

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

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

Notwithstanding the indemnity provisions contained in this section, where in the opinion of the Board Representative the Vendor/Contractor has failed to rectify any damage, injury or infringement or has failed to adequately compensate any person for any damage, injury or infringement for which the Vendor/Contractor is responsible under the Contract, the Board, following notice in writing to the Vendor/Contractor of his intention so to do, may withhold payment of any monies due to the Vendor/Contractor under this or any other Contract until the Vendor/Contractor has rectified such damage, injury or infringement or has paid adequate compensation for such damage, injury or infringement.

14. Damage Reporting

If a utility structure or device, utility cable/conduit, or utility related infrastructure is damaged, the Vendor/Contractor shall notify the Board representative the same working day of any service disruption or damage and the Vendor/Contractor will immediately

notify the utility company to initiate repair. The Vendor/Contractor will additionally make every reasonable effort to advise impacted resident(s) of a service disruption.

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

15. Debriefing Requests

For procurements valued at $100,000 or more, and in accordance with the Broader Public Sector Procurement Directive, unsuccessful Bidders are entitled to a debriefing to receive feedback with respect to their Bid submission. To obtain a debriefing, Bidders shall contact the 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.), musts accompany all purchased goods, that fall under the requirements of the Occupational Health and Safety Act. The Board will not accept any additional charges or surcharges related to the supplying of M.S.D.S.

34. Mathematical Errors (Unit Prices Prevail)

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

35. No Branding

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

36. No Collusion

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

37. No Lobbying

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

i. any elected or appointed officer.
ii. any staff of the Board except the 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 themself, the costs involved shall be borne by the Vendor/Contractor. The Vendor/Contractor will be responsible for any fees that may be associated with these services.

53. Site Inspection and Control

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

54. Site Investigation

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

The Bidder assumes all risk of conditions, existing or arising, in the course of the work, which might or could make the work or any items therefore more expensive in character, or more onerous to fulfill, than was contemplated or known when the Bid was made, or the Contract signed.

55. Site Safety and Clean Up

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

Repair work will be carried out by skilled workers acceptable to the Board Representative, under the liability of the Vendor/Contractor.

The Board Authorized Representative must approve all repairs and replacements prior

to final payment.

56. Site Traffic/Pedestrian Safety

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

57. Site Use and Traffic Control

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

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

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

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

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

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

58. Suspension of Bidders

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

59. Sustainable Purchasing

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

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

60. Termination

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

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

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

61. Termination for Convenience

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

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

62. Termination for Lack of Funding

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

63. Tools and Equipment

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

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

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

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

It is the Vendor/Contractor's responsibility to ensure that the equipment and the operator, are licensed in accordance with the Ministry of Transportation. The Board may, at their discretion, require the Vendor/Contractor to provide proof that the equipment has passed a recent (within the last 12 months) government safety inspection and that the operators are suitably licensed prior to commencement of the contract. All vehicles, tools, equipment, and voltage rated gloves requiring dielectric testing shall have current certification and all applicable documentation.

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

64. Usage Reports

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

65. Variation of Bid Prices

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

66. Volume and Exclusivity

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

67. Waiver

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

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

68. Warranty and Maintenance

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

69. Work Continuity

The Vendor/Contractor shall take adequate care to protect the Work, the Board's property, adjacent properties and shall be fully responsible for any damage or injury due

to their act or neglect or is attributable to the acts or omissions of the Vendor/Contractor, its subcontractors, suppliers, agents, employees, officers, directors, and all other persons and other entities for whose acts the Vendor/Contractor may be liable or for whom it is responsible in law and their respective officers, directors, agents and employees.

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

70. Work Requirements

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

71. Workplace Safety Insurance Board (WSIB) Certificate

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

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

WSIB Certificate evidencing renewal or replacement of Certificates shall be uploaded through the Bidding System within 72 hours of the expiration or replacement of the current certificate, without demand by the Board.

END OF SECTION

00 73 00 "The Supplementary Conditions"

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

(the "Supplementary Conditions")

AGREEMENT, DEFINITIONS, AND

GENERAL CONDITIONS

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

AGREEMENT BETWEEN OWNER AND CONTRACTOR

ARTICLE A-1 – THE WORK

SC17.1	A-1.3	Amend Article A-1.3 by deleting all of the words after *"Contract Documents"* and replace them with the following" "attain .1 *Substantial Performance of the Work* by the 24TH day of October in the year 2025. .2 *Occupancy* – Refer to Schedule on A1.3 and .3 *Ready-for-Takeover – Refer to Schedule on A1.3*."
SC1.1		

ARTICLE A-3 – CONTRACT DOCUMENTS

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

ARTICLE A-4 – CONTRACT PRICE

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

ARTICLE A-5 – PAYMENT

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

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

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

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

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

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

SC6.1	Article A-10	Add the following new Article A-10 as follows: **"ARTICLE A-10 TIME OF THE ESSENCE** 10.1 It is agreed that one of the reasons the *Contractor* was selected by the *Owner* for this *Contract* is the *Contractor's* representation and covenant that it will attain *Substantial Performance, Occupancy (*if applicable), and *Ready-for-Takeover* within the *Contract Time* stated in Article A-1 of this *Contract*. 10.2 The *Contractor* acknowledges and agrees that it is responsible to marshal its resources and those of its *Subcontractors and Suppliers* in a manner which will permit timely attainment of *Substantial Performance, Occupancy (*if applicable), and *Ready-for-Takeover*. The *Contractor* agrees that time is of the essence of this *Contract*." 10.3 The Contractor shall pay to the Owner compensation for all additional costs and damages borne by the Board to cover costs incurred due to delay beyond contract timelines, until Ready-for-Takeover is achieved and certified pursuant to the terms of the Contract. Liquidated damages will be assessed as incurred and amounts will be payable directly to the Board. Additional costs may include, but are not limited to: temporary classrooms, temporary washrooms, additional staff, etc.
SC6.2		

DEFINITIONS

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

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

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

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

	Restricted Period	Add the following definition: "**Restricted Period** *Restricted Period* means the (inclusive) period of time between December 1 to January 8 and August 15 to September 15 of any given year throughout the duration of the *Contract*."

GENERAL CONDITIONS OF THE STIPULATED PRICE CONTRACT

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

PART 1 GENERAL PROVISIONS

GC 1.1 CONTRACT DOCUMENTS

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

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

GC 1.3 RIGHTS AND REMEDIES

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

***NEW* GC 1.5 EXAMINATION OF DOCUMENTS AND SITE**

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

PART 2 ADMINISTRATION OF THE CONTRACT

GC 2.2 ROLE OF THE CONSULTANT

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

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

GC 2.3 REVIEW AND INSPECTION OF THE WORK

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

GC 2.4 DEFECTIVE WORK

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

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

PART 3 EXECUTION OF THE WORK

GC 3.1 CONTROL OF THE WORK

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

GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

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

GC 3.3 TEMPORARY WORK

SC14.1	3.3.2	In paragraph 3.3.2, in the second line after the words "where required by law", insert "or by the *Consultant*".

GC 3.4 CONSTRUCTION SCHEDULE

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

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

GC 3.5 SUPERVISION

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

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

GC 3.6 SUBCONTRACTORS AND SUPPLIERS

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

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

GC 3.7 LABOUR AND PRODUCTS

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

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

GC 3.8 SHOP DRAWINGS

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

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

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

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

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

"

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

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

***NEW* GC 3.11 CLEAN UP**

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

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

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

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

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

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

PART 4 ALLOWANCES

GC 4.1 CASH ALLOWANCES

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

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

PART 5 PAYMENT

GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

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

GC 5.2 APPLICATIONS FOR PAYMENT

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

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

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

GC 5.3 PAYMENT

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

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

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

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

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

.14 spare parts;
.15 samples;
.16 existing reports and correspondence from authorities having jurisdiction in the *Place of the Work*;
.17 inspection certificates;
.18 red-lined record drawings from the construction trailer in two copies and
.19 other materials or documentation required to be submitted under the *Contract.*

5.4.3 The *Consultant* will review the *Work* to verify the validity of the application and shall promptly, and in any event, no later than 30 calendar days after receipt of the *Contractor's* complete deficiency list and application:

.1 prepare a final deficiency list incorporating all items to be completed or corrected, including any incomplete or unsubmitted *Close-Out Documentation*. Each item shall have an indicated value for correction or completion and the determination of the total value of such items shall be determined pursuant to GC 5.8 – DEFICIENCY HOLDBACK. The final deficiency list complete with values is to be included with the *Consultant's* draft verification and shall be reviewed with the *Owner* prior to the *Consultant* rendering a determination in accordance with GC 5.4.3.2

.2 having completed the requirements set out in GC 5.4.3.1,

(a) the *Consultant* shall advise the *Contractor* in writing that the *Work* or the designated portion of the *Work* is not substantially performed and give reasons why, or

(b) the *Consultant* shall state the date of *Substantial Performance of the Work* in a certificate and issue a copy of that certificate to each the *Owner* and the *Contractor.*

5.4.4 Following the issuance of the certificate of *Substantial Performance of the Work* referenced in subparagraph 5.4.3.2(b):

.1 The Contractor shall publish, in a construction trade newspaper in the area of the location of the Work, a copy of the certificate of S*ubstantial Performance of the Work* referred to in GC 5.4.2.2(b) within seven (7) calendar days of receiving a copy of the certificate signed by the *Consultant*, and the *Contractor* shall provide suitable evidence of the publication to the *Consultant* and the *Owner*. If the Contractor fails to publish such notice, the Owner shall be at liberty to publish said certificate and back-charge the Contractor its reasonable costs for doing so;

.2 The *Contractor* shall complete the *Work* within forty (40) calendar days of the date certified as the date of *Substantial Performance of the Work*;

.3 Notwithstanding any other provisions of the *Contract,* no payments will be processed between *Substantial Performance of the Work* and *Ready-for-Takeover*;

.4 The *Owner* reserves the right to contract out any or all unfinished *Work* if it has not been completed within forty (40) days of *Substantial Performance of the Work* using, without limitation, the funds retained in accordance with GC 5.8 - DEFICIENCY HOLDBACK, without prejudice to any other right or remedy and without affecting

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

GC 5.5 FINAL PAYMENT

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

to the requirement in GC 5.2.1 (the "***Final Pre-Invoice Submission Meeting***"), the *Contractor* may submit an application for final payment to the *Owner* and to the *Consultant*, which application for payment shall:

.1 include all of the requirements set out in GC 5.2.2, including without limitation those requirements listed in APPENDIX "1" - PROJECT SPECIFIC REQUIREMENTS FOR A PROPER INVOICE that are specific to an application for final payment; and

.2 if applicable, (a) a certificate from the *Consultant* or written confirmation from the *Owner* that the deficiencies or incomplete *Work* waived by the *Owner* pursuant to GC 12.1.2 have been fully rectified as of the date of the *Contractor's* application for final payment, and/or (b) written confirmation, signed by the *Owner* and the *Contractor,* that the *Contract Price* has been reduced by a specified amount in exchange for the *Owner* releasing the *Contractor* of its obligation to rectify the certain outstanding deficiencies and/or incomplete *Work* waived by the *Owner* pursuant to GC 12.1.2, as detailed in such written confirmation.

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

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

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

.1 the *Consultant* will either:

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

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

.2 the *Owner* shall make payment to the *Contractor* on account as provided in Article A-5 PAYMENT,

(a) in the amount stated in the certificate for payment, or

(b) in the amount stated in the certificate for payment less such amount stated in the *Owner's Notice of Non-Payment* issued pursuant to GC 5.5.5,

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

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

GC 5.6 DEFERRED WORK

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

***NEW* GC 5.8 DEFICIENCY HOLDBACK**

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

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

PART 6 CHANGES IN THE WORK

GC 6.1 OWNER'S RIGHT TO MAKE CHANGES

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

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

GC 6.2 CHANGE ORDER

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

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

GC 6.3 CHANGE DIRECTIVE

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

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

GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

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

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

GC 6.5 DELAYS

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

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

PART 7 DEFAULT NOTICE

GC 7.1 OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK OR TERMINATE THE CONTRACT

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

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

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

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

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

PART 8 DISPUTE RESOLUTION

GC 8.1 AUTHORITY OF THE CONSULTANT

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

GC 8.2 ADJUDICATION

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

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

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

GC 8.3 NEGOTIATION, MEDIATION AND ARBITRATION

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

PART 9 PROTECTION OF PERSONS AND PROPERTY

GC 9.1 PROTECTION OF WORK AND PROPERTY

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

GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

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

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

GC 9.4 CONSTRUCTION SAFETY

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

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

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

PART 10 GOVERNING REGULATIONS

GC 10.1 TAXES AND DUTIES

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

GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

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

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

GC 10.4 WORKERS' COMPENSATION

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

GC 11.1 INSURANCE

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

General liability insurance shall be in the name of the *Contractor,* with the *Owner* and the *Consultant* named as Additional insureds, with limits of not less than $5,000,000.00 inclusive per occurrence for bodily injury, death, and damage to property, including loss of use thereof, for itself and each of its employees, *Subcontractors* and/or agents. The insurance coverage shall not be less than the insurance required by IBC Form 2100, or its equivalent replacement, provided that IBC Form 2100 shall contain the latest edition of the relevant CCDC endorsement form. To achieve the desired limit, umbrella, or excess liability insurance may be used. All liability coverage shall be maintained for completed operations hazards from the date of *Ready-for-Takeover*, as set out in the certificate of *Ready-for-Takeover,* on an ongoing basis for a period of 6 years following *Ready-for-Takeover*. Where the *Contractor* maintains a single, blanket policy, the Addition of the *Owner* and the *Consultant* is limited to liability arising out of the *Project* and all operations necessary or incidental thereto. The policy shall be endorsed to provide the *Owner* with not less than 30 days' notice, in writing, in advance of any cancellation and of change or amendment restricting coverage.

.2 **Automobile Liability Insurance**

Automobile liability insurance in respect of licensed vehicles shall limits of not less than $2,000,000.00 inclusive per occurrence for bodily injury, death and damage to property, covering all licensed vehicles *owned* or leased by the *Contractor*, and endorsed to provide the *Owner* with not less than 30 days' notice, in writing, in advance of any cancellation, change or amendment restricting coverage. Where the policy has been issued pursuant to a government-operated automobile insurance system, the *Contractor* shall provide the *Owner* with confirmation of automobile insurance coverage for all automobiles registered in the name of the *Contractor.*

.3 **Aircraft and Watercraft Liability Insurance**

Intentional Deleted. Not Applicable

.4 Property and Boiler and Machinery Insurance

(1) Builder's Risk property insurance shall be in the name of the *Contractor* with the *Owner* and the *Consultant* named as Additional insureds. The policy shall insure against all risks of direct physical loss or damage to the property insured which shall include all property included in the *Work*, whether owned by the *Contractor* or the owner or owned by others, so long as the property forms part of the *Work*. The property insured also includes all materials and supplies necessary to complete the work, whether installed in the work temporarily or permanently, in storage on the project site, or in transit to the project site, as well as temporary buildings, scaffolding, falsework forms, hoardings, excavation, site preparation and similar work. The insurance shall be for not less than the sum of the amount of the contract price and the full value of products that are specified to be provided by the owner for incorporation into the work, if applicable, with the deductible of $10,000.00 payable by the contractor. The insurance shall include the foregoing and, otherwise, shall not be less than the insurance required by IBC Form 4042 or its equivalent replacement provided that the IBC Form 4042 shall include the latest Addition of the relevant CCDC endorsement form. The coverage shall be based on a completed value form and shall be maintained continuously until ten (10) days after the date of the final certificate of payment.

(2) Boiler and machinery insurance shall be in the name of the *Contractor*, with the *Owner* and the *Consultant* named as Additional insureds, for not less than the replacement value of the boilers, pressure vessels and other insurable objects forming part of the *Work*. The insurance provided shall not be less than the insurance provided by the "Comprehensive Boiler and Machinery Form" and shall be maintained continuously from commencement of use or operation of the property insured and until 10 days after the date of the final certificate for payment.

(3) The policies shall allow for partial or total use or occupancy of the *Work.*

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

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

(6) In the case of loss or damage to the *Work* arising from the work of other contractors, or the *Owner's* own forces, the *Owner*, in accordance with the *Owner's* obligations under paragraph 3.2.2.4 of GC 3.2 – CONSTRUCTION BY OWNER OR OTHER CONTRACTORS, shall pay the *Contractor* the cost of restoring the *Work* as the restoration of the *Work* proceeds and as provided in GC 5.2 – APPLICATIONS FOR PROGRESS PAYMENT and GC 5.3 – PROGRESS PAYMENT.

.5 Contractors' Equipment Insurance

"All risks" contractors' equipment insurance covering construction machinery and equipment used by the *Contractor* for the performance of the *Work*, excluding boiler insurance, shall be in a form acceptable to the *Owner* and shall not allow subrogation claims by the insurer against the *Owner.* The policies shall be endorsed to provide the *Owner* with not less than 30 days' notice, in writing, in advance of cancellation, change or amendment restricting coverage. Subject to satisfactory proof of financial capability by the *Contractor* for self-insurance of his equipment, the *Owner* agrees to waive the equipment insurance requirement.

11.1.2 The *Contractor* shall be responsible for deductible amounts under the policies except where such amounts may be excluded from the *Contractor's* responsibility by the terms of GC 9.1 - PROTECTION OF WORK AND PROPERTY and GC 9.2 - DAMAGES AND MUTUAL RESPONSIBILITY.

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

***NEW* GC 11.2 CONTRACT SECURITY**

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

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

PART 12 OWNER TAKEOVER

GC 12.1 READY-FOR-TAKEOVER

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

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

GC 12.2 EARLY OCCUPANCY

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

GC 12.3 WARRANTY

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

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

PART 13 INDEMNIFICATION AND WAIVER

GC 13.1 INDEMNIFICATION

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

GC 13.2 WAIVER OF CLAIMS

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

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

***NEW* PART 14 OTHER PROVISIONS**

SC58.1	14.1	Add new PART 14 – OTHER PROVISIONS as follows: “**PART 14 OTHER PROVISIONS** **GC 14.1 OWNERSHIP OF MATERIALS**

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

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

APPENDIX 1
to the Supplementary Conditions

Project-specific requirements for a "*Proper Invoice*"

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

.1 the written bill or request for payment must be in writing;

.2 the *Contractor*'s name and current address;

.3 the *Contractor*'s HST registration number;

.4 the date the application for payment was prepared by the *Contractor*;

.5 the period of time in which the services or materials were supplied to the *Owner*;

.6 the purchase order number provided by the *Owner*;

.7 reference to the provisions of the *Contract* under which payment is being sought (e.g. GC 5.3 –PAYMENTS for progress payments, GC 5.4 – SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK GC 5.5 – FINAL PAYMENT for final payment, etc.);

.8 a description, including quantities where appropriate, of the services or materials, or a portion thereof, that were supplied and form the basis of the *Contractor's* request for payment;

.9 the amount the *Contractor* is requesting to be paid by the *Owner*, set out in a statement based on the schedule of values approved under GC 5.2.4, separating out any statutory or other holdbacks, set-offs and HST;

.10 a sworn Statutory Declaration in the form CCDC 9A-2018, only for second and subsequent progress payments;

.11 a current Workplace Safety Insurance Board clearance certificate;

.12 a pre-approved schedule of values, supplied by the *Contractor*, for Divisions 1 through 14 of the *Specifications* (or equivalent Construction Specifications Institute Masterformat) of the *Work*, aggregating the total amount of the *Contract Price*, including all supporting invoicing;

.13 a separate pre-approved schedule of values, supplied by each *Subcontractor*, for each of Division 15, 16, and 17 of the *Specifications* (or equivalent Construction Specifications Institute Masterformat) of the *Work*, aggregating the total amount of the *Contract Price*, including all supporting invoicing;

.14 invoices and other supporting documentation for all claims against the cash allowance;

.15 a current, acceptable, and up to date *Construction Schedule Update*;

.16 if requested by the *Owner*, a current and valid certificate(s) of insurance as required under GC 11.1 – INSURANCE;

.17 the name, title, telephone number and mailing address of the person at the place of business of the *Contractor* to whom payment is to be directed;

.18 a current, up to date, and approved *Shop Drawing* log;

.19 in the case of the *Contractor's* application for final payment, in addition to the foregoing requirements (as applicable):

(a) any *Close-Out Documentation*, together with complete and final as-built drawings;

(b) the *Contractor's* written request for release of the deficiency holdback, including a statement that no written notices of lien have been received by it;

(c) the *Contractor's* written certification that there are no outstanding claims, pending claims or future claims from the *Contractor* or their *Subcontractors* or *Suppliers*; and

(d) sufficient evidence of the *Contractor's* compliance with GC 3.11.

END OF AMENDMENTS TO CCDC 2 - 2020

DIVISION 01 - GENERAL REQUIREMENTS

01 14 00 – Work Restrictions

1.0 GENERAL

1.1. SECTION INCLUDES

.1 Connecting to existing services

.2 Special scheduling requirements

1.2. RELATED SECTIONS

.1 Section 01 53 00 - Temporary Construction.

.2 Section 01 33 00 - Submittal Procedures.

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

1.3. EXISTING SERVICES

.1 Notify Owner and Consultant and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Consultant and Owner forty-eight (48) hours of notice for necessary interruption of mechanical or electrical service throughout the course of work.

.1 Keep duration of interruptions minimum.

.2 Perform interruptions after normal working hours of occupants, preferably on weekends.

.2 Provide for vehicular, pedestrian and personnel traffic.

.3 Construct barriers in accordance with Section 01 53 00.

1.2. AFTER HOURS WORK

.1 Schedule Work with school staff through the Board's contact so as to limit disruption to school operations. Include for any overtime, to ensure orderly and continuous progression of Work and operation of school.

.2 Direct calls from Contractors to Board staff to adjust alarms and to arrange for access will not be accepted. All correspondence must be through the Project Manager.

.3 Arrange 48 hours in advance with the Board to obtain an access card and adjust security alarms for after hours Work.

.4 Bidders are cautioned that the Board will be compensated by the Contractor for false alarms. Any costs associated with each false alarm will be levied against the Contractor for false fire alarm activation or security alarm activation. These costs may include, but are not limited to:
   .1 Fines or penalties imposed by the local Fire Services,
   .2 Fines or penalties imposed by the local Police Services,
   .3 Overtime costs borne by the Board.

.5 Contractors are responsible for ensuring doors and windows are secured prior to leaving school.

.6 Unless specifically stated otherwise school activities take precedence over Contractor's activities.

1.3. SPECIAL REQUIREMENTS

.1 Schedule and perform work in occupied areas to the Board Representative's approval.

.2 Schedule and perform noise generating work to the Board Representative's approval.

.3 Submit schedule of special requirements or disruptions in accordance with Section 01 33 00.

.4 All Contractor personnel are restricted to the job site and necessary access routes. No personnel shall visit other areas or buildings without specific authorization.

END OF SECTION

01 19 00 – Specifications and Documents

1.0 GENERAL

1.1. RELATED DOCUMENTS

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

1.2. WORDS AND TERMS

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

1.3. COMPLEMENTARY DOCUMENTS

.1 Generally, drawings indicate graphically, the dimensions and location of components and equipment. Specifications indicate specific components, assemblies, and identify quality.

.2 Drawings, specifications, diagrams and schedules are complementary, each to the other, and what is required by one, to be binding as if required by all.

.3 Should any conflict or discrepancy appear between documents, which leaves doubt as to the intent or meaning, apply the Precedence of Documents article below or obtain guidance or direction from Consultant.

.4 Examine all discipline drawings, specifications, schedules, diagrams and related Work to ensure that Work can be satisfactorily executed.

.5 All specification sections of the Project Manual and Drawings are affected by requirements of Division 01 sections.

1.4. PRECEDENCE OF DOCUMENTS

.1 In the event of conflict within and between the Contract Documents, the order of priority within specifications and drawings for this project are - from highest to lowest:

.1 the Agreement and Definitions between the Owner and the Construction

.2 the Defined Terms, Definitions;

.3 Supplementary Conditions;

.4 the General Conditions;

.5 Sections of Division 01 of the specifications;

.6 Technical specifications Sections of Divisions 02 through 49 of the specifications.

.7 Schedules and Keynotes:
  .1 Material and finishing schedules within the specifications, then;
  .2 Material and finishing schedules on drawings, then;
  .3 Keynotes and definitions thereto, then;

.8 Drawings:
  .1 Drawings of larger scale shall govern over those of smaller scale of the same date, then;
  .2 Dimensions shown on drawings shall govern over dimensions scaled from drawings, then;
  .3 Location of utility outlets indicated on architectural detail drawings takes precedence over positions or mounting heights located on mechanical or electrical Drawings.

.9 Later dated documents shall govern over earlier documents of the same type.

1.5. SPECIFICATION GRAMMAR

.1 Specifications are written in the imperative command mode, in an abbreviated form.

.2 Imperative language of the technical sections is always directed to the Contractor identified as a primary constructor, as sole executor of the Contract, unless specifically noted otherwise.
  .1 This form of imperative command mode statement requires the primary constructor to perform such action or Work.
  .2 Perform all requirements of the Contract Documents whether stated imperatively or otherwise.

.3 Division of the Work among subcontractors, suppliers, or others is solely the prime contractor's responsibility. The Consultant(s) and specification authors assume no responsibility to function or act as an arbiter to establish subcontract scope or limits between sections or divisions of Work.

END OF SECTION

01 21 00 – Allowances

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 45 00 – Quality Control.

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

1.2. GENERAL

.1 Allowances included herein are for items of Work which could not be fully quantified prior to Bidding.

.2 Expend each allowance as directed by the Consultant. Work covered by allowances shall be performed for such amounts and by such persons as directed by Consultant.

.3 Funds will be expended by means of Cash Allowance allocations and contingency allowance allocations.

.4 Progress payments for Work and Products authorized under allowances will be made in accordance with the payment terms set out in the Conditions of the Contract.

.5 The Contractor shall bid the work involved and submit the Bids received to the Consultant and the Board, for approval

.6 The Contractor shall submit 3 bids unless directed by the Board.

1.3. CASH ALLOWANCES

.1 Cash allowances, cover the net cost to the Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage, installation where indicated, and other authorized expenses incurred in performing the Work. Cash allowances shall not be included by a subcontractor in the amount for their subcontract work.

.2 Supply only allowances shall include:

- .1 Net cost of Products.
- .2 Delivery to Site.
- .3 Applicable taxes and duties, excluding HST.

.3 Supply and install allowances shall include:

- .1 Net cost of Products.
- .2 Delivery to Site.
- .3 Unloading, storing, handling or products on site.

.4 Installation, finishing and commissioning of products.

.5 Applicable taxes and duties, excluding HST.

.4 Inspection and testing allowances shall include:

.1 Net cost of inspection and testing services.

.2 Applicable taxes and duties, excluding HST.

.5 Other costs related to work covered by cash allowances are not covered by the allowance, but shall be included in the Contract Price.

.6 Where costs under a cash allowance exceed the amount of the allowance, the Contractor will be compensated for any excess incurred and substantiated plus an allowance for overhead and profit as set out in the Contract Documents.

.7 Progress payments on accounts of work authorized under cash allowances shall be included in the monthly certificate for payment.

.8 Submit, before application for final payment, copies of all invoices and statements from suppliers and subcontractors for work which has been paid from cash allowances.

1.4. ALLOWANCES SCHEDULE

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

1	Designated Substance Removal. (Additional removal not already identified in the ACM Summary report)	$10,000.00
2	Independent Testing & Inspection (soil, concrete, mortar, structural steel, air barrier, paving, painting) (As directed by the Consultant)	$5,000.00
3	Window coverings (Additional window coverings not addressed elsewhere in the specification)	$5,000.00
7	Data cabling removals (redundant items as directed by WRDSB), installation and network equipment (Including terminations)	$10,000.00
8	Voice cabling removals (redundant items as directed by WRDSB) installation and telephone equipment	$10,000.00

9	Access Control & Intrusion Detection Systems (security systems) (Where not otherwise identified in the Contract Documents and including all cabling)	$2,500.00
10	Door Hardware (Supply Only) – install included in contract value. (POWER DOOR OPERATORS, EMEGENCY CALL SYSTEMS, ETC ARE TO BE INCLUDED IN CONTRACT VALUE, NOT ALLOWANCE)	$15,000.00
11	Audio Visual Supply and Installation.	$10,000.00
12	Electrical Removals not indicated in Contract Documents	$10,000.00
13	Main Stair Tread and Nosing Replacement	$20,000.00
	Total of All Allowances:	**$ 97,500.00**

END OF SECTION

01 31 00 – Project Managing And Coordination

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 32 00 - Construction Progress Documentation.

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 01 53 00 – Temporary Construction Facilities

.4 Section 01 61 00 – Product Requirements

.5 Section 01 78 10 – Closeout Submittals and Requirements

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

1.2. PROJECT COORDINATION

.1 Perform coordination of progress schedules, submittals, use of site, temporary utilities, construction facilities and construction Work, with progress of Work of other contractors, under instructions of the Consultant.

.2 The Contractor shall have total control of the Work and shall effectively direct and supervise the Work so as to ensure conformity with the Contract Documents and within the Contract Time.

.3 The Contractor shall be solely responsible for the construction means, methods, sequences, and procedures and for coordinating parts of the Work under the contract.

.4 Coordinate progress of the Work, progress schedules, submittals, use of site, temporary utilities, construction facilities, safety regulations and fire protection, as per authorities having jurisdiction codes.

.5 The Consultant has the authority to stop the Work:

.1 whenever they observe or are made aware of unsafe conditions.

.2 whenever it is deemed necessary to protect the interests of the Board,

.3 whenever materials or workmanship are in contravention to the Contract Documents.

1.3. SITE SUPERVISOR AND PROJECT MANAGER

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

.2 Performance of the Contractors Project Manager and Site Supervisor

.1 If the Board and or the Consultant become concerned with any of: Site Safety, Project Schedule, or general compliance with the tender documents due to the performance of the Site Supervisor or Project Manager, the Consultant and or the Board will identify the concerns in writing to the Contractor.

.2 The Contractor shall respond in writing to the Board and Consultant with a corrective action for each item within 24 hours.

.3 If it is found that any of the corrections are not immediately implemented, the Consultant and the Board shall meet with the General Contractor to review the credentials including curriculum vitae and comparable experience of a replacement Site Supervisor and or Project Manager proposed by that Contractor.

.4 All outstanding concerns initiating the replacement of the personnel will be immediately addressed to the satisfaction of the Consultant and the Board.

.3 If the Board and or the Consultant become concerned with site safety, project schedule or general compliance with the tender documents due to the performance of the Site Supervisor or the Project Manager, the Consultant or the Board will issue the concerns in writing to the Contractor. The Contractor shall respond in writing within 24 hours to the Consultant and the Board. If any of the corrections are not immediately implemented, the Consultant or the Board will schedule a meeting with the Consultant, General Contractor and the Board. At this meeting the Contractor will introduce the new Project Manager, and or Site Supervisor and present the Curriculum Vitae for each showing proof of comparable experience in similar projects. The Contractor will then address the outstanding concerns to the satisfaction of the Consultant and the Board.

.4 The Project Manager, and/or Site Supervisor shall not be replaced by the Contractor without prior written approval from the Board and the Consultant.

1.4. PERMITS

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

1.5. CONSTRUCTION DOCUMENTS

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

1.6. PRE-CONSTRUCTION MEETING

.1 Immediately prior to construction and upon notification by the Consultant of a time and date, the Contractor shall attend the preconstruction meeting at a location as determined by the Consultant, along with authoritative representatives of certain key subcontractors as specifically indicated in the conference notice. Agenda to include following:

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

1.7. ON-SITE DOCUMENTS

.1 Maintain at job site at all times, one copy (written or digital) each of the following:

- .1 Complete set of Contract drawings.
- .2 Specifications.
- .3 All Addenda.

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

1.8. SCHEDULES

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

1.9. CONSTRUCTION PROGRESS MEETINGS

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

.3 Contractor, major subcontractors and consultants involved in Work are to be in attendance.

.4 Post and forward copies of progress schedules for advice of Subcontractors, Owner and Consultant.

.5 Notify parties minimum five (5) days prior to meetings.

.6 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within two (2) days after meeting.

.7 Agenda to include following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for effect on construction schedule and on completion date.

.12 Review site security issues.

.13 Other business.

.8 Schedule additional meetings, to expedite progress, should work require it.

.9 Keep Owner and Consultant informed of progress, of delays and potential delays during all stages of Work. Do everything possible to meet progress schedule

.10 Schedule and administer pre-installation meetings when specified in sections and when required to coordinate related or affected Work.

1.10. SUBMITTALS

.1 Prepare and issue submittals to Consultant for review.

.2 Submit preliminary Shop Drawings, product data and samples for review for compliance with Contract Documents; for field dimensions and clearances, for relation to available space, and for relation to Work of other contracts. After review, revise and resubmit for transmittal to Consultant.

.3 Submit requests for payment for review, and for transmittal to Consultant.

.4 Submit requests for interpretation of Contract Documents, and obtain instructions through Consultant.

.5 Process substitutions through Consultant.

.6 Process change orders through Consultant.

.7 Deliver closeout submittals for review and preliminary inspections, for transmittal to Consultant.

1.11. RECORD (AS-BUILT) DOCUMENTS AND SAMPLES

.1 Procedures for record as-built documents and samples as specified in Section 01 78 10.

.2 Keep as-built documents and samples available for inspection by the Consultant.

1.12. CLOSEOUT PROCEDURES

.1 Take-over procedures, acceptance, and warranties as specified Section 01 78 10

.2 Notify Consultant and Board when Work is considered ready for Substantial Performance.

.3 Accompany Consultant and Board on preliminary inspection to determine items listed for completion or correction.

.4 Comply with Consultant's instructions for correction of items of Work listed in executed certificate of Substantial Performance.

.5 Notify Consultant of instructions for completion of items of Work determined in Consultant's final inspection.

END OF SECTION

01 32 00 – Construction Progress Documentation

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

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

1.2. SCHEDULES

.1 Within seven 7 days following the award of the Contract, submit a detailed cash flow chart broken down on a monthly basis, in a manner acceptable to the Consultant. Cash flow chart shall indicate anticipated Contractor's monthly progress billings from commencement of work until completion.

.2 Update cash flow chart whenever changes occur to scheduling and in manner and at times satisfactory to Consultant.

.3 Submit schedule of values at least fourteen (14) days before the first application

.4 Submit schedules as follows:

.1 Submittal Schedule for Shop Drawings and Product Data.

.2 Submittal Schedule for Samples.

.3 Submittal Schedule for timeliness of Owner-furnished Products.

.4 Product Delivery Schedule.

.5 Cash Allowance Schedule for acquiring Products and Installation.

.6 Shutdown or closure activity.

1.3. CONSTRUCTION PROGRESS SCHEDULING

.1 Submit initial schedule to the Consultant and the Board in duplicate within seven (7) days after following the award.

.2 Schedule Format.

.1 Prepare schedule in form of a horizontal bar chart.

.2 Split horizontally for projected and actual performance.

.3 Provide horizontal time scale identifying each Working Day of each week.

.3 Schedule Submission.

.1 Consultant will review schedule and return reviewed copies within five (5) days after receipt.

.2 Submit schedules in electronic format, forward to the Consultant and Owner as a pdf. file.

.3 Resubmit finalized schedule within five (5) days after return of review copy.

.4 Submit revised progress schedule with each application for payment.

.5 Distribute copies of revised schedule to:

.1 Job site office.

.2 Subcontractors.

.3 Other concerned parties.

.6 Instruct Consultant to report to Contractor within ten (10) days, any problems anticipated by timetable shown in schedule.

.4 Submit revised schedules with Application for Payment, identifying changes since previous version.

.5 Select either of the following paragraphs to identify the type and format of schedule required.

.6 Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

.7 Indicate estimated percentage of completion for each item of Work at each submission.

.8 Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by Allowances.

.9 Include dates for commencement and completion of each major element of construction:

.1 Site clearing.

.2 Site utilities.

.3 Foundation Work.

.4 Structural framing.

.5 Subcontractor Work.

.6 Equipment Installations.

.7 Finishes.

.10 Indicate projected percentage of completion of each item as of first day of month.

.11 Indicate progress of each activity to date of submission schedule.

.12 Indicate changes occurring since previous submission of schedule:

.1 Major changes in scope.

.2 Activities modified since previous submission.

.3 Revised projections of progress and completion.

.4 Other identifiable changes.

.13 Provide a written report to define:

.1 Problem areas, anticipated delays, and impact on schedule.
.2 Corrective action recommended and its effect.
.3 Effect of changes on schedules of other subcontractors.

1.4. PROGRESS PHOTOGRAPHS

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

1.5. SHOP DRAWING SUBMITTAL SCHEDULE

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

END OF SECTION

01 33 00 – Submittal Procedures

1.0 GENERAL

1.1 RELATED SECTIONS

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

1.1 ADMINISTRATIVE

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

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

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "Shop Drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 The term "design team" means Consultant and Sub-consultants whether Sub-consultants are employees of Consultant or not, and includes structural, mechanical, electrical, etc.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow fourteen (14) days for Consultant's review of each submission.

.5 Adjustments made on Shop Drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

.6 Make changes in Shop Drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of any revisions other than those requested.

.7 Accompany submissions with transmittal letter, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions shall include:

- .1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

.5 Details of appropriate portions of Work as applicable:

.1 Fabrication.

.2 Layout, showing dimensions, including identified field dimensions, and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Relationship to other parts of the Work.

.9 After Consultant's review, distribute copies.

.10 Submit Shop Drawings in Pdf. format for each requirement requested in specification Sections and as consultant may reasonably request.

.11 Submit product data sheets or brochures in Pdf. format for requirements requested in specification sections and as requested by Consultant where Shop Drawings will not be prepared due to standardized manufacture of product.

.12 Delete information not applicable to project.

.13 Supplement standard information to provide details applicable to project.

.14 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, the drawings will be stamped as reviewed or reviewed as modified and will be returned. At this point fabrication and installation of Work may proceed. If Shop Drawings are rejected, noted copy will be returned and re-submission of corrected Shop Drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.15 Signed drawings shall be returned to and retained by Contractor who is then responsible for distribution of copies of corrected shop drawing to appropriate

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

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

1.3 SAMPLES

.1 Submit for review to the Consultant three (3) samples as requested in respective specification Sections.

.2 Submit samples with identifying labels bearing material or component description, manufacturer's name and brand name, Contractor's name, project name, location in which material or component is to be used, and date.

.3 Deliver samples prepay any shipping charges involved for delivering samples to destination point and returning to point of origin if required.

.4 Provide samples of special products, assemblies, or components when so specified.

.5 No work requiring a sample submission shall commence until submission has received Consultant's final review.

.6 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.7 Where colour, pattern or texture is criterion, submit full range of samples.

.8 Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

.9 Make changes in samples which Consultant may require, consistent with Contract Documents.

.10 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 MOCK-UP

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

1.5 ` CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, and prior to commencing the work submit the performance bond and the labour and materials payment bond as described in the bid documents.

.2 Submit transcription of certified true copies of insurance immediately after award of Contract.

.3 A current WSIB clearance certificate

.4 The bidder's health and safety policy for the project.

.5 A copy of the notice of project issued by the ministry of labour for the project

.6 Building materials, components and elements specified without the use of trade or proprietary names shall meet requirements specified. If requested by Consultant, submit evidence of meeting requirements specified. Evidence shall consist of certification based on tests carried out by an independent testing agency. Certification based on previous tests for same materials, components or elements is acceptable. Certification shall be in form of written test reports prepared by testing agency.

END OF SECTION

01 35 17 – Fire Safety Procedures

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 14 00 – Work Restrictions.

.2 Section 01 31 00 - Project Managing and Coordination.

.3 Section 01 33 00 - Submittal Procedures.

.4 Section 01 35 23 – Health and Safety

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

.6 Appendix 01 35 17A Contractor Hot Work Permit

1.2. FIRE SAFETY PLAN

.1 Contractors and their personnel will be familiar with this section and its requirements.

.2 The contractor must take all necessary precautions during the carrying out of the work to prevent the possibility of fire occurring.

1.3. FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by the governing codes, regulations and bylaws.

.2 The contractor will, at all times, when welding, brazing and performing any operation with an open flame, combustible adhesives or flammable solvents keep a portable, operable fire extinguisher within 3 meters of the operation.

1.4. HOT WORK

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

.1 Whenever possible, complete Hot Work in a welding shop or out of doors at the school.

.2 Flammable liquids, dust lint and oily deposits to be removed from within 50-ft (15m) of Work. Remove other combustibles where possible. Otherwise protect with fire-resistive tarpaulins or metal shields.

.3 Explosive atmosphere in area eliminated. Floors swept clean. Combustible floors wet down, covered with damp sand or fire-resistive tarpaulins.

.4 All wall and floor openings covered. Fire-resistive tarpaulins suspended beneath Work.

.5 For on-site Work (indoor and out of doors), advise the Head Custodian, Principal, Consultant (if assigned) and Project Coordinator prior to Work being performed, and of related dangers.

.6 Where the Fire Alarm system is required to be set to stand-by to discourage false alarms from smoke detectors provide a firewatch throughout the building or structure being worked on. NEVER put the fire alarm system in stand-by mode when the building is occupied by staff or students.

.7 In the event of a fire as a result of the Hot Work, notify the fire department immediately. Report incident to the head custodian, the Consultant, if assigned, and Project Coordinator immediately, whether extinguished or not. Provide a fire incident report to the Board.

.8 Barriers must be set up to protect staff and students (i.e. pylons, shields, and caution tape) from exposure to arc flash and smoke migration.

.9 Have all necessary doors, windows and/or drapes closed. Confer with the Head Custodian to shut down all fan systems in the area to reduce or eliminate smoke distribution.

.10 Provide and keep fire extinguishers handy and in good Working condition. Temporarily cover all smoke detectors in the area during time of Work.

.11 Provide a fire watch/spot check for several hours after Work is completed. Uncover smoke detectors.

.12 On new construction, the requirements of the Hot Wok permit may be waived, until such time as either Substantial Completion or Occupancy is granted, whichever comes first.

.13 On additions to existing buildings, the requirements for Hot Work permits shall remain in place.

1.5. HOT WORK PERMIT

.1 **A sample Hot Work Permit is attached to the specifications – refer to attached Appendix 01 35 17-A**

.2 Each permit is valid for seven (7) days only and must be renewed prior to its expiration date

.3 The contractor must obtain Hot Work Permits from the School Board's representative prior to the start of work.

.4 The contractor must complete the form as required and must keep the form on site.

.5 Return each completed form to the School Board's representative on the date of expiration.

.6 The most current version of the Permit and its requirements shall be used for the purposes of the Work.

1.6. FIRE PROTECTION SYSTEMS

.1 Any Modifications to Fire Alarm system and its devices including service, additions and changes in device location must be performed only by a Certified Fire Alarm Technician as per the Ontario Fire Code section 1.1, subsection 1.1.5.

.2 The Contractor will receive from the Board's contact a contact number for the monitoring service and a school system number.

.3 Bidders are cautioned that the Board will be reimbursed for the cost of false alarms. Refer to Section 01 14 00 Work Restrictions, Para. 1.4.4.

.4 An approved inspection firm shall verify all new fire alarm devices, in accordance with CSA regulations. Certificate of Verification is required before occupancy.

1.7. FIRE ALARM SHUT-DOWN PROCEDURE

.1 Plan the operation such that the required work minimizes system down time to the least amount possible. Do not shut the system down or engage silence mode when the building is occupied by students. Only shut the system down when necessary.

.2 For the purposes of this section, unoccupied shall mean when the school is not occupied by students.

.3 Wherever possible, shut down only the zone needing work,

.4 and schedule down time in unoccupied school hours.

.5 Contractor(s) shall ensure all costs are included in their bid price for work related to the fire alarm system outside of regular hours and/or during unoccupied school hours. This shall include evening and weekend work.

.6 A fire alarm system must remain active when the building is not occupied by school or contractor's forces and should never be offline overnight.

.7 Procedure

The following procedure shall be followed when a fire alarm system is completely or partially affected by maintenance, shutdown, bypass, silence, loss of power, or any other nomenclature that affects the proper operation of the complete system.

.1 Inform both the principal and head custodian whenever the fire alarm system is to be disabled prior to any partial or whole system shut down. Where

school staff are not available, ensure that the Project Coordinator and/or area supervisor are informed.

.2 Ensure that the school or building administration has advised all staff when the fire alarm system is disabled and/or when it is back online. This will include instructions to call 911 if they detect smoke or a fire.

.3 Immediately prior to alarm system shutdown and upon restoring the fire alarm system, the person supervising the shutdown must:

1.7.7.1.3.1. obtain the school account number, located on a red decal attached to the fire alarm panel. This number will be formatted as 20-9xxx, with the xxx being the school location code,

1.7.7.1.3.2. contact Direct Detect at 519-741-2494 (the fire alarm monitoring company), to inform them of the state of the fire alarm and the approximate amount of time the fire alarm will be offline. They will require the building name and account number, the contact name, the contractor name as well as any other information they request, and

1.7.7.1.3.3. contact Bestell at 519-741-2494 (the current security monitoring company), to inform them of the state of the fire alarm and the approximate amount of time the fire alarm will be offline. They may require the building name and account number as well as any other information they request.

.4 A fire watch, at the Contractor's expense, shall be undertaken by a person with the sole and express purpose of completing the following tasks and in the event of the detection of smoke, fire, or any other emergency, notifying the fire department, and the building occupants. The fire watch patrol shall:

1.7.7.1.4.1. patrol all halls and high-risk areas affected,

1.7.7.1.4.2. have access to a phone and call 911 if they see or detect smoke or fire,

1.7.7.1.4.3. report any other problems they encounter,

1.7.7.1.4.4. notifying the building occupants in the event of an emergency and

1.7.7.1.4.5. remain on patrol until the fire alarm system is reactivated and fully operational.

.5 Contact Direct Detect, Bestell, and school administration to inform them that the fire alarm is back online.

.6 In the event that a fire alarm system is activated, whether by smoke, fire or accidentally, the system must not be reset until authorized by the Fire

Department (verbally or in person) and the cause of the alarm has been investigated.

1.8. FIRE PROTECTION EQUIPMENT IMPAIRMENT

.1 Fire Protection Equipment referred to in this section includes sprinkler systems, special fire suppression systems, and kitchen hood suppression systems.

.2 The Contractor will take all precautions including restrict all Hot Work operations and shut down hazardous processes during all Fire protection equipment impairment.

.3 Do not shut the Fire protection equipment down unless necessary. Plan the operation required to reduce system impairment time to the least amount possible.

.4 Wherever possible, shut down only the Fire protection equipment needing Work and schedule this impairment time for unoccupied school hours. Allow for this in your bid pricing.

.5 Discuss the possible down time with the head custodian and principal prior to any partial or whole system impairment.

.6 The school administration shall advise all staff of Fire protection equipment shut down. This will include instructions to call 911 if they see a fire and when system is back online

.7 The Contractor will plan to use temporary protection such as extra extinguishers, charged hose lines and temporary sprinkler protection during all Fire protection equipment impairment.

.8 If the sprinkler system is restorable, either in whole or in part, the Contractor or subcontractor shall assign someone to restore the system promptly in the event of a fire.

.9 A fire patrol may need to be established and will include the following at the Contractor's expense:

- .1 Patrol all halls and high-risk areas affected.
- .2 Fire patrol shall have access to a phone and call 911 if they see a fire.
- .3 Report all other problems they encounter.
- .4 Remain on patrol until the system is back on.

.10 The Contractor shall inform all sub trades that the Board has a Red Tag Permit System and it shall be used for all Fire protection equipment impairment.

.11 For ease of use, a Factory Mutual hanging wall kit has been put in place at all Board Fire protection equipment locations. Supplies of Red Tag Permits are provided there.

1.9. FIRE ALARM MODIFICATIONS AND MAINTENANCE

.1 Very important changes to Ontario Building Code as they relate to the Standard for the Verification of Fire Alarm Systems CAN/ULC-S537-M have taken effect December 24, 1999. (Minister's Ruling 99-BC-01)

.1 Clause 5.1; "Addition of conventional field device(s), or modification(s), to existing input circuit(s) or output circuit(s) shall require re-verification of all devices served by those input circuit(s) or output circuit(s)." If one device is added to a zone, the entire zone or in the case of a single zone panel the entire system is to be verified.

.2 Clause 5.2 "Addition of input circuit(s) or output circuit(s) to an existing fire alarm system shall require verification of the new circuit(s) in accordance with this standard, and shall also require all previously existing circuit(s) to be tested as follows:

.3 TEST: One conventional field device on each circuit shall be operated to confirm activation of all output circuits in accordance with the systems design." Even though no other zones have been touched, one device per input zone is to be tested when the Fire Alarm system is modified.

.4 Clause 5.5 "Where a transponder is added to an existing system, the transponder shall be verified in accordance with subsections 3.2, Wiring; and subsection 3.3 Control Units; and with CAN/ULC-S536, Standard for the Inspection and Testing of Fire Alarm Systems as well as re-verification of existing field devices and verification of new conventional field devices." If a new addressable device is added to a system, the new device is to be tested; as well a test must be conducted on all addressable devices on the loop.

.5 Clause 5.6 "Where an existing fire alarm system control unit is replaced with a new control unit, it shall be verified in accordance with CAN/ULC-S536, Standard for the Inspection and Testing of Fire Alarm Systems. Replacement of any control panel will require the testing of all existing fire alarm devices.

.2 The Contractor and subcontractors shall include in the bid price for the above ULC Standards requirements referenced in the Ontario Building Code.

1.10. INTEGRATED LIFE SAFETY TESTING

.1 Integrated System Testing (IST) of Fire Protection and Life Safety System will be performed for the Owner from the Cash Allowance indicated in Division 01 by the Integrated Testing Contractor (ITC).

Co-ordinate work with that of the Integrated Testing Contractor (ITC) as indicated in Section 26 08 50 Integrated System Testing of Fire Protection and Life Safety Systems.

1.11. 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.

1.12. 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.

1.13. 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.

1.14. 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.

.7 **END OF SECTION**

Appendix 013517-A Contractor Hot Work Permit

Waterloo Region District School Board

Appendix - 013517-A

Facility Services

CONTRACTOR HOT WORK PERMIT

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

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

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

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

PART 1

Section A Indicate Precautions Taken

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

Within 35' or 11m of hot work
☐ Flammable liquid, dust, lint and oily deposits removed
☐ Explosive atmosphere in area eliminated
☐ Floors swept clean
☐ All wall and floor openings covered
☐ Combustible floors covered with fire resistant sheets
☐ Protect or shut down ducts that might carry sparks/smoke

Hot work on walls, ceiling or roofs
☐ Construction is noncombustible and without combustible covering or insulation
☐ Combustible materials on other side of walls, ceilings or roofs moved away
☐ Combustible structure wetted down

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

Fire watch/hot work and monitoring
☐ Fire watch will be provided during and for 1 hour after work including break
☐ Fire watch is trained and supplied with suitable extinguishers
☐ Fire watch is trained in the use of sounding fire alarm
☐ Fire watch conductec in adjoining areas, above and below the space where appropriate
☐ Monitor hot work area for an additional 2 hours after fire watch
☐ Other precautions taken (please detail):

_____
_____
_____
_____

Section B Authorization Granted

Board Supervisor/Manager/Proj. Coordinator: _____
Print Name _____ Signature

Permit Valid from / to: (max. 7 days) _____ _____
From This Date _____ To This Date

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

Section C Contractor and Location Affected

Dates: (max 7 days)	Name of Contractor conducting hot work	Name & signature of individual assigned to fire watch	Name & signature of individual assigned to fire monitoring

School:

Room/Area: _____

Nature of Job: _____

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

Hot Works Contractor: _____
Signature

School Administrator notified: _____
Print Name

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

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

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

01 35 23 – Health And Safety

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 31 00 - Project Managing and Coordination.

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 01 35 17 – Fire Safety Requirements

.4 Section 01 35 43 – Hazardous Materials

.5 Section 01 41 00 – Regulatory Requirements

.6 Section 01 53 00 – Temporary Construction Facilities

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

1.2. REFERENCES

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

1.3. SAFETY PLAN

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to commencing any site Work and continue to implement, maintain, and enforce plan until final demobilization from site. The Health and Safety Plan must address project specifications.

.2 Consultant may respond in writing, where deficiencies or concerns are noted and may request resubmission with correction of deficiencies or concerns.

.3 Be governed by pertinent safety requirements of Federal or Provincial Governments and of municipal bodies having authority, particularly the Ontario Construction Safety Act, The Occupational Health and Safety Act for Ontario, and regulations of Ontario Ministry of Labour, and work in conjunction with proper safety associations operating under the authority of Ontario Workers' Compensation Act. Protect Owner, Owner's employees, the public and those employed on the Work from bodily injury and to protect adjacent public and private property and Owner's property from damage. Furnish and maintain protection, such as warning signs, tarpaulins, guard rails, barriers, guard lights, night lights, railings around shafts, pits and stairwells, etc. as required. Remove temporary protective measures when no longer required.

1.4. TEMPORARY WORK

.1 Temporary work requiring engineering proficiency for the design, erection, operation maintenance and removal shall be designed and bear the stamp of the registered professional Engineer or Architect. Detail drawings will be submitted to the Consultant for review prior to commencing any work.

.2 Before a temporary structure is used, the person responsible for design, or their representative, shall inspect the structure and certify it has been constructed according to their design.

1.5. RESPONSIBILITY

.1 The "Prime Contractor" according to applicable local jurisdiction, is responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to the extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.3 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, and follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Health and Safety Act having jurisdiction. Advise the Board and the Consultant verbally and in writing.

.4 The Contractor shall make their own arrangements for emergency treatment of accidents. Any accidents shall be reported immediately to the Board contact.

.5 The Contractor agrees to hold the Board harmless of any and all liability of every nature and description, which may be suffered through bodily injuries, involving deaths of any persons, by reasons of negligence of the Contractor, his agents, employees, or his subcontractors.

1.6. SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00.

.2 Submit site-specific Health and Safety Plan: Within ten (10) days after the date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation

.3 Submit one (1) copy of Contractor's authorized representative's work site health and safety inspection reports to Consultant and Owner.

.4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Submit Material Safety Data Sheets (MSDS) to Consultant.

.7 Consultant's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.8 Medical Surveillance: Where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Consultant.

.9 On-site Contingency and Emergency Response Plan: Address standard operating procedures to be implemented during emergency situations.

.10 File Notice of Project with the Ministry of Labour prior to commencement of Work.

1.7. SAFETY ACTIVITIES

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

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

.3 Perform Work in accordance with Section 01 41 00 - Regulatory Requirements and this section.

1.8. HEALTH AND SAFETY COORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:

.1 have previous experience as a Health & Safety coordinator,

.2 have working knowledge of occupational safety and health regulations,

.3 be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work,

.4 be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan, and

.5 be on site during execution of Work.

1.9. POSTING OF DOCUMENTS

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

1.10. CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Consultant or by the Board.

.2 Provide Consultant and/or Board with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Consultant and or the Board may stop Work if non-compliance of health and safety regulations is not corrected.

1.11. PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:

.1 Refer to Section 01 35 43 Hazardous Materials

1.12. HAZARDOUS WORK

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

1.13. WORK STOPPAGE

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

1.14. LOCKOUT PROCEDURES

.1 All Work to be done on electrical systems or machinery, where the unexpected switching on of the system or machinery could result in personal injury to a student, staff, employee, or the Contractor's employee, must be done in accordance with the Contractor's standard lockout procedure.

.2 The Contractor shall provide his/her own locks for the above procedure.

.3 The lock shall include contact information for the person(s) locking out such devices.

1.15. OVERHEAD LIFTING

.1 Under no circumstances will a crane or lifting device be used over an occupied space.

.2 When working adjacent to occupied spaces, ensure a clearance of one (empty) classroom, or a minimum of 10m between any occupied space and the furthest possible reach of the crane.

1.16. WARNING SIGNS AND NOTICES

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

1.17. FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by the governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site.

.3 Maintain placed or installed Fire Protection to protect the portions of the Work during construction.

1.18. SCENT-FREE ENVIRONMENT

.1 The Board requires that, where advised, a building may be deemed scent-free and as such, the wearing of scented products is prohibited.

.2 Any methods or materials that are found to create negative responses in staff or students shall cease and be removed under advisement of the Consultant and or the Board, until alternate methods can be determined.

END OF SECTION

01 35 43 – Hazardous Materials

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 35 23 – Health and Safety Requirements.

.2 Section 01 41 00 – Regulatory Requirements.

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

1.2. REFERENCES

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

1.3. ASBESTOS and OTHER REGULATED SUBSTANCES

.1 An Asbestos Audit, as prepared by MTE Consultants Inc. for this facility, is attached under Appendix 013543 A. A duplicate set is also available in the Facilities Services Departments located in the Education Centre. Unless specifically covered by a Cash Allowance or Contingency Allowance that states otherwise, include in this Contract the required removal of all asbestos containing materials (ACM) to complete the work. No claims for extra costs will be accepted for areas known to contain ACM that are within the scope of this Work.

.2 Comply with applicable legislation regarding asbestos. Should the Contractor encounter asbestos not noted in the referenced Asbestos Audit that would be disturbed during the course of the Work, they should stop the work in that immediate area and report the same to the Consultant and Board contact.

.3 In addition, Lead, Mercury, Silica, and Isocyanates are anticipated to be present in existing facilities. New construction, renovations, or alterations require compliance by the Contractor with the applicable legislation.

1.4. PROTOCOL FOR ABATEMENT WORK

.1 This Protocol establishes the requirements to be followed by all Asbestos Abatement Contractors involved with the Board. It applies to Type 1, Type 2 and Type 3 Operations as stated in the Regulations and applies to emergency and non-emergency work (directly retained or working as a sub-contractor).

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

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

.4 School Access

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

.5 Communication

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

.1 Principal / Vice Principal

.2 Area Facility Manager

.3 Head Custodian

.4 Environmental Officer

.5 Manager of Mechanical, Electrical and Environmental Services

.6 Manager of Health Safety & Security

.7 Contractor staff

.8 Consultant

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

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

.1 Principal / Vice-principal,

.2 Area Facility Manager, and

.3 Environmental Officer.

.4 Consultant

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

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

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

.7 Additionally, for Type 3 work also contact:

.1 Manager of Health, Safety & Security, and

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

.3 Consultant

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

.6 Asbestos Operations

.1 Emergency work shall be carried out the same day (evening/night) or under exceptional conditions the following day / evening / night. Contractors shall exercise discretion when working in the school to minimize anxiety of staff/school community. Where warranted, contact Area Supervisor, Facility Manager or Environmental Officer to obtain further direction.

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

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

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

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

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

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

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

1.5. SUBMITTALS

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

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

.2 For those projects requiring Air Clearance, ensure this info is sent without delay but in all cases no later than 24 hours after sampling. All Type 3 work must take into account that the initial samples may not pass and the contactor must allow one additional day to re-clean and re-sample before school is to resume operations. For those projects not under the direct supervision of a Environmental Consultant, the contactor is to expedite the air clearance sampling with the lab of their choice and carry these costs.

.3 Forward Air Clearance results to:

.1 Principal / Vice-principal,

.2 Facility Manager,

.3 Environmental Officer,

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

.5 Manager of Health, Safety & Security.

.6 Consultant

1.6. ACKNOWLEDGEMENT

.1 The protocols for asbestos work must be read and understood by Asbestos Contractor.

.2 Submit a signed copy of the most current copy of *PROTOCOL FOR ABATEMENT WORK (ASBESTOS ABATEMENT CONTRACTORS)* to the General Contractor, the Consultant, and the Board's Environmental Officer.

END OF SECTION

Appendix 01 35 43A Asbestos Audit Report

REPORT INSERTED AT END OF SPECIFICATION BOOK

Appendix 01 35 34B– Lead Report – NOT APPLICABLE

01 42 00 – References

1.0 GENERAL

1.1. SECTION INCLUDES

.1 References and standards.

.2 Standards producing industry organizations and their addresses.

1.2. RELATED SECTIONS

.1 Section 01 61 00 – Product Requirements.

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

1.3. REFERENCES

.1 For Products or quality specified by association, trade, or other references or consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

.2 Conform to reference standard by Ontario Building Code except where a specific date is established or required by code.

.3 Obtain copies of standards where required by product specification sections.

.4 Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Consultant shall be altered from the Contract Documents by mention or inference otherwise, in any reference document.

1.4. STANDARDS

.1 The following associations and organizations are cited in specification sections. Acronym, name, address, and Internet URL addresses are as follows:

.2 Canadian Organizations:

.1 Street, Suite 616, Ottawa, ON K1P 5G4; URL: http://www.acec.ca.

.2 **AWMAC** - Architectural Woodwork Manufacturers Association of Canada, 516-4 Street West, High River, AB T1V 1B6; URL: http://www.awmac.com.

.3 **Canada Green Building Council**, 330 - 55 rue Murray Street, Ottawa, ON. K1N5M3; Tel: 613-241-1184, Fax: 613-241-5750; URL: http://www.cagbc.org.

.4 **CCA** - Canadian Construction Association, 75 Albert St., Suite 400, Ottawa, ON K1P 5E7; URL: http://www.cca-acc.com.

.5 **CCDC** – Canadian Construction Documents Committee, Refer to ACEC, CCA, CSC or RAIC; URL: http://www.CCDC.org.

.6 **CGA** - Canadian Gas Association, 20 Eglinton Avenue West, Suite 1305, Toronto, ON M4R 1K8; URL: http://www.cga.ca..

.7 **CGSB** - Canadian General Standards Board, Place du Portage, Phase III, 6B1, 11 Laurier Street, Hull, QC K1A 0S5; URL: http://w3.pwgsc.gc.ca/cgsb.

.8 **CISC** - Canadian Institute of Steel Construction, 201 Consumers Road, Suite 300, Willowdale, ON M2J 4G8; URL: http://www.cisc-icca.ca.

.9 **CLA** - Canadian Lumbermen's Association, 27 Goulburn Avenue, Ottawa, ON K1N 8C7; URL: http://www.cla-ca.ca.

.10 **CNLA** - Canadian Nursery Landscape Association, RR #4, Stn. Main,7856 Fifth Street, Milton, ON L9T 2X8; URL: http://www.canadanursery.com.

.11 **CRCA** - Canadian Roofing Contractors Association, 155 Queen Street,Suite 1300, Ottawa, ON K1P 6L1; URL: http://www.roofingcanada.com.

.12 **CSA** - Canadian Standards Association International, 178 Rexdale Blvd., Toronto, ON M9W 1R3; URL: http://www.csa-international.org.

.13 **CSC** - Construction Specifications Canada, 120 Carlton Street, Suite 312, Toronto, ON M5A 4K2; URL: http://www.csc-dcc.ca.

.14 **CSDMA** - Canadian Steel Door Manufacturers Association, One Yonge Street, Suite 1801, Toronto, ON M5E 1W7; URL: http://www.csdma.org.

.15 **CSPI** - Corrugated Steel Pipe Institute, 652 Bishop Street N, Unit 2A, Cambridge, ON N3H 4V6; URL: http://www.cspi.ca.

.16 **CSSBI** - Canadian Sheet Steel Building Institute, 652 Bishop St. N., Unit 2A, Cambridge, ON N3H 4V6; URL: http://www.cssbi.ca.

.17 **CUFCA** - Canadian Urethane Foam Contractor's Association, Box 3214, Winnipeg, MB R3C 4E7; URL: http://www.cufca.ca.

.18 **CWC** - Canadian Wood Council, 1400 Blair Place, Suite 210, Ottawa, ON. K1J 9B8; URL: http://www.cwc.ca.

.19 **EC** - Environment Canada, Conservation and Protection, Inquiry Centre, 351 St. Joseph Blvd, Hull, QC KIA 0H3; URL: http://www.ec.gc.ca.

.20 **EFC** - Electro Federation of Canada, 5800 Explorer Drive, Suite 200, Mississauga, ON L4W 5K9; URL: http://www.electrofed.com.

.21 **MPI** - The Master Painters Institute, 4090 Graveley Street, Burnaby, BC V5C 3T6; URL: http://www.paintinfo.com.

.22 **NABA** - National Air Barrier Association, PO Box 2747, Winnipeg, MB R3C 4E7; URL: http://www.naba.ca.

.23 **NLGA** - National Lumber Grades Authority, 406-First Capital Place, 960 Quayside Drive, New Westminster, BC V3M 6G2; URL: http://www.nlga.org.

.24 **NRC** - National Research Council, Building M-58, 1200 Montreal Road, Ottawa, ON K1A 0R6; URL: http://www.nrc.gc.ca.

.25 **QPL** - Qualification Program List, c/o Canadian General Standards Board, Place du Portage, Phase III, 6B1, 11 Laurier Street, Hull, QC K1A 1G6; URL: http://www.pwgsc.gc.ca/cgsb.

.26 **RAIC** - Royal Architectural Institute of Canada, 55 Murray Street, Suite 330, Ottawa, ON K1N 5M3; URL: http://www.raic.org.

.27 **SCC** - Standards Council of Canada, 270 Albert Street, Suite 2000, Ottawa, ON K1P 6N7; URL: http://www.scc.ca.

.28 **TTMAC** - Terrazzo, Tile and Marble Association of Canada, 30 Capston Gate, Unit 5 Concord, ON L4K 3E8; URL: http://www.ttmac.com.

.29 **ULC** - Underwriters' Laboratories of Canada, 7 Crouse Road, Toronto, ON M1R 3A9; URL: http://www.ulc.ca.

.3 USA Organizations:

.1 **AA** - Aluminum Association, 900 19th Street N.W., Washington, DC 20006; URL: http://www.aluminum.org.

.2 **AASHTO** - American Association of State Highway and Transportation Officials, 444 N Capitol Street N.W., Suite 249, Washington, DC 20001; URL: http://www.aashto.org.

.3 **AHA** - American Hardboard Association, 1210W Northwest Hwy, Palatine, IL 60067; URL: http://www.hardboard.org.

.4 **AITC** - American Institute of Timber Construction, 7012 S. Revere Parkway, Suite 140, Englewood, CO 80112; URL: http://www.aitc-glulam.org.

.5 **AMCA** - Air Movement and Control Association Inc., 30 West University Drive, Arlington Heights, IL 60004-1893; URL: http://www.amca.org.

.6 **ANSI** - American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036; URL: http://www.ansi.org.

.7 **APA** - The Engineered Wood Association, P.O. Box 11700, Tacoma, WA 98411-0700; URL: http://www.apawood.org.

.8 **API** - American Petroleum Institute, 1220 L St. Northwest, Washington, DC 20005-4070; URL: http://www.api.org.

.9 **ARI** - Air Conditioning and Refrigeration Institute, 4100 N Fairfax Drive, Suite 200, Arlington, VA 22203; URL: http://www.ari.org.

.10 **ASHRAE** - American Society of Heating, Refrigeration and Air-Conditioning Engineers, 1791 Tullie Circle NE, Atlanta, GA 30329; URL: http://www.ashrae.org.

.11 **ASME** - American Society of Mechanical Engineers, ASME Headquarters, 3 Park Avenue, New York, NY 10016-5990; URL: http://www.asme.org.

.12 **ASTM International**, 100 Barr Harbor Drive West, Conshohocken, PA 19428-2959; URL: http://www.astm.org.

.13 **AWCI** - Association of the Wall and Ceiling Industries International, 803 West Broad Street, Suite 600 , Falls Church, UA 22046; URL: http://www.awci.org.

.14 **AWPA** - American Wire Producer's Association, 801 N Fairfax Street, Suite 211, Alexandria, VA 22314-1757; URL: http://www.awpa.org.

.15 **AWPA** - American Wood Preservers' Association, P.O. Box 5690, Granbury TX 76049-0690; URL: http://www.awpa.com

.16 **AWS** - American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126; URL: http://www.amweld.org.

.17 **AWWA** - American Water Works Association, 6666 W. Quincy Avenue, Denver, CO 80235; URL: http://www.awwa.org.

.18 **EIMA** - EIFS Industry Manufacturer's Association, 3000 Corporate Center Drive, Suite 270, Morrow, GA 30260; URL: http://www.eima.com.

.19 **ISAP** - International Society for Asphalt Paving, 400 Selby Avenuse, Suite 1, St. Paul, MN 55102; URL: http://www.asphalt.org.

.20 **IEEE** - Institute of Electrical and Electronics Engineers, IEE Corporate Office, 3 Park Avenue, 17th Floor, New York, NY 10016-5997;URL: http://www.ieee.org

.21 **MSS** - Manufacturers Standardization Society of the Valve and Fittings Industry, 127 Park Street, N.E., Vienna, VA 22180-4602; URL: http://www.mss-hq.com.

.22 **NAAMM** - National Association of Architectural Metal Manufacturers, 8 South Michigan Avenue, Suite 1000, Chicago, IL 60603;URL: http://www.naamm.org.

.23 **NEMA** - National Electrical Manufacturers Association, 1300 N 17th Street, Suite 1847, Rosslyn, VA 22209; URL: http://www.nema.org.

.24 **NFPA** - National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101Quincy, MA 02269-9101; URL: http://www.nfpa.org.

.25 **NFSA** - National Fire Sprinkler Association, P.O. Box 1000, Patterson, NY 12563; URL: http://www.nfsa.org.

.26 **NHLA** - National Hardwood Lumber Association, 6830 Raleigh-La Grange Road, Memphis, TN 38184-0518; URL: http://www.natlhardwood.org.

.27 **NSPE** - National Society of Professional Engineers, 1420 King Street, Alexandria, VA 22314-2794; URL: http://www.nspe.org.

.28 **PCI** - Prestressed Concrete Institute, 209 W. Jackson Blvd., Suite 500, Chicago, IL 60606-6938; URL: http://www.pci.org.

.29 **PEI** - Porcelain Enamel Institute, PO Box 920220, Norcross, GA 30010; URL: http://www.porecelainenamel.com.

.30 **SSPC** - The Society for Protective Coatings, 40 24th Street, 6th Floor, Pittsburgh, PA 15222-4656;URL: http://www.sspc.org.

.31 **TPI** - Truss Plate Institute, 583 D'Onofrio Drive, Suite 200, Madison, WI 53719; URL: http://www.tpinst.org.

.32 **UL** - Underwriters' Laboratories, 333 Pfingsten Road, Northbrook, IL60062-2096; URL: http://www.ul.com.

END OF SECTION

01 45 00 – Quality Control

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 21 00 - Allowances.

.2 Section 01 78 10 – Closeout Submittals and Requirements

.3 Section 01 79 00 – Demonstration and Training

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

1.2. REFERENCES

.1 **ISO/IEC** 17025-2005 - General Requirements for the Competence of Testing and Calibration Laboratories.

.2 **SCC** (Standards Council of Canada).

1.3. INSPECTION BY AUTHORITY

.1 Allow Authorities Having Jurisdiction access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection whenever portions of the Work are designated for special tests, inspections or approvals, either when described in the Contract Documents or when required by law in the Place of the Work.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

1.4. REVIEW BY CONSULTANT

.1 Consultant may order any part of the Work to be reviewed or inspected if Work is suspected to be not in accordance with Contract Documents.

.2 If, upon review such work is found not in accordance with Contract Documents, correct such Work and pay the cost of additional review and correction.

.3 If such Work is found in accordance with Contract Documents, The owner will pay the cost of review and replacement.

1.5. INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection and Testing Agencies will be engaged by Contractor for the purpose of inspecting and testing portions of Work.

.2 The Board may, at their discretion, request that the Consultant direct the Contractor to engage independent inspecting and or testing agencies to review or test the Work.

.3 Allocate Costs for inspections and testing to Section 01 21 00.

.4 Provide equipment required for executing inspection and testing by appointed agencies.

.5 Employment of inspection and testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.6 If defects are revealed during inspection and/or testing, the appointed agency will request additional inspection and testing to ascertain the full degree of defect. Correct defects and irregularities as advised by the Consultant at no cost to the Owner. Contractor shall pay costs directly to the inspection agency for retesting and re-inspection.

1.6. ACCESS TO WORK

.1 Allow inspection and testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Cooperate to provide reasonable access and facilities for such access.

1.7. CONTRACTOR RESPONSIBILITIES

.1 Notify appropriate agency minimum 48 hours in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.8. DUTIES & AUTHORITY OF TESTING AGENCY

.1 Testing agency is expected to do the following:

.1 Act in a professional and unprejudiced basis and carry out inspection and testing functions to establish compliance with requirements of Contract Documents.

.2 Check work as it progresses and prepare reports stating results of tests and conditions of work and state in each report whether specimens tested conform to requirements of Contract Documents, specifically noting deviations.

.3 Distribute reports as follows

.1 Consultant

.2 Owner

.3 Contractor

.2 Testing agency is not authorized to amend or release any requirements of Contract Documents, nor to approve or accept any portion of work.

1.9. REJECTED WORK

.1 The Contractor shall remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by the Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, the Owner may choose to accept the condition. The difference in value between Work performed and that called for by Contract Documents shall be deducted from the Contract value via Change Order. The amount of this change shall be determined by the Consultant. The Contractor shall warrant the work performed for the time period specified as if it were performed in accordance with the Contract Documents.

1.10. TESTING OF EXCAVATION & BACKFILL

.1 The Consultant must approve all Sample and fill tests prior to purchase.

.2 In coordination with the Consultant and Contractor, inspect and test backfill and fill to ensure the degree of compaction specified has been obtained.

.3 Inspect excavation at required levels in regard to bearing values for footings, foundations and floor slabs.

.4 Authorization and calculation of extra excavation work, if required, due to unsatisfactory bearing shall be adjusted by Unit Price.

1.11. CONCRETE STRENGTH TESTS

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

.2 Obtain representative samples of fresh concrete for each mix design of concrete placed in any one day as directed by the Consultant.

.3 Make standard slump tests.

.4 Mould three (3) standard 150mm diameter cylindrical test specimens from each sampling of fresh concrete. Store specimens as per best practice while they are on the site. Cure all cylinders in the laboratory under standard moisture and temperature conditions. Compression test one of the cylinders at 7 days and the remaining two at 28 days after sampling. Each concrete cylinder test report shall contain the specific location of concrete represented by sample, design strength, aggregate size, admixtures used, date, hour and temperature at time of sampling, percentage air content, unit weight and test strength of cylinder.

.5 When concrete is placed under the conditions of "Cold Weather Requirements" make one additional cylinder; store it in a heated enclosure for 24 hours and then store it on the job site in a place protected from disturbance and off the ground. Compressive test this cylinder 7 days after sampling.

.6 Determine the air content of air entrained standard weight concrete.

.7 Determine the air content and unit weight of light weight concrete by the volumetric method.

.8 Additional testing required because of changes in materials or proportions of the mix requested by the Contractor as well as any extra testing of concrete or materials occasioned by their failure to meet specification requirements or testing of the structure or performance of the structure, including load testing, shall be carried out at the Contractor's expense.

1.12. INSPECTION OF STRUCTURAL STEEL

.1 Ensure all steel has mill test reports that comply with the Specification prior to purchase.

.2 Inspect fabrication of steel in the plant.

.3 Inspect erection work at site including fit-up, placing, plumbing, levelling, temporary bracing, field cutting and alterations.

.4 Shop and field inspect welded and bolted connections and painting.

.5 High strength bolts - the installation and testing of bolts shall conform to the requirements of CSA S16-1969. Check one representative connection in ten by torque testing every bolt, and check each bolt in every connection with a tap of hammer for soundness. Enforce requirements of connection type.

.6 Examine visually all welded joints for inclusions, porosity, lack of fusion penetration or even contour, undercuts and cracks. Root passes shall be checked for penetration

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

1.13. INSPECTION OF METAL DECK

.1 Check deck for gauge, type and protective coating thickness to ensure compliance with Specification.

.2 Inspect erection work at the site including anchorage.

1.14. INSPECTION AND TESTING OF PAVING

.1 Testing shall be carried out in three stages as described below by means of sufficient site visits to ensure satisfactory results but in no case less than three site visits.

.2 Test within 16 hours from time called to do so by the Contractor, since paving is a critical item at the end of the project.

.3 Stage One:

.1 Visual inspection and compaction tests of subsoil.

.4 Stage Two:

.1 Inspection of granular sub-base (after each layer is placed or after the last layer is placed and compacted).

.2 On site density tests.

.3 Verify thickness of various levels. (Minimum of 4 checks shall be done on thickness in a paved area of 250m2 or less, and 1 additional check for each additional 250m2 or part thereof).

.4 Laboratory tests: moisture content and grading of materials.

.5 Stage Three:

.1 Inspection of asphalt installation.

.2 Checking of thickness and density of material and checking suitability of equipment used.

.6 Standard Proctor Test shall be carried out for all projects.

.7 Further, grain size analysis and Marshall test shall be carried out if visual inspection is not satisfactory or, if there is reason to suspect materials supplied are not acceptable.

.8 All laboratory tests shall be performed according to A.S.T.M. methods, latest revisions

.9 Paving Contractor shall obtain from their supplier grading tables of materials used and submit them to the testing laboratory for approval. The paving contractor shall ensure material delivered complies with grading tables.

.10 Be responsible for all approvals given to the Paving Contractor. At completion of the paving project, inform the Consultant all tests were performed according to the Specifications and the Contractor's performance has been approved.

.11 The Consultant will not entertain any credits for work either not performed or incorrectly performed by the contractor. If thicknesses or consistencies of sub-base are not as specified, or if asphaltic material is not as specified, then the Contractor shall remove the same at their expense and provide proper specified materials.

1.15. BUILDING THERMOGRAPHIC SCAN

.1 Upon completion of the Work, the Consultant and/or Owner may arrange for an independent agency to carry out a thermographic scan of the building to determine acceptability of thermal performance of the building envelope.

.2 Consultant, prior to start of construction work, will designate a sample area of the building to include a portion of exterior wall and roof.

.3 Consultant will implement a special inspection program for this sample area to be carried out as construction progresses. Contractor shall not cover any completed work until notifying the Consultant and receiving acceptance of completed work. Contractor shall remove and replace any work which is installed in contravention of this requirement.

.4 Results of a thermographic scan of the entire building will be evaluated and compared to those of the sample area to determine acceptance or rejection of any part of the building envelope.

.5 Contractor shall carry out remedial work as required to bring the quality of any rejected portion of the building envelope to that of the sample area. Contractor shall pay for costs of any follow-up thermographic scans required to determine acceptability of remedial work. This procedure shall be repeated until all parts of the building envelope have been accepted.

1.16. TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as may be requested.

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

1.17. MOCK-UP

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

.2 Prepare mock-ups for Consultants review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

.3 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.4 If requested, Consultant will assist in preparing a schedule fixing dates for preparation.

.5 Remove mock-up at conclusion of Work or when acceptable to the Consultant. Repair any damage and clean-up at place of mock-up.

.6 Approved mock-up may remain as part of Work.

1.18. EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical and electrical systems to the consultant.

.2 Refer to Sections 01.78.10 and 01.79.00 for definitive requirements.

END OF SECTION

01 51 00 – Temporary Utilities

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 52 00 - Construction Facilities.

.2 Section 01 53 00 - Temporary Construction.

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

1.2. INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Location of temporary facilities shall be subject to the Consultant's approval.

.3 Salvage and assist in recycling products for potential reuse wherever possible.

.4 Remove temporary facilities from the site when directed by the Consultant.

1.3. DEWATERING

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

1.4. WATER SUPPLY

.1 Provide continuous supply of potable water for construction use until such time as permanent municipal water supply is available.

.2 Hose extensions to be provided by subcontractors requiring them.

.3 For New Builds, arrange for connection with the appropriate utility company and pay all costs for installation, maintenance, removal, and usage costs until occupancy has been achieved.

.4 For Additions and renovations the contractor can use existing Board service unless noted otherwise.

1.5. TEMPORARY HEATING AND VENTILATION

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

.2 Provide temporary heating fuel, if not already available on site, until such time as a permanent natural gas line is installed, and thereafter fuel costs shall be borne by the Board. The Contractor shall provide all connections and piping between the permanent fuel source and the heating appliance(s).

.3 Provide temporary heat and ventilation in enclosed areas as required to:

.1 Facilitate progress of Work.

.2 Protect Work and products against dampness and cold.

.3 Prevent moisture condensation on surfaces.

.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.

.5 Provide adequate ventilation to meet health regulations for a safe working environment.

.4 Maintain temperatures of minimum:

.1 10 degrees C in areas where construction is in progress, until takeover by the Board. Contractor to ensure temporary enclosures remain sealed and penetrations are repaired or closed in a timely fashion.

.2 16 degrees C in areas where finishes are in progress.

.3 16 degrees C in building once it is enclosed.

.4 Refer to other Sections for intermittent heating requirements up to 21 degrees C. Provide insulated tarp enclosures for openings as required to enclose the building after completion of main building shell components and roof.

.5 If the Contractor fails to ensure the temporary enclosures remained sealed (including temp doors when not in use) the Consultant and or the Board shall require the contractor to pay 40% of that months usage charge

.5 Use forced hot air heaters. Open-flame type heaters or salamanders are not permitted. Ventilate direct fired heating units to the outside.

.6 Uniformly distribute heat to avoid hot and cold areas and to prevent excessive drying.

.7 Early heating of the building shell will be required to expedite interior finishing to meet the project schedule.

.8 Ventilating:

.1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.

.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into the atmosphere of occupied areas.

.3 Dispose of exhaust materials in a manner that will not result in harmful exposure to persons.

.4 Ventilate storage spaces containing hazardous or volatile materials.

.5 Ventilate temporary sanitary facilities.

.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.7 Provide minimum 1 air change per hour for enclosed areas receiving architectural finishes.

.8 Do not allow excessive build-up of moisture inside the building.

.9 The permanent mechanical systems for the new building, when installed in safe operating conditions, may be used for temporary heating or cooling if approved in writing by the Consultant, without penalty to the warranty.

.10 Follow the requirements of "Temporary Use of New Permanent Services and Equipment" if the permanent heating system installed under the contract is intended to be used for temporary heating during the construction.

.11 Provide competent persons to operate and maintain permanent systems for the duration of temporary use period.

.12 Perform required repairs and maintenance immediately after each inspection. Pay for operating costs. Upon termination of temporary use period, services and equipment shall be inspected, tested, adjusted, fitters replaced, balanced, cleaned and lubricated.

.13 Permanent services and equipment shall be turned over to the Owner in new and perfect operating condition.

.14 Use of permanent systems and equipment as temporary facilities shall not affect the guarantee conditions and guarantee period for such systems and equipment. Make due allowance to ensure Owner will receive full benefits of the equipment manufacturer's warranty from the date of Substantial Performance.

.15 Ensure date of Substantial Performance of the Work and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Consultant.

.16 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

.1 Conform with applicable codes and standards.

.2 Enforce safe practices.

.3 Prevent abuse of services.

.4 Prevent damage to finishes.

.5 Vent direct-fired combustion units to outside.

.17 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.6. TEMPORARY POWER AND LIGHT

.1 Provide temporary electrical service and system including lighting and power system for use by all Sections.

.2 Contractor will provide a source for, and pay the costs of temporary power during construction for temporary lighting and operating of power tools until such time as a permanent source is available.

.3 Contractor to ensure that the use of power from a source provided by the Board shall not exceed the capacity of the current use required for the operation of any existing facility.

.4 Install and maintain temporary electrical service and systems in accordance with Construction Safety Association's "Temporary Wiring Standards on Construction Sites", the Ontario Electrical Code and other authorities having jurisdiction.

.5 Provide at least one temporary panel on each floor with service capacity suitable for construction requirements and to authorities and utilities approval.

.6 Provide temporary wiring with lighting to all areas of each floor to provide adequate lighting.

- .1 Lighting levels must be maintained at a minimum of 10 foot candles, or to suit the particular location or operation, whichever is greater.
- .2 Do not use materials of the temporary service in permanent installation.
- .3 Increase lighting levels equivalent to the final requirements when finishing operations are underway.

.7 Extension cords, lights, etc., required by various subcontractors and run from above outlet positions will be supplied and maintained by the party or parties requiring the same.

.8 Follow requirements of "Temporary Use of New Permanent Services and Equipment" if electrical power and lighting systems installed under the contract are intended to be used for temporary electricity and lighting during the construction.

.9 Electrical power and lighting systems installed under this contract can be used for construction provided damages are made good and all lamps that have been used for more than two months are replaced with new lamps.

.10 For New Builds, arrange for connection with the appropriate utility company and pay all costs for installation, maintenance, removal and usage costs until occupancy has been achieved.

.11 For Additions and renovations the contractor can use existing Board service unless noted otherwise.

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

1.7. TEMPORARY COMMUNICATION FACILITIES

.1 Contractor to provide and pay for temporary Phone, e-mail and printer hook up, for the duration of contract until completion for use by the contractor.

.2 The site superintendent is to have email access and a printer on site.

END OF SECTION

01 53 00 – Temporary Construction Facilities

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 51 00 - Temporary Utilities.

.2 Section 01 35 23 – Health and Safety

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

1.2. INSTALLATION AND REMOVAL

.1 Provide temporary construction facilities in order to execute work expeditiously.

.2 Remove temporary facilities from the site when directed by the Consultant.

1.3. PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.4. PROTECTION OF SURROUNDING WORK

.1 Provide protection for finished and partially finished Work from damage.

.2 Provide necessary cover and protection.

.3 Be responsible for damage incurred due to lack of or improper or inappropriate protection.

1.5. ROOF AND STRUCTURE PROTECTION

.1 Ensure no part of Work or existing structures are subjected to a load, which will endanger its safety or will cause permanent deformation.

.2 The Contractor when indicated by the Board Contact or Consultant shall provide roof protection. Ensure all precautions are taken to avoid liability for roof damage.

.3 Typical roof protection shall consist of a layer of 1 inch rigid foam insulation set directly on the roof surface and a layer of 19 mm (3/4 inch) plywood in all places under scaffold legs, ladder legs and in areas of foot traffic or falling debris.

1.6. WORK SITE ENCLOSURE & SAFETY BARRIERS

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

.1 a minimum 1800 mm high chain link fence or self-supporting, heavy duty, interconnected fence panels (commonly referred to as Insta-fence)for a temporary site enclosure (hoarding) completely around perimeter of work site,

.2 any temporary posts shall be completely removed by the contractor prior to occupancy,

.3 under no circumstance shall t-bar posts be used on board property

.4 any additional safety devices including full hoarding as required and noted on the drawings, to protect the students, staff, public and private property from injury and damage,

.5 any additional requirements as regulated by authorities having jurisdiction, local by-laws and zoning.

.2 The Contractor is to assume full responsibility for any injury or damage caused due to failure to comply with Paragraph 1 above.

.3 Any hazardous conditions identified outside of the main fenced area will be barricaded with a fence complying to the above.

.4 Provide lockable truck entrance gate/gates and at least one (1) pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys with restricted availability, in the project office.

.5 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.

.6 Provide barriers around trees and plants designated to remain.

.7 Protect from damage by equipment and construction procedures.

1.7. TREE PROTECTION

.1 Protect all existing trees to remain from damage during construction period. Make good, at Contractor's expense, trees damaged during construction.

.2 Confine movement of heavy equipment, storage of same, and storage of materials to a predetermined area. Do not store materials or place equipment over root systems of any existing trees to remain.

.3 Install fencing or approved equal at limits of drip line of existing trees to remain unless directed otherwise. Where this case is not practical, and only if approved by the Consultant, the trunks shall be protected with an approved tree guard.

.4 No rigging cables shall be wrapped around or installed in trees. Do not flush concrete trucks or cement mixing machines over root systems or near trees. Flush concrete trucks or cement mixing machines in areas approved by the Consultant.

.5 Areas where root systems of trees are exposed directly adjacent to a structure will be backfilled with good loam only.

.6 Whenever excavating is required within branch spread of trees that are to remain, the contractor shall contact the consultant for direction prior to the start of work.

.7 If any existing tree to remain is injured and does not survive the following year, it will, as determined by the Board, be removed in its entirety and be replaced with a tree of similar size and value, as directed by the Consultant.

.8 Should the destroyed tree be of such a size or shape that it cannot be feasibly replaced, the Contractor shall compensate the Owner for the minimum sum of five thousand dollars ($5,000.00) per destroyed tree.

1.8. GUARD RAILS AND BARRIERS

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stairwells, open edges of floors and roofs.

.2 Erect and maintain for the duration of the Work, safety devices and barricades including hoarding, as required, to protect the staff, students, public and private property, from injury and damage.

.3 The Contractor is to ensure that all requirements from authorities having jurisdiction and all requirements from the Owner are met.

.4 The Contractor is to assume full responsibility for any damage caused due to his failure to comply with paragraph 2 above.

.5 Hazardous conditions on the exterior shall be fenced.

1.9. WEATHER ENCLOSURES

.1 Provide weather-tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

.2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

.3 Design enclosures to withstand wind pressure.

1.10. DUST TIGHT BARRIERS

.1 Provide dust tight barriers and screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.2 Maintain and relocate protection until such work is complete.

.3 Where required, adjust air handling units to eliminate migration of dust.

1.11. SCAFFOLDING

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

1.12. SHORING, BRACING, PILING

.1 Provide shoring, bracing, piling, sheeting and sheet piling and underpinning required to support soil banks, existing work and property in accordance with Construction Safety Act and other applicable regulations. Maintain shoring until the building is strong enough and sufficiently braced to withstand pressure of backfilling. Make construction aids free of permanent work so they may be removed entirely when no longer required, without damaging the Work. Locate construction aids so adequate room is left for damp-proofing foundation walls, laying substructure drainage and other work.

.2 Shoring and false work over one tier in height shall be designed and shall bear the stamp of a registered professional engineer, having experience in this field.

1.13. HOISTING

.1 Provide, operate and maintain services required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.

.2 Machinery shall be operated by qualified operator.

1.14. OVERHEAD LIFTING

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

1.15. ELEVATORS/LIFTS

.1 When elevators/lifts are to be used by construction personnel, provide protective coverings for finish surfaces of elevator cabs and entrances.

.2 Co-ordinate use of elevator cabs with Consultant and the Board.

1.16. USE OF THE WORK

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

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

1.17. CONSTRUCTION PARKING

.1 Construction personnel vehicle parking, to be confined to the work site enclosure, or.

.2 Parking will be permitted on site only where and if it does not disrupt the employees of the place of work as directed by the Board

.3 Permission to park vehicles on site does not imply any liability or responsibility for safe keeping of vehicles and contents thereof by the School Board.

1.18. ACCESS TO SITE

.1 Provide and maintain adequate access to the project site.

.2 Build and maintain temporary roads where necessary and provide snow removal within the area of work, and access to the work, during the period of Work. The area shall be restored to the satisfaction of the Board at the completion of the project.

.3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

.4 Clean roadways and taxi areas where used by Contractor's equipment.

1.19. SECURITY

.1 The Contractor shall ensure the security of the work site, contents, and built structures for the duration of the project.

.2 The Contractor shall be responsible to provide and pay for security personnel to guard the site and contents of the site after working hours and during holidays as required.

.3 Notify the Board of the use of security guards or systems.

.4 The Board shall not be responsible for the loss, theft, or vandalism.

1.20. OFFICES

.1 Provide and maintain, until completion of Contract, for Contractor's use, a temporary office, large enough to accommodate site administrative activities and site meetings, complete with light, heat, air conditioning, ventilation, table and chairs. Do not store materials in the office area; keep clean and tidy.

.2 Provide a clearly marked and fully stocked first-aid case in a readily available location.

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

1.21. EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds and platforms for storage of tools, equipment and materials.

.2 Review storage areas on site with the Consultant. Store materials and equipment to ensure preservation of quality of product and fitness for the Work. Store materials and equipment on wooden platforms or other hard, clean surfaces, raised above the ground or in water tight storage sheds of sufficient size for storage of materials and equipment which might be damaged by storage in the open. Locate stored materials and equipment to facilitate prompt inspection.

.3 Store packaged materials and equipment undamaged, in their original wrappings or containers, with manufacturer's labels and seals intact.

.4 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

.5 Storage sheds required by subcontractors shall be provided by them.

1.22. SANITARY FACILITIES

.1 Provide weatherproof temporary toilet/sanitary facilities for the work force in accordance with governing regulations and ordinances.

.2 Service temporary toilet/sanitary facilities as required by authorities but not less than weekly.

.3 Post notices and take such precautions as required by local health authorities.

.4 The use of existing washroom facilities is not allowed unless specifically approved by the Board. The Contractor will be required to clean and maintain the existing washrooms to Board standards.

.5 Except where connected to the municipal sewer system, periodically remove wastes from Site.

.6 Keep toilet/sanitary facilities clean and sanitary and protect from freezing.

.7 Keep sanitary facilities clean and fully stocked with the necessary supplies at all times.

END OF SECTION

01 54 00 – Materials and Equipment

1.0 GENERAL

1.1. RELATED SECTIONS

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

1.2. PRODUCT AND MATERIAL QUALITY

.1 Products, materials, equipment and articles referred to as “Products”; throughout the specifications incorporated in the Work, shall be new, not damaged or defective, and of the best quality, compatible with specifications for the purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Defective products will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is a precaution against oversight or error. Remove and replace defective products at own expense, and be responsible for delays and expenses caused by rejections.

.3 Should any dispute arise as to the quality or fitness of products, the decision rests strictly with the Board contact, based upon requirements of the Contract Documents.

.4 Current Material Safety Data Sheets shall be on file with the successful Contractor and shall be provided to the Board contact upon request, within twenty-four (24) hours.

.5 Material safety data sheets are not required for products currently WHMIS exempt.

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

.1 Handle and store products in a manner to prevent damage, adulterations, deterioration, and soiling, and in accordance with manufacturer’s instructions.

.2 Store packaged or bundled products in original and undamaged condition, with manufacturer’s seals and labels intact.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Provide and maintain tools, equipment and materials in a clean and orderly condition. Board tools, ladders, lifts, power cords, flashlights etc. are not to be used.

.5 Materials are to be stored in a manner to cause the least interference with WorK activities.

.6 The Contractor shall determine with the Board contact, prior to ordering materials, those locations that are suitable for receiving and storage of materials and equipment.

.7 All materials and equipment shall be kept in a secure area, at Contractor's expense, or removed from the job site when Work is not actually in progress.

.8 Vehicles, trailers or other similar apparatus may not be stored or parked overnight at site without written authorization from Board contact. Written requests are to be forwarded directly to the Board contact.

.9 Approval for parking does not imply any liability or responsibility for safe keeping by the Board.

.10 The Contractor may use the existing electrical and water services, as required, for the Work, and the costs of these services shall be borne by the Board.

1.4. WORKMANSHIP

.1 Workmanship shall be the best quality, executed by Workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Consultant if required Work is such as to make it impractical to produce required results.

.2 Do not employ any unfit persons or anyone unskilled in their required duties.

.3 Decisions as to the quality or fitness of Workmanship in cases of dispute rest solely with the Board contact, whose decision is final.

.4 All Contractor personnel are restricted to the job site and necessary access routes. No personnel shall visit other areas or buildings without specific authorization.

.5 The Contractor shall make their own arrangements for emergency treatment of accidents.

.6 Any accidents shall be reported immediately to the Board contact.

.7 The Contractor agrees to hold the Board harmless of any and all liability of every nature and description, which may be suffered through bodily injuries, involving deaths of any persons, by reasons of negligence of the Contractor, his agents, employees, or his Subcontractors.

.8 The Contractor shall supply constant on-site supervision in the form of a Project Superintendent. The Project Superintendent shall have within their authority to negotiate minor changes regarding scheduling, manpower and equipment.

1.5. MANUFACTURER'S INSTRUCTIONS

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

1.6. TOOLS OF THE TRADE

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

1.7. EXISTING EQUIPMENT

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

END OF SECTION

01 61 00 – Product Requirements

1.0 GENERAL

1.1. RELATED SECTIONS

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

.2 Section 01 31 00 – Project Managing and Coordination

1.2. TERMINOLOGY

.1 New: Produced from new materials.

.2 Renewed: Produced or rejuvenated from an existing material to like-new condition to serve a new or existing service.

.3 Defective: A condition determined exclusively by the Consultant.

1.3. PRODUCT QUALITY

.1 The term 'new' in the following paragraph does not exclude re-manufactured products that have some or all of the materials recycled from other sources. Preference in recycling is for post-consumer recycled materials.

.2 Products, materials, equipment, parts or assemblies (referred to as Products) incorporated in Work:

.3 New Product, not damaged or defective, of best quality (compatible with specification requirements) for purpose intended. If requested, provide evidence as to type, source and quality of Products provided.

.4 Defective Products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective Products at own expense and be responsible for delays and expenses caused by rejection.

.5 Should any dispute arise as to the quality or fitness of Products, decision rests strictly with Consultant.

.6 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout the building.

1.4. AVAILABILITY

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

.2 Immediately upon receipt of the Board's Purchase Order the Contractor shall issue Purchase Orders and or Contracts to all Sub-trades. Provide proof to the Consultant and the Board within 3 days. The Subcontractors shall identify in writing any delivery issues within 14 days of receiving the Contractor's purchase order or contract. The Schedule noted in 01-31 00 1.7.1 shall incorporate all deliveries and installation.

.3 If delays in supply of Products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.4 In the event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves the right to substitute more readily available Products of similar character, at no increase in Contract Price or Contract Time.

1.5. STORAGE AND PROTECTION

.1 Store and protect Products in accordance with manufacturers' written instructions.

.2 Store with seals and labels intact and legible.

.3 Store sensitive Products in weather tight, climate controlled, enclosures in an environment favourable to Product.

.4 For exterior storage of fabricated Products, place on sloped supports above ground.

.5 Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.

.6 Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

.7 Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

.8 Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.6. TRANSPORTATION AND HANDLING

.1 Transport and handle Products in accordance with manufacturer's written instructions.

.2 Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

.3 Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

.4 Suitably pack, crate and protect products during transportation to site to preserve their quality and fitness for the purpose intended.

.5 Store products in original, undamaged condition with manufacturer's labels and seals intact until they are being incorporated into completed work.

.6 Protect materials from damage by extreme temperatures or exposure to the weather.

1.7. EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum disturbance to the owner.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in a manner approved by authority having jurisdiction. Stake and record location of capped service.

1.8. MANUFACTURER'S WRITTEN INSTRUCTIONS

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

.2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant may establish course of action.

.3 Improper installation or erection of Products, due to failure in complying with these requirements, authorizes Consultant to require removal and reinstallation at no increase in Contract Price or Contract Time.

1.9. QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Consultant if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Consultant and or Board reserves right to require dismissal from site any workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Consultant, whose decision is final.

.4 Products, materials, systems and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the applicable manufacturer's printed directions.

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

1.10. COORDINATION

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

.3 Contractor is responsible to ensure suppliers or distributors of materials specified or alternatives accepted, which he intends to use, have materials with original schedule, and similarly it shall be the responsibility of all subcontractors and suppliers to so inform the Contractor.

.4 Contractor shall contact Consultant immediately upon receipt of information indicating materials or items, will not be available on time, in accordance with the latest approved schedule, and similarly it shall be the responsibility of all subcontractors and suppliers to so inform the Contractor.

.5 The above, in no way releases the Contractor, or their subcontractors and suppliers of their responsibility for ensuring timely ordering of materials and items required, including the necessary expediting, to complete the Work as scheduled in accordance with the Contract Documents including temp accommodations and or materials to ensure occupancy date is achieved.

1.11. CONCEALMENT

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform the Consultant if there is interference. Install as directed by the Consultant at no additional cost to the Board.

1.12. REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.13. LOCATION OF FIXTURES

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

1.14. FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use Type 304 or 316 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.15. PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of any part of the Project.

.2 Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated, without written approval of the Consultant.

END OF SECTION

01 70 00 – Examination and Preparation

1.0 GENERAL

1.1. RELATED SECTIONS

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

1.2. REFERENCES

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

1.3. SUBMITTALS

.1 Submit name and address of Surveyor to Consultant.

.2 On request of Consultant, submit documentation to verify accuracy of field engineering work.

.3 Submit certificate signed by surveyor certifying that elevations and locations of completed Work conforms with Contract Documents.

1.4. QUALIFICATIONS OF SURVEYOR

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

1.5. SURVEY REFERENCE POINTS

.1 Existing base horizontal and vertical control points are designated on Drawings.

.2 Locate, confirm and protect control points prior to starting site Work. Preserve permanent reference points during construction.

.3 Make no changes or relocations without prior written notice to the Consultant.

.4 Report to Consultant when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.5 Require the surveyor to replace control points in accordance with original survey control.

1.6. SURVEY REQUIREMENTS

.1 Establish existing and new permanent bench marks on site, referenced to established benchmarks by survey control points.

.2 Record locations, with horizontal and vertical data in Project Record Documents.

.3 Establish lines and levels, locate and lay out, by instrumentation.

.4 Establish pipe invert elevations.

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

1.7. SUBSURFACE CONDITIONS

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

1.8. EXAMINATION

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

1.9. PREPARATION

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

1.10. EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in the area of Work and notify the Consultant of findings.

.2 Remove abandoned service lines running through existing and new structures. Cap or seal lines at cut-off points as directed by the Consultant.

1.11. LOCATION OF EQUIPMENT AND FIXTURES

.1 Inform Consultant of conflicting installations, install as directed.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Consultant of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Consultant.

1.12. SURVEY RECORD

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.

.3 Record locations of maintained, re-routed and abandoned service lines.

END OF SECTION

SECTION 01 73 30 – EXECUTION AND CUTTING AND PATCHING

1.0 GENERAL

1.1. RELATED SECTIONS

.4 Section 01 32 00 - Construction Progress Documentation: Submittals and scheduling.

.5 Section 01 61 00 - Product Requirements.

.6 Section 01 70 00 – Examination and Preparation

.7 Individual Product Specification Sections:

.1 Cutting and patching incidental to work of the section.

.2 Advance notification to other sections of openings required in Work of those sections.

1.2. SUBMITTALS

.8 Submit written request in advance of cutting or alteration which affects:

.1 Structural integrity of any element of Project.

.2 Integrity of weather exposed or moisture resistant element.

.3 Efficiency, maintenance, or safety of any operational element.

.4 Visual qualities of sight exposed elements.

.5 Work of Owner or separate contractor.

.9 Include in request:

.1 Identification of Project.

.2 Location and description of affected Work.

.3 Necessity for cutting or alteration.

.4 Description of proposed Work and Products to be used.

.5 Alternatives to cutting and patching.

.6 Effect on work of Owner or separate contractor.

.7 Written permission of affected separate contractor.

.8 Date and time work will be executed.

1.3. TOLERANCES

.10 Monitor fabrication and installation tolerance control of Products to produce acceptable Work.

.11 Do not permit tolerances to accumulate beyond effective or practical limits.

.12 Comply with manufacturers' tolerances. In case of conflict between manufacturers' tolerances and Contract Documents, request clarification from the Consultant before proceeding.

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

2.0 PRODUCTS

2.1. MATERIALS

.1 Primary Products: Those required for original installation.

.2 Product Substitution: For any proposed change in materials, submit a request for substitution described in Section 01 33 00.

3.0 EXECUTION

3.1. EXAMINATION

.1 Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

.2 After uncovering existing Work, assess conditions affecting performance of work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

3.2. PREPARATION

.1 Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of the Project from damage.

.2 Provide protection from elements for areas which may be exposed by uncovering work.

.3 Maintain excavations free of water.

3.3. CUTTING

.1 Execute cutting and fitting as needed to complete the Work. Prior to any cutting and or coring of concrete floors the contractor shall confirm the area is free of services or rebar. Notify the Consultant of any interferences.

.2 Uncover work to install improperly sequenced work.

.3 Remove and replace defective or non-conforming work.

.4 Remove samples of installed work for testing for Hazardous materials.

.5 Provide openings in the Work for penetration of mechanical and electrical work.

.6 Employ experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

.7 Cut rigid materials using a masonry saw or core drill. Pneumatic tools are not allowed without prior approval.

.8 Do all cutting, patching, and making good, to leave a finished condition and to make the several parts of the work come together properly. Coordinate work to keep cutting and patching to a minimum.

.9 Make cuts with clean, true, smooth edges. Fit unit to tolerance established by test standard practice for applicable work. Make patches invisible in the final assembly.

.10 Cutting shall be done in a manner to keep patching to minimum. Obtain Consultant's approval of method to be used to conceal new mechanical and electrical services before beginning cutting. Chasing of concrete surfaces is not permitted.

.11 Cutting or coring of any structural concrete is to be reviewed and approved by the Consultant.

.12 Do not endanger any work by cutting, digging or otherwise altering, and do not cut nor alter any load bearing element without written authorization by Consultant. Provide bracing, shoring and temporary supports as required to keep construction safely supported at all times

.13 Any cost caused by omission or ill-timed work shall be borne by the party responsible thereof.

.14 Regardless of which Section of work is responsible for any portion of cutting and patching, in each case tradesmen qualified in work being cut and patched shall be employed to ensure it is correctly done.

3.4. PATCHING

.1 Execute patching to complement adjacent Work.

.2 Fit Products together to integrate with other Work.

.3 Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

.4 Employ original installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.

.5 Restore work with new Products in accordance with requirements of Contract Documents.

.6 Fit work with adequate support to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.7 At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with firestop material.

.8 Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to the nearest intersection or natural break. For an assembly, refinish the entire unit.

.9 Complete and tightly fit all construction to pipes, ducts and conduits which pass through construction to completely prevent the passage of air.

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

END OF SECTION

01 74 00 – Cleaning and Waste Management

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Common Work by All Trades

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

.3 Conduct cleaning and disposal operations to comply with local ordinances and environmental protection legislation.

.4 Store volatile wastes in covered metal containers, and remove them from premises at the end of each working day.

.5 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

2.0 PRODUCTS

2.1. CLEANING PRODUCTS

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

3.0 EXECUTION

3.1. CLEANING DURING CONSTRUCTION

.1 Maintain the Work in tidy condition, free from accumulation of waste products and debris, other than that caused by the Owner or other Contractors.

.2 Remove waste material and debris from the work areas and deposit in a waste container at the end of each working day.

.3 Vacuum clean interior areas prior to the start of finishing work. Maintain areas free of dust and other contaminants during finishing operations.

.4 Individual Subcontractors are responsible for the daily clean-up and removal of debris related to, or generated by, their own work. The overall responsibility for project cleanliness rests with the Contractor.

.5 The Contractor shall be responsible for snow removal within the construction area.

.6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.7 Wherever possible recycle materials

.8 Containers:
  .1 Provide adequate number and sizes of on-site garbage and recycling containers within designated work site as required for collection of waste materials and debris on a daily basis.
  .2 Provide additional waste containers when the extent of work warrants.
  .3 Provide and use clearly marked, separate bins for recycling.

.9 Dispose of waste materials and debris at registered waste disposal and recycling facility.

.10 Remove oily rags, waste and other hazardous substances from premises at close of each day, or more often when required.

.11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

3.2. WASTE MANAGEMENT

.1 Audit, separate and dispose of construction waste generated by new construction or by demolition of existing structures in whole or in part, in accordance with Ontario Regulations 102/94 and 103/94 made under the Environmental Protection Act.

.2 Containers:
  .1 Provide adequate number and sizes of on-site garbage and recycling containers within designated work site as required for collection of waste materials and debris on a daily basis.
  .2 Provide additional waste containers when the extent of work warrants.
  .3 Provide and use clearly marked, separate bins for recycling.

.3 Fires, and burning of rubbish or waste on site is strictly prohibited.

.4 Burying of rubbish or waste materials on site is strictly prohibited.

.5 Disposal of waste or volatile materials such as mineral spirits, oil, gasoline or paint thinner into ground, waterways, or sewer systems is prohibited.

.6 Empty waste containers on a regular basis to prevent contamination of site and adjacent properties by wind-blown dust or debris

3.3. PREPARATION FOR FINAL CLEANING

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

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

3.4. FINAL CLEANING PRIOR TO ACCEPTANCE: INTERIOR

.1 Prior to applying for Substantial Performance of the Work, or, prior to Owner occupancy of the building or portion of the building affected by the Work, whichever comes first, conduct full and complete final cleaning operations for the areas to be occupied.

.2 Final cleaning operations shall be performed by an experienced professional cleaning company, possessing equipment and personnel sufficient to perform full building cleaning operations. Contractors “broom cleaning” is not acceptable as a “Final Clean”. The cleaning contractor shall:

.1 clean interiors of all millwork and surfaces of any furniture and equipment present,

.2 use only cleaning materials recommended by the manufacturer of the surface to be cleaned,

.3 remove all stains, spots, scuff marks, dirt, dust, remaining labels, adhesives or other surface imperfections,

.4 clean and polish all glass and mirrors and remove remaining manufacturer's and safety "X" labels,

.5 clean and polish all finished metal surfaces such as enamelled or stainless steel, chrome, aluminum, brass, and bronze,

.6 clean and polish all vitreous surfaces such as plumbing fixtures, ceramic tile, porcelain enamel, or other such materials,

.7 clean all ceramic tile surfaces in accordance with the manufacturer's instructions,

.8 vacuum, clean and dust behind grilles, louvres and screens,

.9 steam clean all unprotected carpets immediately prior occupancy by Owner, and

.10 clean all equipment and fixtures to a sanitary condition.

.3 For any areas to be occupied after the owner’s initial occupancy, provide full cleaning operations as outlined above prior to turning over to owner,

.4 The Board’s supplies and equipment must not be used for any cleaning operations including, but not limited to: garbage cans, mops, brooms, rags, ladders, chemicals etc.

3.5. FINAL CLEANING PRIOR TO ACCEPTANCE: EXTERIOR

.1 For areas affected by construction final exterior cleaning operations shall be performed by the General Contractor or competent Subontractor. Contractor's "broom cleaning" only is not acceptable.

.2 Final exterior cleaning shall include:

.1 broom clean and wash exterior walkways, steps, and surfaces; rake clean other surfaces of grounds,

.2 remove dirt and other disfiguration from exterior surfaces,

.3 sweep and wash clean paved areas,

.4 replace filters of mechanical equipment for all equipment that was in use during construction,

.5 clean all roofs, gutters, downspouts, areaways, drywells, and drainage systems,

.6 remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.7 remove overspray

END OF SECTION

01 78 10 – Closeout Submittals and Requirements

1.0 GENERAL

1.1. RELATED SECTIONS

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

1.2. TAKE-OVER PROCEDURES

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

1.3. SUBSTANTIAL PERFORMANCE

.1 Prior to requesting a Substantial Performance deficiency inspection submit 2 hard copies, 1 digital copy of the Operating and Maintenance Manuals for Consultants approval.

.2 Application for Substantial Performance must include.

.1 One (1) electronic copy of inspection and acceptance certificates required from regulatory agencies, including but not limited to.

.1 Certificates of Approval of the Work by the local Building Department.

.2 Electrical Inspection Certificate of Inspection.

.3 Fire Alarm Verification Certificate.

.3 Advise Consultant in writing, when the project has been substantially completed. If Consultant agrees this stage has been reached, the Consultant shall prepare a complete list of deficiencies and submit copies of this list to Contractor and the Board.

1.4. COMMENCEMENT OF LIEN PERIODS

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

1.5. TOTAL PERFORMANCE

.1 Prior to requesting a final inspection submit written certificate that the following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents and is ready for final inspection

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested and are fully operational. Submit two copies of the balancing reports

.4 Certificates required by the contractor have been submitted.

.5 Operation of systems have been demonstrated to Owner's personnel.

.6 Submit Record drawings.

.7 Submit maintenance materials.

.8 Provide certified site survey

.2 When items noted above are completed, request final inspection of Work by consultant, and building inspector. If Work is deemed incomplete by Consultant, complete outstanding items and request re-inspection.

1.6. PAYMENT OF SUBSTANTIAL PERFORMANCE HOLDBACK

.1 Prior to the release of lien holdback provide one copy of the following by the Contractor and each subcontractor:

.1 Statutory Declaration or Declaration of Last supply

.2 Workplace Safety and Insurance Board “Certificate of Clearance”.

.2 The Contractor shall submit an application for payment of the holdback amount.

.3 After the receipt of an application for payment which will include a Statutory Declaration and WSIB Clearance from the, the Consultant will issue a certificate for payment of the holdback amount.

1.7. FINAL PAYMENT

.1 When the Contractor considers final deficiencies and defects have been corrected and it appears requirements of Contract have been completed, make application for final payment.

.2 When the Consultant finds the Contractor's application for final payment valid, the Consultant will issue a final certificate of payment

.3 The Board reserves the right to charge the Contractor for school access card(s) that have not been returned.

.4 The cost to reprogram or replace the card(s) access system is estimated at $50.00 (fifty dollars) for each card issued, $30.00 (thirty dollars) for each keybox key, plus $35.00 (thirty five dollars) administration fee.

1.8. CLOSEOUT SUBMITTALS

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products and submit them to the Consultant for review.

.2 Copy will be returned to the contractor with the Consultant's comments.

.3 Revise content of documents as required prior to final submission.

.4 Two (2) weeks prior to Substantial Performance of the Work, submit to the Consultant, the final copies of operating and maintenance manuals.

.5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.6 If requested, furnish evidence as to type, source and quality of products provided.

.7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.8 Pay costs of transportation.

1.9. OPERATION AND MAINTENANCE MANUAL FORMAT

.1 Provide two copies of operating and maintenance data, prepared on 215 X 280mm sheets in printed or typewritten form, contained in 3-ring binders with soft vinyl covers for materials and equipment which require special maintenance or operating procedures.

.2 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder at the front of each volume.

.3 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.4 Arrange content by the divisions of the specifications under Section numbers and sequence of Table of Contents.

.5 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.6 Include the following in each manual:

.1 Complete list of subcontractors and suppliers, their addresses and telephone numbers. Provide 24 hour emergency telephone numbers for such subcontractors as Plumbing, Electrical, Sprinklers, Fire System, Heating, etc.

.2 Specified warranties for contractor, each subcontractor and supplier.

.3 WRDSB Project Asset and Warranty Card, Appendix 00 41 13A

.4 Copy of finish hardware list, complete with all amendments and revisions and lock manufacturer's descriptive and service literature.

.5 Schedule of paints and coatings. Include sufficient explanation to fully identify each surface with the applicable paint or coating used. Enclose a copy of the colour schedule.

.6 Maintenance instructions for finished surfaces.

.7 Brochures, cuts of equipment and fixtures.

.8 Operating and maintenance instructions for equipment.

.9 Submit copies of letters from manufacturers of equipment and systems indicating their technical representatives have inspected and tested systems and are satisfied with methods of installation, connection and operations. These letters shall state names of persons present at testing, methods used and list of functions performed.

.10 Submit one complete set of reviewed shop drawings of architectural, structural, mechanical and electrical items, folded to 215 x 280mm size, contained in heavy duty manila envelopes, numbered and labelled. Follow specification format with no more than one Section per envelope, hard copy and PDF.

.11 Relevant certificates issued by authorities having jurisdiction

.12 Computer disc or flash drive with all the above documentation in PDF format

1.10. RECORDING ACTUAL SITE CONDITIONS

.1 Record information on a set of black line opaque drawings, and within the Project Manual.

.2 Annotate with coloured felt tip marking pens, maintaining separate colours for each major system, for recording changed information.

.3 Record information concurrently with construction progress. Do not conceal Work of the Project until required information is accurately recorded.

.4 Contract drawings and shop drawings: legibly mark each item to record actual construction, including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 References to related shop drawings and modifications.

.5 Specifications: legibly mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

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

1.11. RECORD (AS-BUILT) DOCUMENTS AND SAMPLES

.1 Store AS-BUILT documents and samples in the field office apart from documents used for construction. Provide files, racks, and secure storage.

.2 Label AS-BUILT documents and file in accordance with section number listings in List of Contents of the Project Manual. Label each document AS-BUILT DOCUMENTS in neat, large, printed letters.

.3 Maintain AS-BUILT documents in clean, dry and legible condition. Do not use as-built documents for construction purposes.

.4 Keep as-built documents and samples available for inspection by the Consultant.

1.12. RECORD DRAWINGS

.1 Prior to Substantial Performance of the Work, update the marked up information from the AS-BUILT documents to a master set of drawing.

.2 Submit one set of completed AS-BUILT documents to the Consultant for review.

.3 Documents will be returned to the contractor with the Consultant's comments.

.4 Revise content of documents as required prior to final submission.

.5 After the review is completed resubmit to the Consultant for Consultant to produce electronic record drawings for the owner to use.

1.13. SPARE PARTS

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in the Maintenance Manual.

.4 Obtain receipt for delivered products and submit prior to final payment.

1.14. REPLACEMENT (MAINTENANCE) MATERIALS

.1 Deliver to site, unload and store where directed, replacement (maintenance) materials as required elsewhere in these Specifications. Obtain a signed receipt from the Owner's Representative for delivered materials and include a copy of receipt in Operation and Maintenance manuals.

.2 Package materials so they are protected from damage and loss of essential properties.

.3 Label packaged materials for proper identification of contents.

1.15. SPECIAL TOOLS

.1 Provide special tools, in quantities specified in the individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual

1.16. FINAL SITE SURVEY

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

1.17. WARRANTIES AND BONDS

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Except for items put into use with Owner's permission, leave the date of beginning of time of warranty until the Date of Substantial Performance is determined. The date of Substantial Performance of the Work shall be the date for commencement of the warranty period.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute submittals when required.

.6 Retain warranties and bonds until time specified for submittals.

END OF SECTION

01 78 40 – Maintenance Requirements

1.0 GENERAL

1.1. SECTION INCLUDES

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

1.2. RELATED SECTIONS

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

1.3. EQUIPMENT AND SYSTEMS

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete
.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
.3 Include installed colour coded wiring diagrams.
.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
.6 Provide servicing and lubrication schedule, and list of lubricants required.
.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide coordination Drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide a list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include test and balancing reports as specified in Section 01 45 00.

.15 Additional requirements: As specified in individual specification sections.

2.0 PRODUCTS

2.1. MATERIALS AND FINISH

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Building Envelope: include copies of drawings of building envelope components, illustrating the interface with similar or dissimilar items to provide an effective air, vapour and thermal barrier between indoor and outdoor environments. Include an outline of requirements for regular inspections and for regular maintenance to ensure that on-going performance of the building envelope will meet the initial building envelope criteria.

.5 Additional Requirements: as specified in individual specifications sections.

2.2. SPARE PARTS

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in the Maintenance Manual.

.4 Obtain receipt for delivered products and submit prior to final payment.

2.3. MAINTENANCE MATERIALS

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in the Maintenance Manual.

.4 Obtain receipt for delivered products and submit prior to final payment.

2.4. SPECIAL TOOLS

.1 Provide special tools, in quantities specified in the individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in the Maintenance Manual.

3.0 EXECUTION

3.1. DELIVERY TO SITE

.1 Deliver to place of work and store.

.2 General Contractor to receive and acknowledge delivery from contractors and subcontractors of all parts and materials assembled for maintenance requirements. Provide a summary inventory list to the Consultant and/or the Board after all materials are gathered and verification of location. Signatures of receipt will not be accepted from anyone except the General Contractor’s representative.

3.2. STORAGE, HANDLING AND PROTECTION

.1 Consult with the Board to determine location for storage.

.2 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.3 Store in original and undamaged condition with manufacturer's seal and labels intact.

.4 Store components subject to damage from weather in weatherproof enclosures.

.5 Store paints and freezable materials in a heated and ventilated room.

.6 Remove and replace damaged products at own expense and to the satisfaction of the Consultant.

END OF SECTION

01 79 00 – Demonstration and Training

1.0 GENERAL

1.1. SECTION INCLUDES

.1 Procedures for demonstration and instruction of Products, equipment and systems to Owner's personnel.

.2 Seminars and demonstrations.

1.2. RELATED SECTIONS

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

1.3. DESCRIPTION

.1 At Substantial Performance, at a time acceptable to Owner and Consultant, but not before operations and maintenance manual have been reviewed and accepted by the consultant; contractor shall give a complete demonstration in the presence of consultant; Sub-consultants, Owner and Owner's personnel of operation and maintenance of systems and equipment once they are 100% complete.

.2 Owner will provide a list of personnel to receive instructions and will coordinate their attendance at agreed-upon times.

1.4. COMPONENT DEMONSTRATION

.1 Manufacturer to provide authorized representative to demonstrate operation of equipment and systems.

.2 Instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.

1.5. SUBMITTALS

.1 Submit schedule of time and date for demonstration of each item of equipment and each system one (1) week prior to designated dates, for Consultant's approval.

.2 Submit reports within forty eight (48) after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.3 Give time and date of each demonstration, with a list of persons present.

1.6. CONDITIONS FOR DEMONSTRATIONS

.1 Equipment has been inspected and put into operation in accordance with manufacturer's instructions and contract requirements.

.2 Testing, adjusting, and balancing have been performed in accordance with manufacturer's instructions and contract requirements, and equipment and systems are fully operational.

.3 Provide information packages as required for use in demonstrations and instructions.

2.0 PRODUCTS

2.1. NOT USED

.1 Not used.

3.0 EXECUTION

3.1. PREPARATION

.1 Verify that suitable conditions for demonstration and instructions are available.

.2 Verify that designated personnel are present.

.3 Prepare agendas and outlines.

.4 Establish seminar organization.

.5 Explain component design and operational philosophy and strategy.

.6 Develop equipment presentations.

.7 Present system demonstrations.

.8 Accept and respond to seminar and demonstration questions with appropriate answers.

3.2. PREPARATION OF AGENDAS AND OUTLINES

.1 Prepare agendas and outlines including the following:

.1 Equipment and systems to be included in seminar presentations.

.2 Name of companies and representatives presenting at seminars.

.3 Outline of each seminar's content.

.4 Time and date allocated to each system and item of equipment.

.5 Provide a separate agenda for each system.

3.3. SEMINAR ORGANIZATION

.1 Coordinate content and presentations for seminars.

.2 Coordinate individual presentations and ensure representatives scheduled to present at seminars are in attendance.

.3 Arrange for presentation leaders familiar with the design, operation, maintenance and troubleshooting of the equipment and systems. Where a single person is not familiar with all aspects of the equipment or system, arrange for specialists familiar with each aspect.

.4 Coordinate proposed dates for seminars with Owner and select mutually agreeable dates.

3.4. EXPLANATION OF DESIGN STRATEGY

.1 Explain design philosophy of each system. Include following information:

.1 An overview of how the system is intended to operate.

.2 Description of design parameters, constraints and operational requirements.

.3 Description of system operation strategies.

.4 Information to help in identifying and troubleshooting system problems.

3.5. DEMONSTRATION AND INSTRUCTIONS

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment.

.2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.

.3 Instruct personnel on control and maintenance of sensory equipment and operational equipment associated with maintaining energy efficiency and longevity of service.

.4 Review contents of manual in detail to explain all aspects of operation and maintenance.

.5 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

END OF SECTION

1 General

1.1 SUMMARY

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

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

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

.1 Partitions complete with framing.

.2 Window, window bucks and window accessories scheduled.

.3 Ceiling assemblies and ceiling features scheduled for demolition, complete with existing light fixtures and equipment as scheduled.

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

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

.6 Floor, wall base and wall finishes.

.7 Millwork and adjacent coat racks in their entirety where scheduled.

.8 Tackboards and Whiteboards.

.9 Kitchen appliances indicated.

.10 Wood ceiling assembly.

.11 Stair tread covers from each stair scheduled, complete with adhesive.

.12 Openings in concrete floor for installation of new mechanical services.

.13 Access hatches scheduled.

.14 Doors, frames and associated hardware.

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

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

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

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

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

1.2 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI):

.1 ANSI A10.8-2019, Scaffolding Safety Requirements

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

.1 ASTM C475/C475M-17(2022), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board

.3 Canadian Standards Association (CSA):

.1 CSA S350- M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

.4 National Fire Protection Association (NFPA):

.1 NFPA 241-22, Standard for Safeguarding Construction, Alteration, and Demolition Operations

.5 Provincial Legislation:

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

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

.2 Canadian Construction Safety Code;

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

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

1.3 DEFINITIONS

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

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

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

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

1.4 EXAMINATION

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

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

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

1.5 SUBMITTALS

.1 Provide required information in accordance with Division 01.

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

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

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

.2 Interruption of utility services

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

1.6 QUALITY ASSURANCE

.1 Conform to requirements of all authorities having jurisdiction.

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

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

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

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

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

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

1.7 PROTECTION

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

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

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

.4 Prevent damage of surrounding vegetation by construction.

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

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

1.8 REMAINING AND ADJACENT STRUCTURES

.1 Do not interfere with, encumber, endanger or create nuisance, from any cause due to demolition work, to public property or any adjacent attached and/or detached structures in possession of Owner or others, which are to remain, whether occupied or unoccupied during this work.

.2 Make good damage to such structures resulting from work under this Section at no cost to Owner. Make good adjacent building surfaces damaged by work of this Section.

1.9 PROTECTION OF SERVICES AND STRUCTURES

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

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

1.10 EXISTING SERVICES

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

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

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

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

1.11 DECOMMISSIONED SERVICES

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

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

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

1.12 EXISTING WARRANTIES

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

2 Products

2.1 DEBRIS, SALVAGED MATERIAL AND EQUIPMENT DISPOSAL

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

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

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

2.2 PROTECTION

.1 Temporary Protection:

.1 Erect temporary hoarding protection, as indicated in Division 01, to enclose openings in exterior walls, and/or provide security to partially occupied interior spaces.

.2 Erect temporary dust screens, as indicated in Division 01, to prevent dust and debris to enter areas of the building which are not scheduled for demolition. Remove temporary dust screens when no longer required.

2.3 REPAIR MATERIALS

.1 Use repair materials identical to existing materials:

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

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

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

.2 Floor Patching and Levelling Compounds: Cement based, trowelable, self-levelling compounds compatible with specified floor finishes; as indicated in Section 03 35 00.

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

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

2.4 EXISTING MATERIALS

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

.1 Millwork.

.2 Radiator and radiator cover.

.3 Ceiling mounted forced flow heater.

.4 Wall louver.

.5 Digital thermostat and classroom controls.

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

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

3 Execution

3.1 GENERAL

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

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

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

.4 Demolition by explosives is not permitted.

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

.6 Sprinkle exterior debris with water to prevent dust. Do not cause flooding, contaminated run-off or icing. Do not allow waste material, rubbish, and windblown debris to reach and contaminate adjacent properties.

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

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

3.2 SAFETY AND SECURITY

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

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

3.3 ACCESS ROUTES

.1 Restrict operations to designated access routes.

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

3.4 SELECTIVE DEMOLITION

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

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

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

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

.5 Do not allow water to accumulate or flow beyond work area. Provide receptacles and mop-up as work proceeds.

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

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

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

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

.8 Demolish existing flooring and wall finishes, and adhesive remnants as follows:

.1 Floor and wall substrate shall be smooth, free from ridges and depressions, and adhesive remnants that could telegraph through new flooring and wall finishes.

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

.10 Remove all wall coverings scheduled for demolition. Patch and repair wall surfaces with skim coat of gypsum board joint compound leaving wall surfaces smooth and even ready for new wall finishes.

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

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

3.5 PATCHING AND REPAIRING

.1 Floors and Walls:

.1 Where walls or partitions that are demolished extend from one finished area into another, patch and repair floor and wall surfaces in the new space.

.2 Provide an level and smooth surface having uniform finish colour, texture, and appearance.

.3 Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.

.4 Patch with durable seams that are as invisible as possible.

.5 Provide materials and comply with installation requirements specified in other Sections of these Specifications.

.6 Patch any existing areas adjoining / adjacent to new construction in good workmanship, filling and finishing gaps between finishes to allow new work to blend seamlessly with existing work.

.7 Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.

.8 Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

.2 Ceilings: Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

.3 Exterior Walls: Where existing doors and/or windows are schedule to be removed during demolition, patch and repair exterior walls using similar wall construction techniques as adjacent wall construction. Ensure compatibility between insulation, air barrier and vapour retarder, providing continuous air and vapour control and wall R-Value between existing and new construction. Provide exterior and interior finish materials, matching existing adjacent materials, to provide an even-plane surface of uniform appearance.

3.6 EXCESSIVE DEMOLITION

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

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

3.7 COMPLETION

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

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

END OF SECTION

1 General

1.1 SUMMARY

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

.1 Liquid-Applied Penetrating Sealer.

.2 Cementitious Topping, Patching and Flash Patching Materials.

1.2 DEFINITIONS

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

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

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

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

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

1.3 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA):

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

1.4 RELATED REQUIREMENTS

.1 Basement Floor Underlayment and Moisture Vapour Control Layer: As indicated in Section 09 61 43.

1.5 ADMINISTRATION REQUIREMENTS

.1 Coordination:

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

.2 Pre-Construction Meetings:

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

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

1.6 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

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

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

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

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

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

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

.3 Suspended Slabs: Measurement of 3mm (1/8") or greater than ±6mm (¼") measurement (80% tolerance allowance) will be considered as a failed test and will require flash patching.

1.7 QUALITY ASSURANCE

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

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

1.8 SITE CONDITIONS

.1 Environmental Requirements:

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

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

.2 Protection:

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

2 Products

2.1 MATERIALS

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

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

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

.2 Topping:

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

.2 Basis of Design Materials:

.1 Sikafloor Level 25CA by Sika Canada Ltd.

.2 Ultratop by Mapei Canada Inc.

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

.3 Patching and Flash Patching Materials:

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

.2 Basis of Design Materials:

.1 SikaQuick 1000 by Sika Canada Ltd.

.2 Planitop 18ES by MAPEI Canada Inc.

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

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

3 Execution

3.1 EXAMINATION

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

3.2 FINISHING FLOORS AND SLABS

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

3.3 INSTALLATION

.1 Installation - Liquid-Applied Penetrating Sealer:

.1 Vertical Surfaces:

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

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

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

.2 Horizontal Surfaces:

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

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

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

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

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

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

.1 Leak Prevention:

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

.2 Prime substrate according to manufacturer's recommendations.

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

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

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

.3 Control Joints:

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

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

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

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

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes supply and installation of single wythe unit masonry assemblies, complete with mortar and grout, masonry joint reinforcement, ties, anchors, and miscellaneous masonry accessories.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

.1 American Concrete Institute: (ACI):

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

.2 Canadian Standards Association (CSA):

.1 CSA A165 Series, CSA Standards on Concrete Masonry Units

.2 CSA A179, Mortar and Grout for Unit Masonry

.3 CSA A370, Connectors for Masonry

.4 CAN/CSA A371, Masonry Construction for Buildings

.5 CSA S304.1, Design of Masonry Structures

.6 CSA W186-M, Welding of Reinforcing Bars in Reinforced Concrete Construction

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

.1 ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

.2 ASTM A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

.3 ASTM A496/A496M, Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement

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

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

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

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

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

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

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

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

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

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

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

.15 ASTM F594, Standard Specification for Stainless Steel Nuts

.4 Ontario Concrete Masonry Block Association (OCBA):

.1 OCBA Metric Technical Manual

.5 Underwriters Laboratories of Canada (ULC):

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

1.3 ADMINISTRATIVE REQUIREMENTS

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

.1 Confirmation of specifications and details for the project;

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

.3 Confirmation of appearance of exposed block lintels;

.4 Confirmation of reinforcement at corners and wall intersections;

.5 Coordination of interior crack control measures;

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

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

.1 Steel Support Angles and Brackets:

.1 Coordinate requirements for structural steel support angles and brackets supplied and installed onto the building structure by Structural.

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

.2 Masonry Anchors:

.1 Coordinate supply of anchor sections connecting to structural frame installed by Structural.

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

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Samples: Submit samples of the following; Concrete block, mortar, masonry reinforcement, ties and anchors for Consultant's approval before commencing work of this section.

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

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

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

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

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

.1 Not later than thirty (30) working days following Award of Contract, submit copies of ULC Assembly and Materials Listing for indicating ULC Number and how assembly meets the rating criteria for assemblies listed on drawings.

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

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

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

.1 Masonry Units:

.1 Include material test reports substantiating compliance with requirements.

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

.2 Cementitious Materials:

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

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

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

.3 Accessories:

.1 Reinforcing bars

.2 Joint reinforcement

.3 Anchors, ties, and metal accessories

.4 Site Quality Control Submissions: Submit detailed description of methods, materials, and proposed unit masonry cleaning techniques.

1.5 SITE CONDITIONS

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

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

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

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

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

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

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

1.6 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Delivery and Acceptance Requirements: Deliver pre-blended, dry mortar mix in moisture resistant containers designed for lifting and emptying into dispensing silo; store dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

.2 Storage and Handling Requirements: Store masonry units on elevated platforms in a dry location and as follows:

.1 Stack materials on floors of building so that structural design loads are not exceeded; coordinate with Consultant.

.2 Cover tops and sides of stacks with waterproof sheeting securely tied to pallets if units are not stored in an enclosed location; do not install masonry units that become wet until they are dry.

.3 Store cementitious materials on elevated platforms, under cover, and in a dry location; do not use cementitious materials that have become wet or damp.

.4 Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

2 Products

2.1 CONCRETE MASONRY UNITS

.1 Standard concrete blocks shall be autoclave or bubble cure process, high pressure steam cured, modular, conforming to CSA A165 Series, with lineal shrinkage and moisture movement not to exceed 0.035% and shall be as follows;

.1 Classification: S/15/A/M, 75% solid for all locations where structural members bear on concrete block.

.2 H/15/A/M, for all other block work.

.3 Size: Modular imperial to sizes indicated on Drawings.

.4 Special shapes:

.1 Provide square units for exposed corners.

.2 Provide purpose made shapes for lintels and bond beams.

.3 Provide additional special shapes required for project.

.4 Manufacture special shapes at same time and with the same batch as standard concrete block to be used.

.2 Fire Resistant Concrete Masonry Units: Manufactured in accordance with CSA A165 as modified below:

.1 Classification:

.1 2 Hour Fire Rating: H/15/C/O.

.2 1 Hour Fire Rating: H/15/A/O.

.2 Concrete Composition – 2 Hour Fire Rating: Type $L_2$20S Concrete.

.3 Size: Modular to sizes indicated on Drawings.

.4 Where concrete block walls are required as fire separations or barriers, they shall conform to the local Building Code. With respect to equivalent thickness and type of concrete. Consult with Consultant for locations and special conditions.

.3 Exposed block shall all be made by one manufacturer and shall be uniform in colour, shade and texture.

2.2 MORTAR MATERIALS

.1 Mortar materials shall conform to CSA A179.

.2 Water: Potable (clean, exempt of ice, oils, acid, alkalis, organic matter, sediments or any other harmful matter).

.3 Aggregate: Meeting CSA A179, and as follows:

.1 Use same brands of materials and source of aggregate for entire project.

.2 Use washed aggregate consisting of natural sand or crushed stone for mortar that is exposed to view.

.3 Use aggregate graded with 100% passing the No. 16 (1.18-mm) sieve for joints less than 6 mm thick.

.4 Cement: Normal portland, in accordance with CSA A3000, Type GU.

.5 Grout: In accordance with CSA A179, Table 3.

.6 Hydrated Lime: ASTM C207, Type S.

2.3 MORTAR MIXES

.1 Mixing:

.1 Prepare and mix mortar materials under strict supervision and in small batches for immediate use only.

.2 Mix proprietary mortars in strict accordance with CSA A179. Do not use re-tempered mortars for coloured mortars.

.2 Interior Reinforced or Non-Reinforced Block Walls:

.1 Use Type 'S', premixed 'Bloc Mix' by Daubios Inc., or approved equal by Maxi-Mix.

2.4 MASONRY REINFORCEMENT, TIES AND ANCHORS

.1 Masonry Joint Reinforcement: In accordance with to CSA A371 and ASTM A496, with corrosion protection in accordance with CSA S304.1 and CSA A370, and as follows:

.1 Interior Walls: Hot dip galvanized, carbon steel.

.2 Lengths: A minimum of 3048mm (10') with prefabricated corner and tee units.

.2 Connectors: In accordance with to CSA A370 and CSA S304.1 with hot dip galvanized finish.

.3 Single Wythe Masonry Joint Reinforcement: Either ladder or truss type with single pair of side rods.

.4 Ties and anchors specified in this section shall be designed in accordance with CSA A370 for non-conventional masonry connectors as follows:

.1 Deflection: Maximum 1.6mm (1/16") including free play, when acted upon by a lateral load of 0.45 kN, in all possible positions of adjustment.

.2 Positive restraint at position of maximum adjustment.

.3 Free play of multi-component ties maximum 0.8mm (1/32") when assembled in all possible configurations.

.4 Anchors shall allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall.

.5 Lateral Partition Supports (Top of Wall Anchors):

.1 Angle Support: Fabricated from 3mm (1/8") core metal thickness angled steel plate having 75mm (3") long legs fastened to deck structure to allow vertical movement of masonry assembly; hot dip galvanized; coordinate with Section 07 84 00 for firestopping insulation and smoke seals.

.1 Basis of Design Materials: Blok-Lok BL-LSA1 & 2

.2 Plate Support: Fabricated from 3mm (1/8") core metal thickness stainless steel plate with 10mm (3/8") diameter metal 150mm (6") long welded to plate having closed end plastic tube fitted over rod that allows rod to move in and out of tube.

.3 Anchor Bolts: Where required provide Headed or L-shaped steel bolts in accordance with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers; hot-dip galvanized in accordance with ASTM A153, Class C.

.6 Galvanizing for Masonry Reinforcement, Ties and Anchors:

.1 Hot Dip Hardware and Bolts: In accordance with ASTM A153/A153M, Class B-2 regardless of location.

.2 Hot Dip Sheet Steel: In accordance with ASTM A653, Coating Designation Z600, regardless of location.

.3 Structural Shapes and Pipes: In accordance with ASTM A123, Grade 85, regardless of location.

.7 Rebar Positioners: 9 gauge diameter wire, hot dipped galvanized.

.1 Basis of Design Materials: Blok-Lok BL-RB Rebar Positioners.

.8 Fastening Into Solid Concrete or Solidly Grouted Installation: Two component, injectable adhesive specifically manufactured for use in installing dowels or threaded anchor rods and inserts into new or existing concrete or grout, and as follows:

.1 Epoxy Composition: Sealed packaging containing resin, hardener, cement and water; components.

.2 Curing Time: Rapid set, high strength and stiffness; maximum time 45 minutes at 20 deg C.

.3 Basis-of-Design Materials: Hilti Inc., HIT HY150 System

.9 Fastening Trough Hollow Wall Installation: Two-component, injectable adhesive specifically manufactured for use in installing dowels or threaded anchor rods and inserts, with cylindrical mesh screen tube into new or existing masonry cavity wall, and as follows:

.1 Epoxy Composition: Sealed packaging containing resin, hardener, cement and water.

.2 Curing Time: Rapid set, high strength and stiffness; maximum time 60 minutes at 20 deg C.

.3 Basis-of-Design Materials: Hilti Inc., HIT HY20 System.

2.5 MISCELLANEOUS MASONRY ACCESSORIES

.1 Packing Insulation: As indicated in Section 07 21 16.

.2 Firestopping: As specified under Section 07 84 00.

.3 Sealants: As specified under Section 07 92 00, and as follows:

.1 Vertical Sealant: Colour to match masonry.

.2 Horizontal Sealant: Colour to match mortar.

.4 Maintenance Cleaners: Manufacturer's recommended maintenance cleaners.

.5 Support Angle: Hot dip galvanized, in accordance with CSA A370 and ASTM A153.

.6 Fasteners: Galvanized fasteners meeting the requirements of ASTM A325, and as recommended by manufacturer.

.7 Compressible Joint Filler: Pre-moulded filler strips in accordance with ASTM D1056-07, Grade 2A1; compressible up to 35%; of width and thickness indicated; formulated from neoprene, urethane or PVC.

.8 Bond Breaker Strips: #15 asphalt saturated, organic roofing felt in accordance with CSA A123.3.

2.6 MASONRY COATINGS

.1 Proprietary Masonry Cleaner: Masonry manufacturer's recommended cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discolouring or damaging masonry surfaces.

.1 Clear coating.

.2 Verify acceptability of cleaner for cleaning masonry with mortar joints and for kinds of masonry units specified.

3 Execution

3.1 EXAMINATION

.1 Examine conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work.

.1 Prepare written report listing conditions detrimental to performance of work and submit to the Consultant.

.2 Verify that reinforcing dowels are properly placed.

.2 Examine rough-in and built-in construction for piping systems to verify actual locations of piping connections before installation of unit masonry.

.3 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION - GENERAL

.1 Thickness: Build single wythe walls to actual widths of masonry units, using units of widths indicated on Drawings.

.2 Single wythe masonry construction shall conform with the Ontario Concrete Block Association (OCBA) requirements for water resistant single wythe masonry construction.

.3 Use full size units without cutting except as follows:

.1 Cut units with motor driven saws if cutting is required to provide a continuous pattern or to fit adjoining construction.

.2 Provide clean, sharp, un-chipped edges.

.3 Allow units to dry before laying unless wetting of units is specified.

.4 Install cut units with cut surfaces and cut edges concealed where possible; obtain Consultant's acceptance where cut edges must be exposed.

.4 Select and arrange units for exposed unit masonry to produce a uniform blend of colours and textures; mix units by drawing units diagonally down multiple rows from at least three different pallets as masonry units are placed. "Exposed" means visible in complete work, unpainted and painted.

.1 Large variations in colour or texture between adjacent blocks of material will cause the Consultant to reject the installation, and the installer to rebuild the assembly at no additional cost to Contract.

.5 Wet masonry before laying when recommended by manufacturer; allow units to absorb water so they are damp but not wet at time of laying.

.6 Maintain dimensions, lines and levels.

.7 Keep exposed faces free from stains, chips and cracks.

.8 Keep tolerance in plane of 3mm in 2440mm (1/8" in 96"). Do not use chipped, cracked or deformed units in exposed work.

.9 Buttering corners of units, throwing mortar droppings into joints, will not be permitted. Do not shift or tap units after mortar has taken initial set, where adjustments must be made after mortar has started to set, remove mortar and replace with fresh supply.

3.3 LAYING MASONRY WALLS

.1 Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement type joints, returns, and offsets; avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

.2 Bond Pattern for Exposed Masonry: Unless otherwise indicated in this Section or on the Drawings, lay exposed masonry in running bond, unless otherwise indicated on the Drawings; do not use units with less than 100mm (4") horizontal face dimensions at corners or jambs; lay masonry in running bond where not otherwise indicated.

.3 Lay concealed masonry with all units in a wythe in running bond or bonded by lapping a minimum of 100mm (4"), and as follows:

.1 Bond and interlock each course of each wythe at corners.

.2 Do not use units with less than nominal 100mm (4") horizontal face dimensions at corners or jambs.

.4 Stopping and Resuming Work:

.1 Stop work by racking back units in each course from those in course below; do not tooth.

.2 Clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry when resuming work.

.5 Built-In Work:

.1 Build in items specified in this and other Sections as construction progresses.

.2 Fill in solidly with masonry around built-in items.

.3 Fill space between steel frames and masonry solidly with mortar.

.4 Place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core where built-in items are to be embedded in cores of hollow masonry units.

.5 Protect built-in items from damage arising from work of this Section.

.6 Grouting Hollow Concrete Masonry Units – Load Barring Application:

.1 Fill cores in hollow concrete masonry units with grout 610mm (24") under bearing plates, beams, lintels, posts, and similar items.

.2 Use concrete or fine grout where indicated, and also for vertical core filling, lintel beams, bond beams and other filled cores where reinforcing steel is indicated.

.3 Use fine grout where the space being grouted is 50mm (2") or less in its least dimensions; use concrete in all other applications that call for grout.

.4 Use square end concrete masonry units wherever a full or half concrete masonry unit will receive concrete fill.

.5 Use full mortar bedding of cross webs for cores that are filled.

.6 Fill cores in lifts of 1220mm (4') maximum; provide cleanout openings for lifts in excess of 4' where Consultant has accepted larger lifts.

.7 Consolidate core fill during placement by vibration or puddling.

.8 Stop concrete core fill 38mm (1-1/2") below top surface of lift whenever filling will be stopped for more than a 1 hour time duration.

.9 Fill all cores of roof parapets with concrete.

.10 Secure vertical reinforcement in position at top and bottom of core, and a maximum 4' spacing, refer to Drawings for location of vertical reinforcement.

.11 Fill voids solid with mortar so that ties and anchors are set in full mortar bed where masonry walls abut steel or concrete columns.

.7 Build non-load bearing interior partitions full height of storey to underside of solid floor or roof structure above, leaving a gap to allow for structural deflection, and as follows:

.1 Fasten lateral partition supports to structure above and build into top of partition; grout cells of concrete masonry units solidly around plastic tubes of anchors and push tubes down into grout to provide 13mm (½") clearance between end of anchor rod and end of tube; space anchors at 1220mm (4') O.C.

3.4 MORTAR BEDDING AND JOINTING

.1 Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place; do not deeply furrow bed joints or slush head joints.

.2 Lay block work as follows:

.1 Provide special shapes and sizes as required such as halves, jambs, lintels, solids, corners, semi-solids, etc.

.2 Webs to align plumb over each other with thick ends of webs up. Leave no cells open in exposed work. Reinforce all block.

.3 Minimize cutting block. Cut exposed work with power driven abrasive cutting disc or diamond cutting wheel for flush mounted electrical outlets, grilles, pipes, conduit, etc., leaving 3mm (1/8") maximum clearance.

.4 Do not wet concrete masonry units before or during laying.

.5 Locate corners accurately. Use full bed of mortar for first course. Bed face shells and cross and end web fully in mortar. Stagger joints in every course. Align joints plumb over each other in every other course.

.6 Bond intersecting block walls in alternate courses. Where block abuts concrete, bond each block course with dovetail anchors, ties and dovetail slot. Do not break bond of corridor walls or other walls of exposed units where partitions intersect and if bonding would show through on intersect with prefabricated intersection masonry reinforcement in each course.

.7 Take special care in erecting block walls to which other sections will be applying finishes or attaching equipment to ensure tolerances required for work of other sections can be met with reasonable construction procedures. (e.g. thin-set application of ceramic tile.)

.8 Provide bullnose block at all exposed block corners.

.9 Build block lintels, ensure that lintel jointing coincides with regular bond.

.3 Set trim units in full bed of mortar with full vertical joints, and as follows:

.1 Fill dowel, anchor, and similar holes.

.2 Clean soiled surfaces with fibre brush and soap powder and rinse thoroughly with clear water.

.3 Lay trim units so that joints are even and so that average distance between joint centrelines is equal to the nominal modular dimension of adjacent masonry. Lay trim units in running bond, unless otherwise indicated on the Drawings.

.4 Set trim units in accordance with manufacturers recommended installation practices and materials. Review manufacturer's written recommendations with the Consultant before proceeding.

.5 Use chipped or blemished units only where the defect will be concealed; reject all defective and broken units or units with chipped edges or corners.

.6 Install cut units with cut surfaces and, where possible, cut edges concealed. Where complex cutting is required, place mortar along the cut edge and trowel smooth to provide a consistent 50mm (2”) wide gap.

.4 When mortar is "thumbprint" hard, tool all joints (exposed or concealed) concave except at blockwork designated to receive ceramic tile finish which blockwork shall be struck flush.

.1 Use sufficient force to press mortar tight against masonry units on both sides of joints.

.2 Remove excess material or burrs left after jointing. Use trowel or rub with burlap bag.

.5 Lay all joints 10mm (3/8") thick unless otherwise specified or otherwise indicated. Fill all joints solidly with mortar except where specifically designated to be left open.

.6 Stagger joints in every course. Align joints plumb over each other in every other course. Vertical and horizontal joints to be uniform in thickness.

3.5 PARTITIONS (OTHER THAN LOAD-BEARING)

.1 Carry following partitions up through ceiling to structure above, unless noted or specified otherwise; corridor partitions, partitions around staircases and shafts, partitions around washrooms, and any other partitions so indicated on drawings. Terminate all other partitions at first coursing joint above finished ceiling.

.2 Except around staircases and shafts, terminate through partitions within 19mm (3/4") of structure above, i.e. floor, roof decking depending under which partitions occur, and where such partitions occur directly under and parallel to structural framing carry these partitions up to within 19mm (3/4") of bottom of such structural framing.

.3 Around staircases and shafts, wedge and grout masonry solidly to structure above. Laterally support other partitions as required by building code. Where tops of partitions are exposed to view, lateral supports shall be concealed.

.4 Where walls and partitions are pierced by structural members, ducts or pipes, fill voids with mortar to within 19mm (3/4") of such members flush with wall fins.

.5 Fill spaces between partition and structure, ducts and pipes with compressed glass fibre or mineral wool insulation completely from one side of wall to other.

3.6 CONTROL JOINTS

.1 Provide vertical through wall control joints 7620mm (25') O.C. maximum (except as otherwise shown or specified) in continuous walls having no openings, intersections or columns. Control joints as shown on Drawings.

.2 Locate control joints at high stress concentrations and at points of weakness such as at abrupt changes in work height, wall thickness changes such as at chases and at pilasters and maximum of 3658mm (12') from corners.

.3 Construct joint as detailed and generally as follows:

.1 Place building paper against end of block on one side of control joint. Extend bond breaker full wall thickness.

.2 Fill voids between ends of block with mortar to form key and strike back exposed vertical joints 19mm (3/4") deep, install backer rod and caulk in accordance with Section 07 92 00.

.3 Reinforce joints every third course with two 6mm (1/4") diameter greased smooth rods. Locate rods 32mm (1-1/4") in from faces of block centres on joint running parallel to wall.

3.7 REINFORCEMENT AND REINFORCING TIES

.1 Reinforce all masonry walls with continuous masonry horizontal reinforcement in every second block course.

.2 Provide extra reinforcement or reinforcing ties at openings so that first and second courses above and below openings are reinforced. Extend extra reinforcement 610mm (2') beyond opening in each direction.

.3 Anchor new masonry to structural steel to concrete elements, to existing construction at maximum 406mm (16") O.C., vertically in accordance with local building code requirements.

3.8 MASONRY COATINGS

.1 Masonry Sealers: Apply masonry sealer to unit masonry to gloss levels indicated in accordance with manufacturer’s written instructions.

.2 Cover surfaces not scheduled for masonry coatings; cover and protect surfaces and non-masonry finishes with in areas scheduled for coatings.

.3 Rinse off masonry until no indications of chemicals are present; rinse from bottom to top and from top to bottom; cleanup work area as work progresses; remove debris and waste from site at end of each work day.

3.9 BUILT-INS

.1 Built-in items provided by other Sections, anchor bolts, sleeves, inserts, loose steel lintels, shelf angles, access panels, and other such items.

.2 Built-in items to present neat, rigid, true and plumb installation. Leave wall openings required for ducts, grilles, pipes and other items.

.3 Fill voids between masonry and metal frames with masonry mortar.

3.10 REPOINTING OR TUCKPOINTING

.1 Repoint defective joints as follows:

.1 Cut back joints 13mm (1/2"), taking care not to damage units. Remove dust and loose materials by brushing or by water jet.

.2 If water jet is used, allow excess water to drain before repointing.

.3 Repoint with same mix as original. Pack mortar tightly in thin layers, and tool joints or strike flush as required.

3.11 CLEANING

.1 Keep work clean and free of mortar stains during laying. Allow mortar droppings which adhere to wall to dry out but not set.

.2 Rub with small piece of masonry followed by brushing to remove all traces.

.3 On completion of masonry, after mortar is thoroughly set and cured, and defective joints tucked and pointed, clean masonry thoroughly.

.4 Remove mortar with wood paddles and scrapers before wetting. Saturate masonry with clean water and flush off loose mortar and dirt. Clean block work using water, scrubbing brushes and wood paddles only.

END OF SECTION

1 General

1.1 SUMMARY

.1 Unless otherwise specified conform to CSA-S16, Steel Structures for Building - Limit States Design and CAN/CSA-S136, Cold Formed Steel Structural Members.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

.1 Canadian Institute of Steel Construction (CISC):

.1 CISI - Specification for the Design of Cold-Formed Steel Structural Members, in accordance with CAN/CSA-S136.

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

.1 ASTM A153/A123M, Zinc Coating (Hot-Dipped) on Iron and Steel Hardware.

.2 ASTM A568/A568M, General Requirements for Steel Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.

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

.4 ASTM C955, Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Track), and Bracing or Bridging for Screw Application of Gypsum Board and Metal Plaster Bases.

.3 American National Standards Institute/American Welding Society:

.1 ANSI/AWS D1.3, Structural Welding Code - Sheet Steel.

.4 Canadian Standards Association:

.1 CSA-W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.2 CSA-W59, Welded Steel Construction (Metal Arc Welding).

.3 CSA-S16, Design of Steel Structures

.4 CAN/CSA-S136, North American Specification for the Design of Cold-Formed Steel Structural Members

.5 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating

.2 CAN/CGSB-51.32-M, Sheathing, Membrane, Breather Type

.6 Canadian Sheet Steel Building Institute:

.1 CSSBI 51M, Lightweight Steel Framing Design Manual.

1.3 SYSTEM DESCRIPTION

.1 Design Requirements:

.1 Have work of this section designed by a professional engineer licensed to design structures and registered in the place of Work.

.2 Design cold formed metal framing system to resist pressure and suction of wind loads, snow loads, snow load build-up and temperature range, expected in the geographical area for this project, under the local Building Code, climatic information for 30 year probability without any detrimental effects on appearance and performance.

.3 Design shall be based on Limit States Design principles using factored loads and resistances.

.4 Deflection (inward or outward) shall not be greater than L/720 of the span between points of support.

.5 Resistance strength and resistance factors shall be determined in accordance with applicable building code requirements and CAN/CSA-S136.

.6 Construct work of this section to provide for expansion and contraction of components as will be caused by ambient temperature range without causing buckling, failure of joint seals, undue stress on fasteners or other effects detrimental to appearance or performance.

.7 Section properties shall be computed on the basis of the nominal core thickness.

.8 Design bridging to prevent member rotation and member translation perpendicular to the minor axis. Provide for secondary stress affects due to torsion between lines bridging. Sheathing shall not be used to help restrain member rotation and translation perpendicular to the minor axis for wind bearing studs.

.9 Design cold formed metal framing system to support loads and superimposed loads transferred from cladding and include for design of support and attachment components between other assemblies and stud system. Responsibility for design of exterior wall loads transferred from other envelope components is part of work of this section.

1.4 SUBMITTALS

.1 Shop Drawings:

.1 Prepare and submit shop and erection drawings which conform to the requirements of the CAN/CSA-S16, and as specified herein.

.2 Cold formed metal framing system must have shop drawings prepared by qualified draftsmen, checked by and bearing the seal of a professional engineer registered to design structures and practice in the place of Work.

.3 Show the size, spacing and location of connections, attachments, reinforcing and anchorage. Include necessary plans, elevations and details. Indicate size and type of fastening. For weld connections use welding symbols in compliance with AWS and indicate clearly net weld lengths.

.4 Submit typical details of connections, and any special connections for approval before preparation of shop drawings.

.5 Review of shop drawings by the Consultant and Structural Engineer will not absolve the Contractor from his responsibility of providing materials and equipment to complete and finish work of this section in accordance with the architectural and structural drawings. Departures or differences from the referenced drawings shall be approved in writing by the Consultant.

1.5 QUALITY ASSURANCE

.1 Conform to requirements of CAN/CSA-S16, Steel Structures for Buildings, and CAN/CSA-S136, Cold Formed Steel Structural Members.

.2 Work to be executed by firm thoroughly conversant with laws, by-laws and regulations which govern, and capable of workmanship of best grade of modern shop and field practice known to recognized manufacturer's specializing in this work.

.3 Work shall be executed by workers especially trained and experienced in this type of work. Have a full time, senior, qualified representative at the site to direct the work.

.4 Install system to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

.5 Install system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

1.6 INSPECTION AND TESTING

.1 An independent inspection and testing company appointed and paid for by the Owner may carry out inspection and testing of the structural steel stud systems.

.2 Provide free access for inspectors to all places where work is being done.

.3 Inspectors are to ensure that materials conform to the requirements of this section.

.4 Any inspection and/or testing required because of an error by the Contractor, or due to departure from the Contract Documents shall be paid for by the Contractor.

.5 Inspection and testing of structural metal stud systems shall include, but shall not be limited to the following:

.1 Checking that mill test reports are properly correlated to materials.

.2 Sampling fabrication and erection procedures for general conformity to the requirements of the specification.

.3 Checking that the welding conforms to the requirements of CSA W47.1, CSA W59 and/or ANSI/AWS D1.3, whichever is applicable.

.4 Checking fabricated members against specified member shapes.

.5 Visual inspection of all welded connections including sample checking of joint preparation and fit-up.

.6 Sample checking of screwed and bolted joints.

.7 Sample checking that tolerances are not exceeded during fit-up and/or erection.

.8 Additional inspection and testing of welded connections at required by CSA W59.

.9 General inspection of field cutting and alterations required by other trades.

.10 Submission of reports to the Consultant covering the work inspected with details of deficiencies discovered.

.6 The inspection and testing provided in this Section does not relieve the Contractor of his responsibility for the performance of the Contract. The Contractor shall implement his own supervisory and quality control procedures.

.7 Materials and/or workmanship not conforming to the requirements of the Contract Documents may be rejected at any time during the progress of the work, and shall be replaced and/or repaired without cost to the Owner.

1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with Construction Progress Schedule and arrange ahead for off-the-ground storage location. Do not load any area beyond the design limits.

.2 Adequately protect steel against rust and damage during manufacturing, delivery and storage.

.3 Store material on planks on a dry area and protect from damage. Make good immediately any damage done, clean scratches and the like, touch-up with specified primer.

2 Products

2.1 MANUFACTURERS

.1 Cold formed metal framing as indicated on drawings and as specified herein shall be by one of the following:

.1 Bailey Metal Products Limited, or;

.2 Canadian Steel Manufacturing, Division of British Steel Canada Inc., or;

.3 Lightsteel Inc., Boucherville, Quebec or;

.4 Approved equal.

2.2 MATERIALS

.1 Faming materials shall conform to the requirements of CAN/CSA-S136.

.2 Galvanized Sheet Steel:

.1 Conform to ASTM A653/A653M, minimum Grade D, 50 PSI (345 Mpa) yield for 1.5mm (.060") material.

.3 Structural Metal Studs:

.1 Galvanized sheet steel formed to channel shape, of minimum gauge, sizes, and section properties to meet design requirements, and conforms to ASTM C955.

.4 Metal Stud Runners/Top and Bottom Tracks:

.1 Galvanized sheet steel formed to channel shape, having same width as studs, with tight fit and solid web, of minimum gauge to meet design requirements, but no less than gauge of metal studs, and conforms to ASTM C955.

.5 Metal Plates, Bridging, Gussets and Clips:

.1 Formed from galvanized sheet steel, of gauges, shapes and sizes required to meet design requirements determined for conditions encountered, and of same finish as framing members.

.6 Fastenings:

.1 Self-drilling, Self-tapping Screws, Bolts, Nuts and Washers: Hot-dip galvanized to 1.25 ounce per square foot and conforms to ASTM A153/A153M-09, Class B3, '12-24 x 7/8 HWH #4STLG' by Hilti Canada, or approved equal.

.2 Anchorage Devices: Power driven, powder actuated, drilled expansion bolts, or screws with sleeves, as application dictates.

.3 Welding Materials: Conforms to CSA W59.

.4 Electrodes for welding shall have minimum 480 Mpa tensile strength series, (E480XXX,E480S-X).

.7 Touch-Up Primer:

.1 Ready mixed, zinc-rich primer, and conforms to CAN/CGSB-1.181, 'Sealtight Galvafroid Zinc-Rich Coating' by W.R. Meadows of Canada Limited, or 'Zinc Clad No.7 Organic Zinc Rich Primer' by Sherwin Williams Company of Canada Ltd., or approved equal.

.8 Dampproof Course:

.1 No. 15 asphalt building paper conforming to CAN/CGSB-51.32-M77.

2.3 FABRICATION

.1 Fit and assemble work in shop where possible. Execute work according to details and reviewed shop drawings.

.2 Take measurements at the building for work which is to fit or be connected to steel, concrete framing or masonry, before commencing fabrication.

.3 Structural metal studs shall have one unreinforced service cut-out centred in the web of the studs and with the centreline of the cut-out a minimum of 455mm (1'-6") from the bottom of the studs. In addition to the above, provide cut-outs for internal bridging as required. All unreinforced cut-outs shall conform to dimension limitations of Table 1, in the CSSBI M50 Manual.

.4 Provide prepunched cut-outs in inner top track for anchor clearances so that deflection clearances are not reduced.

.5 Fabrication tolerances for cold formed steel framing members shall to Table 2 of the CSSBI M50 Manual.

.6 Cutting of cold formed steel framing members shall be by "power saw" or "shear" methods. Cutting by "torch" method shall not be permitted.

.7 Steel thickness, exclusive of coating shall be marked on all cold formed steel framing members by embossing, or by stamping with indelible ink, or by colour coding method.

.8 Gauges and sizes of metal shall be adequate for various conditions.

3 Execution

3.1 EXAMINATION

.1 Verify at site that the work to receive the work of this section is free of irregularities detrimental to the installation and performance of the work and that it is located correctly and at proper levels before delivery and installation.

.2 Verify that building framing components are ready to receive work.

.3 Beginning of installation means acceptance of existing conditions.

3.2 ERECTION OF STUDS

.1 Install components in strict accordance with manufacturer's written instructions.

.2 Methods of construction may be either piece by piece (stick-built), or by fabrication into panels (panelized) either on or off site. Handling and lifting of prefabricated panels shall not cause permanent distortion to any member or collateral material.

.3 Cold formed steel framing shall be erected true and plumb within the tolerances specified herein. Temporary bracing shall be employed wherever necessary to withstand all loads to which the structure may be subject during erection and subsequent construction. Temporary bracing shall be left in place as long as required for the safety and integrity of the structure. The Contractor shall ensure that during erection a margin of safety consistent with the requirements of the National Building Code and CAN/CSA-S136 exists in the uncompleted structure.

.4 Erection Tolerances:

.1 For the purposes of erection tolerances, "camber" is defined as the deviation from straightness of a member or any portion of a member with respect to its major axis and "sweep" is defined as the deviation from straightness of a member or any portion of a member with respect to its minor axis.

.2 For wind bearing studs, out of plumbness shall not exceed 1/500th of the member length. Out of straightness (camber and sweep) shall not exceed 1/1000th of the member length.

.3 For runners/tracks, camber shall not exceed 1/1000th of the member length.

.4 Studs shall seat into top and bottom runners/tracks. The gap between the end of the stud and the web of the runner/track shall not exceed 4mm (5/32") for wind bearing studs.

.5 Where cold formed metal framing is made in prefabricated panels, align adjacent prefabricated panels to provide surface continuity at the interface.

.6 Spacing of studs shall not be more than 3mm (1/8") from the design spacing. The cumulative error in spacing shall not exceed the requirements of the finishing materials.

.5 Align floor and ceiling runners/tracks, locate to wall or partition layout. Secure in place with screws or welding at maximum 610mm (24") O.C. Coordinate installation of sealant with floor and ceiling track.

.6 Place studs to meet design requirements as indicated on approved shop drawings, and not more than 50mm (2") from abutting walls, and at each side of openings. Connect studs to tracks using clips and ties, screws, or welding. Diameter of screws shall be equal to, or exceed the minimum diameter indicated on the reviewed shop drawings. Penetration of screws beyond joined materials shall be not less than three (3) exposed threads. Thread types and drilling capability of screws shall conform to the manufacturer's written recommendations to suit design requirements and conditions. Screws to be covered by sheathing materials shall have "low profile" type heads.

.7 Field cutting of cold formed steel framing members shall be by "power saw" or "shear" methods. Cutting by "torch" method shall not be permitted.

.8 Holes that are field cut into cold formed steel framing members shall conform to the dimensional requirements of Table 1, in the CSSBI M50 Manual.

.9 Brace structural metal studs as required to meet design requirements and as indicated on reviewed shop drawings.

.10 Provide continuous dampproof course to underside of bottom runner/track.

.11 Construct corners using minimum of three studs. Double studs at door, window jambs, and wall openings.

.12 Erect studs one-piece full length. Splicing of studs is not permitted.

.13 Erect load bearing studs, brace, and reinforce to develop full strength to meet design requirements.

.14 Refer to drawings for height of partition framing.

.15 Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.

.16 Install intermediate studs above and below openings to match wall stud spacing.

.17 Provide deflection allowance in stud bottom runner/track, directly below horizontal building framing for non-load bearing framing.

.18 Attach cross studs or furring channels to studs for attachment of fixtures anchored to walls. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

.19 Touch-up field welds and damaged galvanized surfaces with two coats of zinc rich touch-up primer.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install all miscellaneous metal work indicated on drawings and not included in the work of other Sections in addition to items listed in this Section.

1.2 RELATED REQUIREMENTS

.1 Read carefully all other Sections and review drawings to determine extent of metal work supplied and installed, or installed by others.

.2 Be responsible for co-ordinating this section with all related sections.

1.3 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

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

.1 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless

.2 ASTM A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

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

.4 ASTM C939, Standard Test Method for Flow of Grout for Preplaced Aggregate Concrete (Flow Cone Method)

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

.6 ASTM C1107/C1107M, Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink)

.2 Canadian Standards Association (CSA):

.1 CSA G40.20-04/G40.21, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel

.2 CAN/CSA-G164-M, Hot Dip Galvanizing or Irregularly Shaped Articles

.3 CSA-S16, Design of Steel Structures

.4 CSA-S136, North American Specification for the Design of Cold Formed Steel Structural Members

.5 CSA W47.1, Certification of Companies for Fusion Welding of Steel

.6 CSA W55.3, Certification of Companies for Resistance Welding of Steel and Aluminum

.7 CSA W59, Welded Steel Construction (Metal Arc Welding)

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating

.2 CAN/CGSB-51.32-M, Sheathing, Membrane, Breather Type

.3 CGSB 31-GP-105Ma, Zinc Phosphate Conversion Coatings for Paint Base

.4 The Society for Protective Coatings (SSPC):

.1 SSPC1 Solvent Cleaning

.2 SSPC2 Hand Tool Cleaning

.3 SSPC-3 Power Tool Cleaning

.4 SSPC-6 Commercial Blast Cleaning

1.4 QUALITY ASSURANCE

.1 All Codes and Standards referred to in this Specification shall be current editions including all latest revisions and addenda.

.2 Conform to requirements of CSA-S16, Design of Steel Structures and CAN/CSA-S136, Cold Formed Steel Structural Members.

.3 Architectural metals work shall be of the highest architectural quality, free of scratches, pitting, roughness, marring, discolouration, staining and other imperfections.

.4 Work of this Section to be executed by firm thoroughly conversant with laws, by-laws and regulations which govern, and capable of workmanship of best grade of modern shop and field practice known to recognized manufacturer's specializing in this work.

.5 Work of this Section shall be executed by workers especially trained and experienced in this type of work. Have a full time, senior, qualified representative at the site to direct the work of this Section.

.6 Where required by authorities having jurisdiction, have work of this Section designed by a professional engineer licensed to design structures and registered in the Province of the Work.

1.5 SUBMITTALS

.1 Provide submittals bearing stamp or seal and signature of the Professional Engineer responsible for the design of the work of this Section.

.2 Shop Drawings:

.1 Make thorough examination of drawings and details, determine the intent, extent, and materials, and be fully cognizant of requirements when preparing shop drawings.

.2 Submit shop drawings showing and describing in detail all work of this Section including large scale detail of members and materials, of connection and interfacing with work of other Sections, jointing details, and of anchorage devices, dimension, gauges, thicknesses, description of materials, metal finishing, as well as other pertinent data and information.

.3 Digital files of design drawings shall not be used in the preparation of shop drawings.

1.6 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off the ground, under cover storage locations. Do not load any area beyond the design limits.

.2 Adequately protect and crate all components against damage, dirt, disfigurement and weather during delivery and storage. Damaged materials shall not be used and shall be replaced by approved material.

.3 Cover and protect the work of other Sections in the area of work from damage. Make good all damage to the satisfaction of the Consultant.

.4 Protect the installed work of this Section and on completion the work shall be examined and damage shall be remedied to the complete satisfaction of the Consultant.

2 Products

2.1 MATERIALS

.1 Structural Steel Sections and Steel Plate: New stock (not weathered or rusted); to conform to CAN/CSA-G40.21, Grade 300W (44W) and Grade 350W (50W) for wide flange shapes.

.2 Hollow Structural Sections (HSS): New stock; to conform to CAN/CSA-G40.21, Grade 350W (50W), Class C, stress relieved.

.3 Sheet Steel (Structural Quality): Conforms to ASTM A1011/A1011M.

.4 Sheet Steel (Commercial Quality): Conforms to ASTM A653/A653M, stretcher levelled or temper rolled.

.5 Tube: Conforms to ASTM A53.

.6 Galvanized Sheet Steel (Commercial Quality): Galvanized coating G90 (Z275) in accordance with ASTM A653/A653M, minimized spangle, stretch levelled or temper rolled. Specially treat by phosphate conversion process conforming to CGSB 31-GP-105Ma ready to receive prime paint finish.

.7 Steel Pipe: Hot-dip galvanized, zinc coated, welded and seamless type steel pipe conforming to ASTM A53/A53M.

.8 Aluminum Plate and Sheet: ASTM B209M, Alloy 6061-T6.

.9 Aluminum Extrusions: ASTM B221M, Alloy 6063-T6.

.10 Non-Shrink Grout: Premixed, high strength, maximum bearing, impact resistant, non-shrink non-metallic aggregate grout having minimum 76 Mpa, 28 day compressive strength and conforms to ASTM C939 and ASTM C1107/C1107M.

.11 Galvanizing: All uncoated steel specified to be galvanized shall be galvanized after fabrication by the hot dip process according to CSA-G164, with minimum coating of 2 oz./sq.ft. Galvanize after all welding is complete. Welding of galvanized material will not be permitted. Specially treat by phosphate conversion process conforming to CGSB 31-GP-105Ma ready to receive prime paint finish.

.12 Primer Paint: CISC/CPMA 2-75.

.13 Bolts, Nuts, Washers: Conforms to ASTM A325.

.14 Welding Materials: Conforms to CSA W59.

.15 Metal Filler: Polyester based type.

.16 Painting:

.1 Shop Applied Structural Steel Primer: Steel Spec Universal Primer (B50RV6227 Red), by Sherwin Williams Company of Canada Ltd., or approved equal. Apply a minimum of 2 mils dft./coat. Grey coloured primer is acceptable.

.2 Zinc Rich Paint For Touch-up of Galvanized Metals: Ready mixed, zinc-rich primer conforming to CAN/CGSB-1.181, Sealtight Galvafroid Zinc-Rich Coating by W.R. Meadows of Canada Limited or Zinc Clad No. 5 Organic Zinc Rich Primer by Sherwin Williams Company of Canada Ltd., or approved equal.

.3 Touch-up Primer (On Site): Procryl Universal Acrylic Primer by Sherwin Williams Company of Canada Ltd, or approved equal. Touch-up primer shall be no less than 3 mil dft.

.4 Refer to Section 09 90 00, and coordinate with the above.

.17 Isolation Coating: Acid and alkali resistant bituminous paint.

.18 Building Paper: Conforms to CAN/CGSB-51.32.

.19 Butyl Tape: Extruded, high grade, macro-polyisobutylene tape of size, width and shore hardness to suit conditions.

2.2 FABRICATION

.1 Fit and assemble work in shop where possible. Execute work according to details and reviewed shop drawings.

.2 Take measurements at the building for work which is to fit or be connected to steel or concrete before commencing fabrication.

.3 Where shop fabrication is not possible, make trial assembly in shop.

.4 Do all welding in accordance with requirements of CSA W59, CSA W55.3 and CSA W47.1 including all supplements. Weld stainless steel electric arc process. Grind welds smooth and flush with surface of parent metal, where exposed to view and where specifically indicated on drawings. Welds shall be continuous seam welds unless specified otherwise. Maintain sharp arises.

.5 Fit joints and intersecting members accurately in true planes, square, plumb, straight with tight joints and intersections.

.6 Provide adequate reinforcing, fastenings, anchors, accessories required for fabrication and erection of work of this Section. Such items occurring on or in an exterior wall or slab shall be hot-dip galvanized. Make thread dimensions such that nuts and bolts will fit without rethreading or chasing threads.

.7 Fabricate, drill and tap members to accommodate attachments, anchorage and work of other Sections where located and directed by them.

.8 Exposed steel surfaces shall be smooth and free from imperfections such as warping, buckling, weld marks, burrs, rust and scale.

.9 Gauges and sizes of metal shall be adequate for various conditions.

.10 Make exposed metal fastenings and accessories of same material, texture, colour and finish as base metal on which they occur unless otherwise shown or specified. Keep exposed fastenings to an absolute minimum evenly spaced and neatly laid out. Make fastenings of permanent type unless otherwise indicated.

2.3 SHOP PAINTING AND PROTECTION

.1 As per SSPC2 Hand Tool Clean and SSPC1 Solvent Clean, clean welds by wire brushing and wash down with clean water, to remove the chemical residues left by the electrodes, prior to painting.

.2 Prepare steel as per SSPC-3 Power Tool Cleaning for Interior or SSPC-6 Commercial Blast Cleaning for exterior members. Remove rust, mill scale, oil, dirt, and other foreign matter before commencing shop painting.

.3 Apply shop coat of primer to all surfaces except areas requiring field welding. Apply by brush, working paint well into surfaces, interstices and cavities.

.4 Primer is to be free of runs, sags, or other collections of primer due to dipping of members into primer.

.5 Steel work shall be painted under cover, and shall remain under cover, until the paint protection is dry.

.6 Prime field welded areas after erection and touch up shop coat where damaged and barred by erection and handling.

.7 Prime steel with two full coats of paint in strict accordance with paint manufacturer's directions.

.8 Give the parts which are inaccessible after assembly two coats of primer coat paint, of different colours, when members are noted to be painted.

2.4 HOT DIP GALVANIZING

.1 Hot dip galvanize, after fabrication, steel metal fabrication items. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with brush or spray-applied anti-corrosion coating containing 92-95% zinc, in accordance with manufacturer's printed directions.

.1 Members exposed to elements when in final location.

.2 Members embedded on exterior side of exterior walls.

.3 Members imbedded in concrete.

.4 Members specified in this Section or indicated on Drawings.

.2 Hot-dip galvanize members in accordance with CAN/CSA G164 and requirements of the following ASTM standards, with minimum coating weights or thicknesses as follows:

.1 Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips: ASTM A123/A123M; average weight of zinc coating of actual surface

.1 4.8 mm (3/16”) and less member thickness: 600 g/sq.m.

.2 6 mm (1/4”) and heavier members: 640 g/sq.m.

.2 Iron and Steel Hardware: ASTM A153/A153M; minimum weight of zinc coating, in gram per square meter of surface, in accordance with Table 1 for the various classes of materials used in the Work.

2.5 ALUMINUM FINISHES

.1 Finish designations prefixed by AA comply with the system established by the Aluminium Association for designating aluminium finishes.

.2 As Fabricated Finish (Mill Finish): AA-M10, as fabricated mechanical finish.

.3 Clear Anodized Finish:

.1 Class II Finish: Architectural Class II, clear coating 0.010 mm or thicker in accordance with AAMA 611.

.4 High Performance Organic Finish:

.1 2 Coat PVDF or FEVE Coating:

.1 Manufacturer's standard 2 coat, thermo-cured system consisting of specially formulated inhibitive primer and colour topcoat, and apply coating to exposed metal surfaces in accordance with AAMA 2605 and with coating and resin manufacturers' written instructions.

.2 Colour: White, unless otherwise indicated on the Drawings.

.3 Basis of Design Materials: PPG Duranar.

3 Execution

3.1 GENERAL

.1 Verify at site that the Work to receive the work of this Section is free of irregularities detrimental to the installation and performance of the work and that it is located correctly and at proper levels before delivery and installation.

.2 Erection: To meet specified requirements of CAN/CSA-S16.

.3 Bearing Plates and Anchors: Standard.

.4 Anchors: Anchors to structural concrete shall be approved inserts set into concrete or approved self-drilling expansion insets drilled and placed afterwards.

3.2 INSTALLATION

.1 Assemble and erect work plumb, true, square, straight, level and accurate to sizes detailed, to reviewed shop drawings, free from distortion and defects detrimental to appearance and performance.

.2 Isolate metals where necessary to prevent corrosion due to contact between dissimilar metals and between metals and masonry, concrete or plaster. Use bituminous paint or butyl tape.

.3 Supply adequate instructions, templates, and if necessary, supervise installation of the fastenings or accessories requiring to be built-in by other Sections of the Work.

3.3 SCHEDULES

.1 Where items are required to be built into masonry, concrete or other work, supply such items to respective Sections with all anchors and accessories for building in.

.2 Itemized List: Supply and install metal work listed below unless specifically designated to be supplied only. Each item shall be as shown on drawings and as detailed on reviewed shop drawings.

.3 Miscellaneous Steel Framing, Channels, Angles, Plates and Brackets: As required and indicated on drawings.

.4 Loose Lintels:

.1 Provide and install loose lintels if not by structural steel.

.2 Finish: Hot-dip galvanized after fabrication.

.5 Masonry Lateral Supports:

.1 Install deflection space and lateral support for non-load-bearing masonry walls and partitions in accordance with specified requirements of CAN/ULC-S304-M, where not provided on Structural Drawings.

.2 At walls with concealed tops:

.1 75mm x 50mm x 6mm (3" x 2" x 1/4") angles 200mm (8") long on both sides of walls. Anchor to structure above wall.

.3 At walls with tops exposed to view:

.1 75mm x 50mm x 6mm (3" x 2" x 1/4") angles, continuous on both sides of wall. Anchor to structure above wall.

.4 Finish: Prime paint.

.6 Corner Guards:

.1 2440mm (8') high aluminium, diamond plate corner guard, 3mm (18 gauge) thick.

.7 Louver Blank-Off Panel:

.1 Non-Insulated blank-off panel of 1mm (0.040") thick aluminum sheet blank-off panel.

.2 Finish:

.1 Exterior face sheet: Colour as selected by the Consultant.

.2 Interior face sheet: Mill finish.

.8 Other Miscellaneous Metal Components:

.1 As required and indicated on drawings.

.2 Finish: Prime paint for interior components, ready for finishing by Section 09 90 00 and hot-dip galvanized after fabrication for exterior components.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply all labour, materials, equipment, services and perform all operations required to complete all rough carpentry work to the full intent of the drawings and as herein specified.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

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

.1 ASTM A307-21, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

.2 ASTM C954-22, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

.3 ASTM D6007-22, Standard Test Method for Determining Formaldehyde Concentrations in Air from Wood Products Using a Small-Scale Chamber

.4 ASTM D6330-20, Standard Practice for Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels Using Small Environmental Chambers Under Defined Test Conditions

.5 ASTM E1333-22, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber

.2 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S102-18, Standard Method of Test for Surface Burning Characteristics of building Materials and Assemblies

.3 American Wood Preservers Association (AWPA):

.1 AWPA Book of Standards, Latest edition

.4 Canadian General Standards Board (CGSB):

.1 CAN/CGSB 71.26-M88, Standard for Adhesives for Field-gluing Plywood to Lumber Framing for Floor Systems.

.5 Canadian Roofing Contractors Association (CRCA):

.1 Roofing Specifications Manual – Latest Edition

.6 Canadian Standards Association (CSA):

.1 CSA A172-M79(R1999), High Pressure Paper Base, Decorative Laminates

.2 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples

.3 CSA G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles

.4 CSA O80 Series-21, Wood Preservation

.5 CSA O86-19, Engineering Design in Wood

.6 CSA O112 Series-M1977(R2006), CSA Standards for Wood Adhesives

.7 CSA O121-17(R2022), Douglas Fir Plywood

.8 CAN/CSA-O141-05(R2019), Softwood Lumber

.9 CSA O151-17(R2022), Canadian Softwood Plywood

.10 CSA O325-21, Construction sheathing (Adopted NIST PS 2-18, with Canadian deviations)

.11 CSA O437 Series 93(R2011), Standard on OSB and Waferboard

.12 CSA O452 Series 94 (R2001), Design Rated OSB

.7 National Lumber Grading Association (NLGA):

.1 NLGA SPS2-2017 Special Products Standards on Machine Stress-Rated Lumber.

.2 NLGA Canadian Lumber Grading Rules

1.3 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Do not store seasoned materials under conditions that will cause their moisture content to increase.

.4 Protect edges and corners of sheet materials from damage during handling and storage.

.5 Store preservative-treated materials under cover, off the ground and protected from moisture.

2 Products

2.1 MATERIALS

.1 Framing Lumber:

.1 Lumber for structural components shall be of species and grade specified, well seasoned, processed and stamped at same mill with appropriate grade markings.

.2 Conform to requirements of Standard Grading Rules for Canadian Lumber of National Lumber Grades Authority the (NLGA) with latest supplements, approved by the Canadian Lumber Standards Administrative Board.

.2 Lumber:

.1 Except as indicated or stated otherwise, lumber to be softwood, S4S, moisture content 19% or less, in accordance with the following standards:

.1 CSA O141 - “Softwood Lumber”.

.2 NLGA - “Standard Grading Rules for Canadian Lumber” (latest supplement).

.3 Framing and Board Lumber:

.1 Treatable Species: No. 2 and better - S4S, Dry, 19%.

.4 Framing, Furring, Strapping, Blocking:

.1 Spruce, 122c, "Standard" light framing, except as otherwise specified.

.5 Rough Hardware:

.1 Provide rough hardware such as nails, spikes, staples, H-clips, bolts, nuts, washers, screws, clips, strap iron and including hardware for temporary enclosures.

.2 Nails for plywood shall be annular or spiral type, all other nails shall be spiral type. All nails, spikes and staples shall conform to CSA B111.

.3 All rough hardware shall be galvanized unless otherwise noted. Galvanizing shall conform to CAN/CSA-G164.

.6 All Other Materials and Hardware:

.1 Shall be as noted on drawings.

2.2 PRESSURE PRESERVATIVE TREATED MATERIALS

.1 Pressure Preservative Treated Lumber: Lumber graded and stamped in accordance with applicable grading rules and standards of associations or agencies approved to grade lumber by Canadian Lumber Standards Accreditation Board in accordance with CSA O80 Series -08.

.1 Species: Pine or Spruce-Pine

.2 Grade: No.2 or better structural posts and lumber, pieces may be grade stamped or shipment certified by letter of compliance.

.3 Grading authority: NLGA, paragraph 131CC

.4 Material having twisted grain or structural defects affecting integrity of lumber will not be acceptable for this project.

.5 Use only material with radius edges, minimum 6 mm.

.6 Kiln dry lumber materials to 8% moisture content or less.

.2 Pressure Preservative Treated Plywood: Treated in accordance with CSA O80 Series using water-borne preservative to obtain minimum net retention of 4 kg/m³ of wood. Plywood or laminated materials shall be manufactured with exterior grade adhesives. After treatment, plywood shall be kiln dried to moisture content of 8% or less.

2.3 PRESSURE FIRE RETARDANT TREATED MATERIALS

.1 Treat by pressure impregnation with fire-retardant chemicals in accordance with CSA O80 Series to provide classification for flame spread of not more than 25, smoke developed of not more than 75 in accordance with CAN/ULC S102.

.2 All fire retardant wood must comply with the requirements in AWPA Standard C20 for lumber and C27 for plywood.

.1 AWPA C20: Structural Lumber, Fire-Retardant Pressure Treatment, lumber materials shall only be of species listed. After treatment, lumber 50 mm or less in thickness shall be kiln dried to moisture content of 8% or less.

.2 AWPA C27: Plywood, Fire-Retardant Pressure Treatment, plywood or laminated materials shall be manufactured with exterior grade adhesives. After treatment, plywood shall be kiln dried to moisture content of 8% or less.

.3 All species to comply with CAN/ULC S102 for surface-burning characteristics and shall bear identification showing classification and type of fire retardant.

.3 Each piece or bundle of fire-retardant treated material or panel to bear ULC inspection label or stamp attesting to FRS rating indicating flame spread, smoke developed, and fuel contributed classification meeting AWPA standard C20 and C27 for Type A Use.

.4 Fire retardant chemicals used to treat lumber must comply with FR-1 of AWPA Standard P17 and shall be free of halogens, sulphates and ammonium phosphate.

.5 Acceptable materials: Plywood and lumber materials treated by licensed applicators with fire retardant materials from the following:

.1 Dricon FRTW by Hickson Corporation.

.2 Pyro-Guard by Hoover Treated Wood Products Inc.

.3 D-Blaze by Chemical Specialties Inc.

3 Execution

3.1 INSTALLATION - GENERAL

.1 Consult with and co-operate with other Sections in advance and build-in or make provisions for installation of other work.

.2 Provide and fit in place all furring, strapping, battens, nailers, sleepers, grounds and blocking required to provide adequate properly placed fixing for all wood finishes, fitments and as required for the work of others trades.

.3 Blocking, strapping and other rough carpentry indicated shall not be regarded as complete or exact. Provide all rough carpentry work required, whether specifically shown or not.

.4 Grounds shall be of a thickness to provide for application of finishes. Room side surfaces of grounds shall be plumb and in true plane throughout.

.5 All nails shall be long enough so that at least half their length penetrate in to the second member. Splitting of wood members shall be minimized by staggering the nails in the direction of the grain and by keeping nails well in from edges.

.6 Blocking shall be through-bolted to structure.

.7 Anchor rough bucks to concrete or masonry with 10mm (3/8") diameter expansion bolts and shields or Drummond and Reeves security buck anchors, minimum three (3) per jamb.

3.2 WOOD BLOCKING, CANTS AND NAILERS

.1 Provide wood blocking, cants and nailers, where shown to be required as detailed. Bolt securely in place.

.2 Block under cants same thickness as installed roof insulation.

.3 Check mechanical, electrical, architectural drawings and provide all blocking, cants, nailers etc. required.

.4 Leave work ready for roofing work and prefinished sheet metal flashing installation.

3.3 PRESSURE PRESERVATIVE TREATED WOOD INSTALLATION

.1 Comply with AWPA M4.

.2 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation. Allow first coating to fully soak into grain before applying second coating in accordance with manufacturer’s instructions.

.3 Remove with fine sandpaper, chemical deposits on treated wood to receive applied finish.

.4 Use only hot-dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of preservative treated materials.

.5 Use water-borne preservative treated wood for:

.1 Wood in contact with masonry or concrete;

.2 Wood within 457mm (18”) of grade;

.3 Wood in contact with flashings;

.4 Wood in contact with waterproofing membranes, confirm compatibility with membrane manufacturer prior to application.

.6 Use oil-borne preservative treated wood for:

.1 Wood in contact with the ground;

.2 Wood in contact with freshwater;

3.4 PRESSURE FIRE RETARDANT TREATED WOOD INSTALLATION

.1 Field Cuts:

.1 Do not rip, mill or conduct extensive surfacing of fire retardant treated lumber, label will be voided.

.2 Only end cuts, drilling holes and joining cuts are permitted.

.3 All cuts on plywood will be considered end cuts.

.4 Fire-retardant lumber and plywood can be given a light sanding for cosmetic cleaning after treatment.

.5 Pre-cut to the greatest extent possible before treating.

.2 Fire retardant treated plywood used in structural applications shall be graded or span-rated material.

.3 Use only hot-dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of fire-resistant treated materials.

.4 Where humidity conditions are such that moisture may condense between hardware and treated wood, hardware shall be back-primed with a corrosive-inhibitive paint.

.5 Back-prime at contact points and fasteners to prevent electrolysis when fire retardant framing members are used in metal buildings.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply all labour, materials, equipment, services and perform all operations required to complete all finish carpentry, millwork and fitment installation including but not limited to the following:

.1 Interior millwork.

.2 Site fabricated and installed shelving and closet rods.

.3 Hardware.

.4 High pressure decorative laminate.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

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

.1 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

.2 ASTM D6007, Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber

.3 ASTM D6330, Standard Practice for Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels Using Small Environmental Chambers Under Defined Test Conditions

.4 ASTM E1333, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber

.2 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of building Materials and Assemblies

.3 Canadian Standards Association (CSA):

.1 CSA B111, Wire Nails, Spikes and Staples

.2 CSA G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles

.3 CAN/CSA O80 Series, Wood Preservation

.4 CSA O86, Engineering Design in Wood

.5 CSA O112 Series-M, Adhesives for Wood

.6 CSA O121-M, Douglas Fir Plywood

.7 CAN/CSA-O141-M, Softwood Lumber.

.8 CSA O151-M, Canadian Softwood Plywood.

.9 CSA O325.0, Construction Sheathing

.10 CSA O437 Series, OSB and Waferboard

.11 CSA O452 Series, Design Rated OSB

.4 National Lumber Grading Association (NLGA):

.1 NLGA Canadian Lumber Grading Rules

1.3 QUALITY ASSURANCE

.1 Contractor executing work of this section shall have a minimum of five (5) years continuous experience in successful manufacture/fabrication and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Follow applicable requirements of The Architectural Woodwork Manufacturer's Association of Canada (AWMAC) Standard for Millwork latest edition, including supplements and modifications.

.3 Unless otherwise indicated on drawings, all millwork shall be Custom Grade, in accordance with AWMAC standards.

.4 Supplements and modifications to the above standards as indicated on the drawings or as specified herein shall govern work of this section.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Samples for Verification: Submit two (2) samples prior to fabrication of millwork as follows; accepted samples will form the standard of acceptance for the remainder of the work:

.1 High pressure decorative laminate for finishing of millwork

.2 Exposed Fasteners, Hardware and Accessories: One unit for each type and finish.

.3 Shop Drawings:

.1 Submit detailed shop drawings of all shop fabricated finish carpentry components.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate sizes and locations of framing, blocking, furring, and reinforcements provided by work that is specified in other Sections is complete before starting work of this Section.

.2 Pre-Construction Meeting: Arrange a preconstruction meeting attended by Contractors personnel, Consultant, finish carpentry Subcontractor to discuss:

.1 Installation requirements,

.2 Special surface effects and finishing,

.3 Coordination of work with adjacent finishes,

.4 Protection of finishes,

.5 Acceptability of substrates and quality of materials being used for the project.

1.6 DELIVERY, STORAGE, HANDLING & PROTECTION

.1 Do not permit delivery of work of this section to site until area is sufficiently dry so that woodwork will not be damage by excessive changes in moisture content.

.2 Coordinate deliveries to comply with construction schedules and arrange ahead for under cover storage location.

.3 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect material with suitable non-staining waterproof coverings.

.4 Store material in original, undamaged containers or wrappings.

.5 Unsatisfactory materials shall be promptly removed from the site.

.6 Adequately protect the structure and work of other sections during delivery, storage, handling and execution of the work of this section.

.7 Provide tools, plant and other equipment required for the proper execution of the work of this section.

1.7 SITE CONDITIONS

.1 Site Measurements: Verify dimensions by site measurements before fabrication and indicate measurements on Shop Drawings where casework is indicated to fit walls and other construction; coordinate fabrication schedule with construction progress to avoid delaying the Work; locate concealed framing, blocking, and reinforcements that support woodwork by site measurements before being enclosed and indicate measurements on Shop Drawings.

.2 Established Dimensions: Establish dimensions and proceed with fabricating casework without confirmed site measurements where site measurements cannot be made without delaying the Work; coordinate with the construction to ensure that actual dimensions correspond to established dimensions; allow for trimming and fitting.

.3 Ambient Conditions: Maintain area or room in which casework is being installed at a uniform temperature and humidity for 24 hours prior to, during and after installation in accordance with AWS for relative humidity and moisture content; provide additional lighting to maintain a minimum of 430 lx on surfaces and areas where casework is being installed.

1.8 WARRANTY

.1 Warrant plastic laminate work of this Section against defects in materials and workmanship in accordance with General Conditions but for an extended period of two (2) years and agree to repair or replace faulty materials or work which appears during warranty period, without cost to the Owner.

.2 Defects shall include but not be limited to, opening of joints, cracking, shrinkage, warpage, delamination of plastic laminate.

2 Products

2.1 MATERIALS

.1 Framing Lumber:

.1 Lumber for structural components shall be of species and grade specified, well seasoned, and processed and stamped at same mill with appropriate grade markings. Conform to requirements of standard grading rule for Canadian lumber of Nation Lumber Grades Authority (NLGA) latest issue, approved by Canadian Lumber Standards Administrative Board, as follows:

.1 Rough Carpentry for built-in work: No. 2 select grade Ontario white pine.

.2 Blocking, Ground, Furring and Strapping, Bucks and Nailing Strips: C.L.A. No. 1 grade pine, kiln dried stock.

.3 Non-Exposed Softwood: Fabricator's option, meeting requirements of CAN/CSA O141-05(R2009), kiln dried for interior use to a moisture content of 4% to 8%, and 7% to 10% for exterior use; Surface 4 sides (S4S).

.2 Hardwood: Oak, Birch, Ash, Maple or other species, as indicated on drawings and conforms to requirements of AWMAC Custom Grade and NHLA Select Grade.

.3 Panel Materials:

.1 Plywood: Douglas Fir veneer core plywood, 19mm (3/4") thick or thickness as indicated on drawings, Select Sheathing-Tight Face, good two sides, sanded "B" faces and conforms to CSA 0121.

.2 Particleboard: ANSI A208.1, 700 kg/m³ density.

.3 Medium density fibreboard (MDF): ANSI A208.2, density minimum 750 kg/m³, moisture resistant.

.1 Basis of Design Materials: Premier Plus MR MDF by Flakeboard.

.4 Fire-Rated (FR) Medium density fibreboard (MDF): ANSI A208.2, meeting CAN/ULC S102, FSC certified; Modulus of Rupture (MOR): 4000 psi, with face screw hold of 250lbs.

.1 Basis of Design Materials: TRUPAN Fire-Rated (FR) MDF by Arauco.

.4 Glue: CSA 0112; Water-resistant urea-formaldehyde free resin glue.

.5 Plastic Laminate Covered Components:

.1 Plastic laminate face sheets: High pressure, paper based, melamine surfaced, laminated plastic sheets, conforming to CAN/CSA-A172, with thickness tolerances in accordance with Table 1 of CAN/CSA-A172 and plastic laminate grades as follows:

.1 General Purpose Grade (GP): Minimum 1.27mm (0.050") thick.

.2 Post-forming Grade (PF): Minimum 1.06mm (0.042") thick.

.2 Plastic Laminate Face Sheet Colour, Model and Manufacturer (MEL-1 & MEL-2): As indicated in the Finish Schedule on the Drawings.

.3 Plastic laminate backing and liner sheets: High pressure, paper based, melamine surfaced, laminated plastic backing sheets, conforming to CAN/CSA-A172, backing grade (BK), minimum 0.5mm (0.020") thick; Colour: White.

.4 Cores: Unless otherwise indicated, 19mm (3/4") thick core.

.5 Laminating Adhesive: CSA-0112, water resistant type.

.6 Draw Bolt Fasteners: 'K&V 516' by Knape & Vogt Canada. No substitutions allowed.

.6 Rough Hardware:

.1 Provide required rough hardware to frame and fix all finished carpentry and include for expansion shields, nails, spikes, screws, bolts, anchors, clips, plates, washers, rods, wires, wall brackets, chrome finishing trim, and other ironmongery which may be required. All wood screws shall be drill thread screws except at chipboard where self-tapping screws shall be used. All rough hardware shall be galvanized unless otherwise noted.

.7 Cabinet Hardware: All cabinet hardware shall in general, conform to CAN/CGSB-9.25, ANSI/BHMA A156.9-1982 and shall be as follows, unless otherwise indicated on the Drawings:

.1 Acceptable manufacturers supplying cabinet hardware:

.1 Stanley Hardware

.2 Knape & Vogt Canada

.3 Hafele Canada Inc.

.2 Door/Drawer Pulls (PULL-1): As indicated in the Finish Schedule on the Drawings.

.3 Adjustable Steel Standards and Supports: Nickel plated steel, adjustable on 13mm (1/2") centres. Standards at 151mm (6") from top and bottom. One support per 305mm (12") length of standard.

.4 Hinges: 95 deg opening, self-closing, concealed casework type hinges for overlay doors, having dual adjustable with heat tempered steel working parts with bright nickel finish (US14).

.5 Silencers: Round vinyl, self-adhering type silencers. Provide 2 per door.

.6 Drawer Slides: Full extension, side mounting, zinc coated, steel ball bearing, medium duty rated.

.7 Cabinet Locks: Single and double door cabinet cylinder locks to suit conditions by Best Lock Corporation. Co-ordinate keying with the Owner/Tenant.

.8 Magnetic Catches: Cast aluminum type.

.8 Wall Mounted Standards and Brackets:

.1 Basis of Design Manufacturer: Knape & Vogt Canada.

.2 Wall Mounted Standards: 22mm (7/8") wide x 17.5mm (11/16") high 12 gauge heavy-duty wall mounted standards with 50mm (2") slot adjustment, 914mm (3') long and capable of supporting 65 lbs./100 sq.ft.

.3 Brackets: 305mm (12") heavy-duty steel brackets with single, moulded nylon cam lock lever.

.4 Shelf Rests: Provide end, centre and front type shelf rests, complete with rubber cushions as required and for joining 2 shelves on one bracket.

.9 Accessories:

.1 Garment Hooks: 133mm (5-1/4") high with 75mm (3") projection, institutional type garment hooks with bright chrome finish complete with mounting screws, '2038 CHR' by Knape & Vogt Canada.

.2 Closet Rods: Extension type zinc coated steel closet rods with zinc coated forged steel end brackets and 2 centre supports, 1524mm to 2438mm (60" to 96") extension type, complete with mounting screws, 'KV2 ZC' by Knape & Vogt Canada.

2.2 FABRICATION AND WORKMANSHIP

.1 Work shall be executed by skilled carpenters under the supervision of a competent carpentry foreman. All items shall be shop assembled, insofar as is practical. Unless indicated otherwise comply with AWMAC Custom Grade requirements.

.2 Make thorough examination of drawings and details, check anchorage, interfacing with work of other sections and other factors influencing the installation of the work, and be fully cognizant of requirements.

.3 Finished woodwork shall be free from bruises, blemishes, mineral marks, knots, shakes and other defects and shall be selected for uniformity of colour, grain and texture.

.4 Be responsible for methods of construction and for ensuring that materials are rigidly and securely attached and will not be loosened by the work of other sections.

.5 Fabricate the work in a manner which will permit expansion and contraction of the materials without visible open joints.

.6 Mitre exposed corners; no end grain shall be visible in completed installation.

.7 Provide solid wood edging at exposed plywood edges.

.8 Jointing of shop assembled work shall be by means of mortise and tenons, dowels, stub tenons, dovetails, dadoes, lock joints as applicable for the jointing condition.

.9 Accurately cut, mitre, fit and frame work together to produce tight hairline joints, rigidly secured together in a permanent manner using glue, blind screw fixing or nails. Use concealed glue blocks for additional strength where possible.

.10 Finished woodwork shall be in one piece wherever possible and all trim shall be in long lengths. Where jointing is necessary in the length, the joints between pieces shall be scarfed, glued and properly fastened. The material being jointed shall match reasonably well for grain and colour where natural finish is specified. Joints between lengths where paint finish is to be applied may be finger jointed in lieu of scarfing. Trim shall be accurately cut and mitred at all corners, glued and properly fastened.

.11 Machine dressed work shall be properly machine using sharp cutters, the finished work shall be free from drag, feathers, slivers or roughness of any kind. Remove machine marks by sanding.

.12 Finished woodwork shall be carefully hand sanded after installation to remove roughness and planer marks. Sanding shall be done with the grain of the wood and finished with fine grit paper to leave a smooth scratch-free surface suitable to receive the paint or natural finishes to be applied over as specified in Section 09 90 00.

.13 Nail heads in the finished surfaces shall be set with straight shank nail sets. Screw and bolt heads in finished surfaces shall be let into the work and capped with edge grain wood caps dressed and finished flush.

.14 Provide cutouts for sinks, fixtures, fittings, inserts, outlet boxes, services, other mechanical and electrical items and appliances. Round corners, and chamfer edges. Where items for cutouts butt to underside or back of finished surface, finish exposed edge to match face. Where item covers cutout, and at all concealed cut edges of core material, apply uniform coating of seal to cut edges.

.15 The finished work shall be of a high quality, with all corners having exact angles to ensure no swerve or twisting. All bends, crimps or angle parts shall be produced by professional equipment and tools for this purpose and if long runs or repeats are required, such shall be produced in the shop, or have proper equipment on site.

.16 Counters, Cabinets and Fitments:

.1 Provide and install counters, cabinets, and fitments as indicated on drawings.

.2 Shop fabricate and finish countertops and cabinet work in as large a size as practical. Verify field dimensions and conditions prior to fabrication.

.3 Make each unit rigid and self-supporting, suitable for individual removal. Assemble components with dovetail connections, mortise and tenon or blind dado joints, and adequately glued and secured with screws.

.4 Construct cabinets of solid lumber framing, with 19mm (3/4") MDF gables. Provide 19mm (3/4") MDF bottoms. Provide minimum 6mm (1/4") thick MDF full width backs having joints concealed behind framing. Backs which support shelves, equipment, or other loads, shall be 19mm (3/4") thick MDF. Route backs into end gables.

.5 Fabricate cabinet base in wood, separately in height indicated or, if not indicated, to match flooring base.

.6 Fabricate cabinet doors of flush panels from 19mm (3/4") thick MDF framed with hardwood edging.

.7 Make drawer fronts of 19mm (3/4") finished MDF, and wide enough to cover slide space. Provide 13mm (1/2") drawer backs, 16mm (5/8") sides, 6mm (1/4") dividers, and 6mm (1/4") bottoms, all of finished MDF. Fasten sides to fronts with dovetail joints, and grooved and glued joints for backs. Groove and glue bottoms into fronts and sides.

.8 Drawers shall be supported and guided with side extension drawer slides.

.9 Where a locking drawer is located below another drawer, provide 6mm (1/4") thick MDF diaphragm in framing immediately above locking drawer.

.10 Fabricate shelving of 19mm (3/4") finished MDF. Route cabinet gables to receive fixed shelving where indicated and to receive recessed metal shelf standards flush with adjacent surfaces for adjustable shelving.

.11 Fabricate countertops to details shown of 19mm (3/4") plywood, unless otherwise indicated on the Drawings as Solid Surface Countertops.

.12 Support counters without cabinets below on solid wood framing, and MDF gables.

.13 Provide MDF shelf units with finished plywood cleats for shelving and coat rod installations. Provide closet rods with end flanges and intermediate supports.

.17 Edging Treatment:

.1 3mm (1/8”) Self Edge Laminate: HPDL, colour matching cabinet work, as indicated on the Drawings.

.18 Plastic Laminate Covered Components:

.1 Meet requirements of CAN/CSA-A172, Appendix A.

.2 Bond plastic laminate to core with adhesive using pressure. Provide balanced construction with plastic laminate face sheet on exposed sides of core and backer/liner sheet. Finish drawers with liner sheet on both sides of core for balanced construction.

.3 Unless otherwise detailed, provide 19mm (3/4") thick core.

.4 Apply plastic laminate to core material in accordance with adhesive manufacturer's instructions. Provide same core and laminate profiles to provide continuous support and bond over entire surface.

.5 Use continuous lengths up to 2439mm (8'). Keep joints 610mm (2') from cutouts and in locations indicated on reviewed shop drawings.

.6 Locate joints, where required at 2439mm to 3048mm (8' to 10') O.C. At L-shaped corners mitre plastic laminate, to the outside corner. Accurately fit members together to provide tight and flush butt joints, in true planes. Provide 6mm (1/4") blind spline and approved type draw bolts; one draw bolt for widths up to 150mm (6") at maximum 457mm (18") centres for widths exceeding 150mm (6"). Colour-match adjoining units.

.7 Form shaped profiles and bends using postforming grade laminate to laminate manufacturer's instructions.

.8 Where curved or bent surfaces are required for counters, backsplashes and other areas, use postforming laminate.

.9 Self-edge straight-line-edging with general purpose laminate and radius corners with postforming laminate, of same colour and finish as facing sheet, to cover exposed edges of core material. Apply with same adhesive as facing sheet. Chamfer edges uniformly at approximately 20 deg using machine router. Do not mitre laminate edges.

.10 Fabricate horizontal wearing surfaces including counters, shelves, both sides of removable shelves, cabinet doors and drawer fronts, of general purpose laminate except where postforming is required.

.11 Use general purpose laminate for exposed vertical surfaces except where otherwise specified or indicated.

.12 Apply plastic laminate backing sheet to reverse side of core of plastic laminate finished work including under counter tops and concealed portions of plastic laminate faced work. Provide backing sheet of specified minimum thickness, increased as required to compensate stresses caused by facing sheet.

.13 Apply laminated plastic liner sheet to interior of cabinetry unless indicated otherwise.

.14 Where cutouts are required in countertops for items that butt to underside of top only, trim edges of opening with postforming laminate. Use radiused corners and chamfer edges around cutouts to avoid chipping laminate. Where item covers cutout, apply uniform coating of sealer to cut edges.

.15 Assemble work, true and square. Arrange adjacent parts of continuous laminate work to match in colour and pattern.

2.3 MOISTURE CONTENT

.1 Moisture content of interior woodwork shall be between 8% and 12%.

2.4 FINISHES

.1 Finishes shall match approved finished samples of wood treatment submitted by this section for each species of wood required. Wood items provided under this section shall be finished as part of the work of this section.

.2 Apply stain to items where scheduled, indicated or as directed Consultant, providing uniform required stain colour(s).

3 Execution

3.1 EXAMINATION

.1 Inspect available spaces and check surfaces over which the work of this section is dependent for any irregularities detrimental to the application and performance of the work. Notify Consultant in writing of all conditions which are at variance with those on the Contract Documents and/or detrimental to the proper and timely installation of the work of this section. The decision regarding correct measures shall be obtained from the Consultant prior to proceeding with the affected work.

.2 Check humidity in building with moisture reading instruments if doubt exists that building is sufficiently dry and ready to receive millwork. Do not proceed until unsatisfactory conditions are corrected.

.3 Commencement of work indicates acceptance of surfaces and conditions.

3.2 INSTALLATION - GENERAL

.1 Provide and fit in place all furring, strapping, battens, grounds and blocking required to provide adequate properly placed fixing for all finish carpentry work and as required for the work of other sections.

.2 Refer to drawings and coordinate with drywall, the painting and floor covering sections to establish sequence of installation or execution of each others' work. Pay particular attention to areas where materials are supplied by others and installed under this Contract.

.3 All nails where their use is permitted, shall be long enough so that at least half their length penetrates into the second member. Splitting of wood members shall be minimized by staggering the nails in the direction of the grain and by keeping nails well in from edges.

.4 Unless otherwise permitted by Consultant, fasten finish carpentry components in concealed manner.

.5 Plastic laminate work shall be free of cracks and chipped or broken edges. Replace damaged components.

.6 Fitments shall be installed level, plumb and true and complete in all respects.

.7 Fit small scribe moulds of same material as fitment to hide voids at junction of fitment to fitment and fitment to walls, partitions, ceilings, furrings.

.8 Provide and install all pass-thru doors, cable entry plugs, computer paper feed slot guides, casters, wall mounted standards with brackets and accessories as indicated on drawings, secure, plumb, level and true to line to adjacent surfaces and items.

3.3 PRIMING

.1 Immediately in instances where primed work is cut (as for fitting), a coat of primer shall be applied to the resulting raw surfaces.

3.4 INSTALLATION - CABINET HARDWARE

.1 Install cabinet hardware in shop wherever possible.

.2 Install cabinet hardware secure, plumb, level, true to line, and in accordance with hardware manufacturers' instructions.

.3 Cut and fit to finish carpentry and millwork for proper installation and operation of cabinet hardware.

.4 Size cutouts so that hardware item completely covers cutouts.

.5 Adjust and lubricate cabinet hardware as required for smooth and efficient operation without binding.

3.5 INSTALLATION - FINISHING HARDWARE

.1 Take delivery of all finishing hardware and install. Check each item as received.

.2 Set, fit and adjust hardware according to manufacturer's directions at heights directed by Consultant. Hardware shall operate freely. Protect installed hardware from damage and paint spotting.

.3 Install all hardware for hollow metal doors including hinges. Prepare wood doors for installation with required bevels, clearances and mortices for hardware. Install wood doors, door grilles and all applicable hardware.

.4 Pre-drill kickplates and doors before attachment of plates. Apply with water-resistant adhesive and countersunk stainless steel screws.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes supply and installation of a self-adhering modified bitumen waterproofing for foundation walls, complete with primer, drainage board, and protection course required for a complete system installation.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

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

.1 ASTM D412, Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers - Tension

.2 ASTM D882, Standard Test Method for Tensile Properties of Thin Plastic Sheet

.3 ASTM D1970/D1970M, Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection

.4 ASTM E96/E96M, Standard Test Methods for Water Vapour Transmission of Materials

.5 ASTM E154/E154M, Standard Test Methods for Water Vapour Retarders Used in Contact with Earth Under Concrete Slabs, on Walls or as Ground Cover

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals:

.1 Product Data:

.1 Submit copies of the most current technical data sheets, describing materials physical properties, and explanations about product installation, including installation techniques, restrictions, limitations and other manufacturer recommendations.

.2 Submit membrane manufacturer’s standard details that will be utilized for this project, indicate changes that must be made to make the details project specific for review by the Consultant.

.2 Samples: Provide samples of all materials required for work of this Section.

.3 Safety Data Sheets: Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on Site for reference by workers.

1.4 QUALITY ASSURANCE

.1 Subcontractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful application of bituminous sheet membrane waterproofing work of type as indicated on drawings and specified herein. Submit proof of experience upon Consultant's request.

.2 All membrane waterproofing products to be manufactured by or, approved by one manufacturer, which includes but is not limited to the following:

.1 Primers,

.2 Mastics and membranes,

.3 Asphaltic protection boards,

.4 Composite drainage boards,

.5 Expansion joint membranes.

.3 Work of this Section shall be executed by workers especially trained and experienced in this type of work. Have a full time, senior, qualified representative at the Site to direct the work of this Section at all times.

.4 Subcontractor executing work of this Section shall ensure that manufacturer's representative shall inspect substrates prior to commencement of work of this Section, during application of bituminous sheet membrane waterproofing and upon completion of work of this Section.

.5 Subcontractor executing work of this Section shall ensure that manufacturer's representative shall provide technical assistance to applicator and assist where required in correct application of bituminous sheet membrane waterproofing materials.

.6 Submit copies of the membrane manufacturer’s current ISO certification including the manufacturing of the membrane, primer, mastics, adhesives and asphaltic protection board.

1.5 PREINSTALLATION MEETING

.1 Arrange a preconstruction meeting in accordance with Division 1 requirements.

.2 Review requirements for waterproofing, including surface preparation specified under other Sections, substrate condition and pre-treatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.6 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off the ground, under cover storage area. Do not load any area beyond the design limits.

.2 Material shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable waterproof coverings.

.3 Deliver and store waterproofing materials in the manufacturer's original containers and wrappers with seals intact.

.4 Store solvent based materials in safe areas well away from open flames or excessive heat.

.5 Do not permit materials to freeze. Store materials at temperatures above 10 deg C.

.6 Do not permit traffic of any kind over unprotected waterproof membranes. Do not allow backfill to be placed against unprotected waterproof membranes. Apply drainage board/protection board as soon as possible after installation of membrane.

1.7 PROJECT CONDITIONS

.1 Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer.

.2 Apply waterproofing to dry substrates, when relative humidity is less than 85%, and when surface and ambient temperatures are 4 deg C above dew point.

.3 Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are imminent during application and curing period.

.4 Maintain adequate ventilation during application and curing of waterproofing materials.

1.8 WARRANTY

.1 Warrant that the work of this Section shall remain free from leaks and from defects in materials and workmanship in accordance with the Contract Requirements, but for a period of five (5) years.

.2 Promptly make good defects within the warranty period without cost to the Owner.

.1 Warranty is inclusive for procedures to gain access to waterproofing membrane including removal and reinstallation of earthwork, protection board, drainage panels, and insulation.

2 Products

2.1 MANUFACTURERS

.1 Compatibility: Verify that waterproofing systems identified in this Section are provided by a single manufacturer to ensure compatibility at intersections. Multiple manufacturers providing waterproofing systems on this project will not be accepted.

.2 Provide a written declaration to the Consultant, from the waterproofing manufacturer, that the waterproofing materials and components are compatible, and that warranty period specified above will be upheld at junctions between waterproofing systems required to waterproof the areas outlined in the Specifications and Drawings.

.3 Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

.1 W.R. Meadows

.2 Henry Company

.3 Hydrotech

.4 Grace Construction Products

2.2 MATERIALS

.1 Bituminous Sheet Membrane Waterproofing (WP-01):

.1 Rolled, Self-Adhering Waterproofing Membrane: Polymeric waterproofing membrane protected by release paper on cross-laminated polyethylene carrier film with exposed polymeric membrane strips on both sides protected by pull-off release strips.

.1 Compliance: AREMA Specification Chapter 29 - Waterproofing.

.2 Thickness:

.1 Carrier Film: 4 mils.

.2 Polymeric Membrane: 56 mils.

.3 Tensile Strength, ASTM D412, Die C:

.1 Carrier Film: 5,900 psi (40.71 MPa) minimum.

.2 Polymeric Membrane: 460 psi (3.23 MPa) minimum.

.4 Elongation, ASTM D412, Die C: Polymeric Membrane: 971 % minimum.

.5 Peel Adhesion, ASTM D903: 11.8 lbf/in. (2068 N/m).

.6 Lap Adhesion, ASTM D1876: 8.62 lbf/in. (1508 N/m)

.7 Water Vapor Permeability, ASTM E96, Method B: 0.036 perms.

.8 Water Absorption, ASTM D570: 0.1 percent, 72 hours maximum.

.9 Resistance to Hydrostatic Head: Equivalent to 230.9 feet (70.3 m) of water.

.10 Puncture Resistance, ASTM E154: 48.2 lbf (214.6 N).

.11 Exposure to Fungi, Soil Test: Pass, 16 weeks.

.2 Basis of Design Product: Blueskin WP200 by Henry Company, or MEL-ROL Waterproofing System by W.R. MEADOWS, or approved alternate by Hydrotech, or Grace Construction Products.

.2 Surface Conditioner:

.1 Temperatures Above 0 deg F (-18 deg C): Blueskin Primer by Henry Company, or Mel-Prime VOC Compliant Solvent Base Primer by W.R. MEADOWS.

.3 Flashing and Fillets: HE925 BES Sealant by Henry Company, or MEL-ROL LIQUID MEMBRANE by W.R. MEADOWS.

.4 Termination Sealant: As recommended by membrane manufacturer.

.5 Drainage Board:

.1 High impact polypropylene core board with polypropylene fabric attached, having the following physical properties:

.1 Flow Rate: 223L/min/m,

.2 Compressive Strength: 15,100 psf,

.3 Thickness: 10mm (3/8")

.6 Drainage Board Adhesive: As recommended by membrane manufacturer to ensure compatibility between drainage board and waterproofing.

.7 Drainage Board Accessories:

.1 Moulding Strip: Continuous 90mm (3-1/2") wide “Z” flashing strip to fit over exposed top edge of drain board.

3 Execution

3.1 EXAMINATION

.1 Examine the vertical surfaces to which membrane is to be applied. Ensure that concrete has cured for at least 28 days, that all slabs slope to drains, that all surfaces are sufficiently smooth (plywood formed or wood float) and that surfaces to which membrane is to be applied are clean of waxy or oily substances, dust, dirt or other extraneous materials or any substance which might impair bond.

.2 Do not apply membrane to damp or frosty surfaces. Ensure that all items penetrating the membrane, such as pipes, conduits, drains, and the like, are in place and rigidly fastened.

.3 Report any defects of any conditions which might impair the performance of the membrane. Do not apply the membrane until defects have been corrected.

.4 Commencement of work of this Section implies acceptance of surfaces and conditions.

.5 Ensure that any required skim/mud slabs are placed in ample time and at correct levels.

3.2 PREPARATION

.1 Priming:

.1 Apply primer in strict accordance with manufacturer's recommended rate.

.2 Prime only areas which shall be covered with bituminous sheet membrane waterproofing in same working day.

.3 Reprime areas contaminated with dust or, not covered with membrane within 24 hours.

.4 Allow minimum 30 minute open time.

.2 Joint and Crack Treatment:

.1 All cracks in concrete 1.5mm to 3mm (1/16" to 1/8") wide are to be pre-treated with a 1.5 mm (60 mil) coating of liquid membrane 50 mm (2") wide centred on the crack. Alternately, apply a 150 mm (6") wide strip of waterproofing membrane centred over crack. Provide 75 mm (3") end laps.

.2 Horizontal to vertical inside corner transition areas are to be pre-treated with a liquid membrane fillet extending 19 mm (3/4") vertically and horizontally from the corner. Apply a minimum 229 mm (9") strip of waterproofing membrane centred at the joint.

.3 All outside corners are to be pre-treated with a minimum 229 mm (9") strip of waterproofing membrane centred at the joint.

.4 Where three or more planes come into contact reinforce with cut sections of waterproofing membrane reinforcing sheet as per manufacturer's instructions.

3.3 INSTALLATION - BITUMINOUS SHEET MEMBRANE WATERPROOFING

.1 Installation of bituminous sheet membrane waterproofing shall be in strict accordance with manufacturer's written instructions.

.2 Corner Detailing:

.1 Form 19mm (3/4") fillet of liquid membrane at all inside corners and cover with minimum 305mm (12") wide sheet membrane strip centered on corner prior to installation of bituminous sheet membrane waterproofing.

.2 Apply minimum 305mm (12") wide sheet membrane strip centered on all outside corners prior to installation of bituminous sheet membrane waterproofing.

.3 Horizontal Surfaces:

.1 Apply bituminous sheet waterproofing membrane from low point to high point so that laps shed water.

.2 Stagger all end laps and overlap all seams minimum 75 mm (3").

.3 Provide double thickness of bituminous sheet waterproof membrane over construction joints and cracks up to 3mm (1/8") wide.

.4 Roll membrane in its entirety immediately following placement to ensure continuous adhesion to slab.

.5 Tie-in under floor bituminous sheet membrane waterproofing with bituminous sheet membrane waterproofing system applied to walls, overlapping existing a minimum 457 mm (18"). Seal junction with continuous liquid membrane, minimum 3mm (1/8") thick and 25mm (1") wide.

.6 Seal all "T" joints and sheet membrane terminations with liquid membrane, minimum 3mm (1/8") thick and 25mm (1") wide.

.4 Vertical Surfaces:

.1 Apply bituminous sheet membrane waterproofing vertically in full lengths.

.2 Stagger all end laps and overlap all seams minimum 75mm (3").

.3 Provide double thickness of bituminous sheet waterproofing membrane over construction joints and cracks up to 3mm (1/8") wide.

.4 Roll membrane in its entirety immediately following placement to ensure continuous adhesion to walls.

.5 Install securement bars at horizontal terminations, edges with liquid membrane.

.6 Tie-in bituminous sheet membrane waterproofing with existing waterproofing system, overlapping existing a minimum 305mm (12"). Seal junction with continuous liquid membrane, minimum 3mm (1/8") thick and 25mm (1") wide.

.7 Seal all "T" joints and sheet membrane terminations with liquid membrane, minimum 3mm (1/8") thick and 25mm (1") wide.

.5 Protrusions:

.1 Apply bituminous sheet membrane waterproofing to within 25mm (1") of base of protrusion. Apply liquid membrane around protrusion, minimum 3mm (1/8") thick and minimum 75mm (3") on to sheet membrane.

.6 Drains:

.1 Apply collar of membrane to drains, collar to extend minimum 6" beyond drain opening.

.2 Apply full coverage of bituminous sheet waterproofing membrane over the collar. Cut out drain opening so that the membrane extends under the clamping ring.

.3 Place a continuous bead of liquid membrane between the membrane waterproofing and clamping ring.

.7 Repairs:

.1 Inspect bituminous sheet waterproofing membrane thoroughly and make any repairs before covering.

.2 Patch tears and inadequately lapped seams with bituminous sheet membrane waterproofing. Slit "fishmouths" and repair with bituminous sheet membrane waterproofing extending min 150 mm (6") in all directions of slit.

.3 Seal all repairs with liquid membrane.

3.4 INSTALLATION - DRAINAGE BOARD

.1 Align and hang drainage up to foundation wall. Position bottom edge of drainage board to be in moderate contact with weeping tile system.

.2 Secure drainage board to foundation wall with board adhesive. Apply adhesive using saw tooth notched trowel having 3mm (1/8") notches or apply a 6mm (1/4") diameter bead on 150mm (6") centres in a serpentine pattern.

.3 Align and install termination strip along top edge with nails spaced 305mm (12") o/c and seal with termination sealant.

.4 Align and install moulding strip over completed top edge detail.

.5 Overlap end laps, pull back loose fabric to expose drain core and position core of second panel over the overlap flange of first panel.

.6 Bend drain board to create inside corners and cut board to create outside corners, provide 75mm (3") of extra fabric to wrap corner.

.7 Stagger or offset joints of drain board sheets.

.8 Place all subsequent sheets in an overlapping single fashion.

.9 Backfill bottom edge in conjunction with weeping tile system.

3.5 FIELD QUALITY CONTROL

.1 An independent inspection and testing company appointed and paid for by the Owner will carry out inspection and testing in accordance with the General Conditions.

.2 Arrange site meeting with inspection company representative three weeks prior to commencement of work of this Section on Site. Obtain inspector's instructions and procedures to be followed.

.3 Co-operate with the inspector and afford all facilities necessary to permit full inspection of the work of this Section and testing of materials prior to their use. Act immediately on instructions given by the inspector.

END OF SECTION

1 General

1.1 SUMMARY

.1 Work of this section includes, but is not limited to supply and installation of Crystalline Waterproofing of concrete substrates, using surface application, in the following locations:

.1 Dry side of elevator pits and sump pits.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

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

.1 ASTM C39/C39M, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

.2 ASTM C267, Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacings and Polymer Concrete

1.3 SUBMITTALS

.1 Product Data: Submit manufacturer's product data, with complete general and specific installation instructions, recommendations, and limitations affecting installation.

.2 Provide representative samples of the following for review by Consultant: Crystalline waterproofing.

.3 Provide certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical requirements; and that waterproofing system and components; materials are supplied by a single source manufacturer.

.4 Provide written certification that installer has current approved applicator status with waterproofing material manufacturer when requested by Consultant.

.5 Provide written report summarizing manufacturer’s observations, and indicating results of final inspection and any corrective action required for changes arising from deficiencies or site conditions.

1.4 QUALITY ASSURANCE

.1 Manufacturer Qualifications: A firm with not less than ten (10) years experience manufacturing crystalline waterproofing of the type specified, able to provide test reports showing compliance with specified performance characteristics, and able to provide on-site technical representation to advise on installation.

.2 Installer Qualifications: Experienced in work of the type specified in this section and approved in writing by waterproofing manufacturer.

.3 Pre-installation Meeting: Before installation, conduct meeting with waterproofing installer, installers of adjacent work and work penetrating waterproofing, and waterproofing manufacturer's representative to verify project requirements, substrate conditions, manufacturer’s installation instructions, and manufacturer’s warranty requirements; notify Owner and Consultant at least one week in advance of meeting.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Deliver materials in factory sealed and labelled packaging, and handle and store as per the manufacturer's instructions, recommendations and material safety data sheets.

.2 Store materials in accordance with manufacturer’s instructions, and as follows:

.1 Do not double stack pallets during shipping or storage.

.2 Protect waterproofing materials from moisture, excessive temperatures and sources of ignition.

.3 Provide cover to top, bottom and sides for materials stored on site, allowing for adequate ventilation.

.3 Handle materials in accordance with manufacturer’s instructions, and as follows:

.1 Protect from construction operation related damage, damage from weather, excessive temperatures and prolonged sunlight.

.2 Remove damaged material from site and dispose of in accordance with applicable regulations.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Perform work only when existing and forecasted weather conditions are within guidelines established by the manufacturer for installation of waterproofing materials.

.2 Do not apply waterproofing materials into standing or ponding water conditions.

1.7 WARRANTY

.1 Provide manufacturer’s written system warranty for a period of five (5) years starting from substantial performance of the Project, covering materials and labour.

.2 Installer's Warranty: Provide warranty signed by installer that reads as follows:

.1 Installer warrants that, upon completion of the work, surfaces treated with crystalline waterproofing will be and will remain free of water leakage resulting from defective workmanship or materials for a period of ten (10) years from Date of Substantial Performance.

.2 In the event that water leakage occurs within the warranty period from such causes, the installer shall, at his own expense, repair, replace, or otherwise correct such defective workmanship and materials.

.3 Installer shall not be liable for consequential damages.

.4 Installer's liability shall be limited to repair, replacement, or correction of defective workmanship and materials.

.5 This warranty excludes leaks or other defects due to causes beyond the installer's control, including but not limited to structural failure, movement of the structure, fire, earthquakes, tornadoes, and hurricanes.

2 Products

2.1 MANUFACTURER

.1 Subject to compliance with requirements specified in this Section, manufacturers’ products that may be incorporated into the Work include, but are not limited to, the following:

.1 Tremco, Permaquik Crystalline Waterproofing Systems

.2 Xypex Chemical Corporation

.3 Krystol T2 Waterproofing System by The Kryton Group of Companies

2.2 MATERIALS

.1 Waterproofing Products: Provide installed products that comply with following, when tested using cured concrete samples made without admixtures, with two 1.27mm (0.05") thick coats of waterproofing:

.1 Penetration: At least 50mm (2") penetration of crystal-forming material, evidenced by scanning electron microscope photographs.

.2 Permeability: No measurable leakage through waterproofed concrete, when tested in accordance with COE CRD-C 48 at 123.4 m (405 feet) of head or 1200 kPa (175 psi) using 50 mm (2") thick, 13.8 MPa (2000 psi) compressive strength concrete.

.3 Chemical Resistance: No detrimental effects when tested using (27.6 MPa) compressive strength concrete in accordance with ASTM C 267 using hydrochloric acid (pH of 3.5), brake fluid, transformer oil, ethylene glycol, toluene, and caustic soda as test mediums for duration of 84 days each; minimum of 14 percent increase in concrete compressive strength when tested in accordance with ASTM C39.

.4 Potable Water Contact Approval: NSF certification for use on structures holding potable water, based on testing in accordance with NSF 61.

.2 Waterproofing: Modified single coat crystalline waterproofing; proprietary compound of Portland cement, silica sand and active chemicals, mixed with water in proportions recommended by manufacturer to achieve full coverage with application method used.

.3 Patching Compound: Single component, fast-setting, nonshrink, high bond strength hydraulic cement; with admixture where needed for increased bond strength to existing concrete.

3 Execution

3.1 CONDITIONS OF SUBSTRATES

.1 Surfaces shall be clean and free of oil, grease, paint, loose dust and laitance.

.2 Surfaces and ambient temperature shall be minimum 50 deg. C for a period of 24 hours before the installation, during and after the installation.

3.2 PREPARATION

.1 Slabs:

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

.2 Apply dry shake powder to fresh horizontal concrete surfaces at rate recommended by manufacturer. Incorporate powder into surface during concrete finishing process.

.2 Defective Surfaces:

.1 Remove defective concrete to a depth where sound concrete is found; fill tie holes, reglets, honeycombed areas and routed out cracks with mortar.

.3 All Surfaces:

.1 Wash all surfaces thoroughly with water and let dry to a damp condition.

.4 Construction Joints: Apply sealing strips at each construction joint by filling grooves coinciding with construction joint.

.1 If grooves have not been preformed, at least 19mm (3/4") wide and minimum 25mm (1") deep, saw cut and chip grooves to that dimension.

.2 Apply specified slurry coat to slot at rate recommended by manufacturer.

.3 Fill and form surfaces using specified dry pack repair compound while slurry coat is still green, but after slurry coat has reached initial set.

.4 Compact tightly using pneumatic packer or hammer and block.

3.3 APPLICATION

.1 Provide cementitious waterproofing in elevator pits and sump pits as indicated on drawings.

.2 Install mortar cove at junction of walls to slabs.

.3 At slabs and toppings broadcast cementitious waterproofing material dry at time of initial set of concrete and float thoroughly into concrete or apply by slurry coat method.

.4 Apply cementitious waterproofing material to walls with brush, broom or suitable spray equipment. Where two coat application is required, apply second coat while first coat is still green.

.5 Fill reglets at construction joints and other locations, with mortar.

.6 Give surfaces a smooth, dense and uniform finish.

3.4 CURING

.1 Curing: Cure exposed waterproofing treatment using a mist fog spray of clean water after coating has hardened sufficiently not to be damaged by spray; do not use plastic sheeting laid directly on waterproofing; air circulation is required.

.1 If water curing is not possible, follow manufacturer's recommendations for curing using chemical curing agent approved by manufacturer.

.2 Avoid coating damage with spray operation.

.3 Spray treated surface 3 times a day for 2 to 3 days.

.4 In hot climates, spray treated surfaces at intervals recommended by waterproofing manufacturer.

.5 During curing period, protect treated surfaces from rainfall, ambient temperature below freezing, and puddling of water.

.6 Provide supplementary air circulation as recommended by waterproofing manufacturer.

.2 Comply with waterproofing manufacturer’s recommendations for sequencing construction operations after waterproofing applications to avoid conditions detrimental to performance of waterproofing application.

3.5 CLEANING AND PROTECTION

.1 Clean spillage and overspray from adjacent surfaces using appropriate cleaning agents and procedures.

.2 Protect installed product from damage during construction; do not allow traffic on unprotected waterproofed surfaces.

.3 Do not backfill against waterproofed surfaces for at least 36 hours after installation; use moist backfill material when backfilling occurs less than 7 days after installation.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install the following as indicated in this Section:

.1 Mineral Fibre Batt Insulation

.2 Glass Fibre Batt Insulation

.3 Foamed-In-Place Insulation

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

.1 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S702, Standard for Thermal Insulation Mineral Fibre for Buildings

.2 CAN/ULC S114, Standard Method of Test for Determination of Non-Combustibility in Building Materials

.3 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-51.10, Mineral Fibre Board Thermal Insulation

1.3 SUBMITTALS

.1 Affidavits:

.1 In lieu of samples and inspection procedures when required by CGSB Standards, submit affidavits, if requested, that materials supplied under these requirements meet CGSB Standards.

.2 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on site for reference by workers.

1.4 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Handle and store material in accordance with the manufacturer's recommendations.

.2 Materials shall be delivered to the job in their original packages and containers bearing the manufacturer's labels intact and clearly visible.

.3 Store materials in dry, watertight areas and protect to prevent damage by other trades.

.4 Do not expose rigid insulation board to sunlight after installation. Protect it with black polyethylene or tarpaulin cover as recommended by manufacturer if permanent covering is not completed within twenty-four (24) hours.

2 Products

2.1 MATERIALS

.1 Mineral Fibre Batt Insulation:

.1 Unfaced, semi-rigid mineral slag batt insulation in accordance with CAN/ULC S702, Type 1; having a nominal RSI of 0.67/25 mm; rated non-combustible in accordance with CAN/ULC S114 and having a flame spread rating of 5 or less in accordance with CAN/ULC S102; density 32 kg/m3; square edges, thickness as required to meet design insulation values indicated on drawings or as required to fill insulated spaces where not indicated.

.2 Basis of Design Materials:

.1 Rockwool Inc., Rockwool COMFORTBATT

.2 Thermafiber, SAFB (2.5 pcf Density)

.2 Glass Fibre Batt Insulation:

.1 Unfaced, preformed glass fibre batt insulation in accordance with CAN/ULC S702-09, Type 1; having a nominal RSI of 0.55/25 mm, thickness as required to meet design insulation values indicated on drawings or as required to fill insulated spaces where not indicated; formaldehyde free, manufactured using recycled glass.

.2 Basis of Design Materials:

.1 Owens-Corning Canada Inc., Pink Fiber Glass Insulation

.2 CertainTeed Sustainable Insulation

.3 Johns-Manville Formaldehyde Free Batt Insulation

.3 Foamed-In-Place Insulation:

.1 Two component polyurethane froth/spray kit, UL Class I (flame spread of 25 or less), Great Stuff by Dow Building Solutions Inc., or approved equal.

3 Execution

3.1 PREPARATION

.1 All materials and methods used in application shall be in strict accordance with the printed instructions of the manufacturer.

.2 Remove stains, defective work or materials when directed by the Consultant and replace with approved work and materials at no cost to Owner.

.3 Clean all surfaces of dust, dirt and projecting surfaces prior to the application of insulation.

.4 Do not install insulation when ambient air and surface temperatures are below 4 deg C (40 deg F) or more than 38 deg C (100 deg F). The temperature shall be maintained in the building during and after installation as necessary by the above requirement and as directed for curing of the adhesive. Obtain approval prior to proceeding with application of adhesive and insulation.

3.2 INSTALLATION

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.2 Cut insulation to fit around electrical boxes, pipes, ducts, openings, corners and all protruding obstructions occurring on the surface to be insulated and seal with adhesive.

.3 Keep insulation minimum of 75mm (3") away from heat emitting devices.

.4 Trim and cut insulation neatly to fit spaces. Butt joints tightly, offsetting vertical joints. In multiple layer application, offset both vertical and horizontal joints.

.5 Install batt insulation in locations and thicknesses shown. Seal joints to prevent transfer of moisture.

.6 Apply foamed-in-place insulation at exterior walls, around penetrations through walls, within ceiling space above the elevator ceiling, as shown and where indicated. Apply foamed-in-place insulation with suitable equipment in accordance with the manufacturer's written instructions. Fill all joints completely, leaving no voids or gaps and trim excess material.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply of polyethylene sheet materials, accessories and installation requirements to provide an effective and continuous vapour retarder forming a part of the complete building envelope system.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

.1 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-51.34-M, Vapour Retarder, Polyethylene Sheet, for Use in Building Construction

1.3 SUBMITTALS

.1 Provide required information in accordance with Division 01.

.2 Submit manufacturer's printed installation instructions including special handling criteria, installation sequence, cleaning procedures, and joint treatment and repair recommendations.

.3 Submit product data sheets for sheet vapour retarders indicating the following:

.1 Product characteristics.

.2 Performance criteria.

.3 Limitations.

2 Products

2.1 SHEET VAPOUR RETARDER

.1 Polyethylene Film: 0.10 mm thickness meeting the requirements of CAN/CGSB-51.34.

2.2 ACCESSORIES

.1 Joint Sealing Tape: Air resistant pressure sensitive adhesive tape, type recommended by vapour retarder manufacturer, 50 mm wide for lap joints and perimeter seals, 25 mm wide elsewhere.

.2 Sealant: Asbestos free non-hardening sealant, compatible with vapour retarder materials, recommended by vapour retarder manufacturer in accordance with Section 07 92 00.

.3 Staples – Wood Framing Application: minimum 6 mm leg.

.4 Moulded Box Vapour Retarder: Factory moulded polyethylene box purpose made for use with recessed electric switch and outlet device boxes.

3 Execution

3.1 INSTALLATION

.1 Verify that services are installed and have been accepted by the Consultant and Authorities Having Jurisdiction prior to installation of vapour retarder.

.2 Install sheet vapour retarder on warm side of exterior wall, and ceiling assemblies, as indicated on the Drawings, prior to installation of gypsum board to form continuous retarder in accordance with manufacturers written instructions.

.3 Use sheets of largest practical size to minimize joints.

.4 Install materials in a manner the maintains continuity; repair punctures and tears with sealing tape before work is concealed.

3.2 EXTERIOR SURFACE OPENINGS

.1 Cut sheet vapour retarder to form openings and lap and seal to window and door frames in accordance with good building envelope practice.

3.3 PERIMETER SEALS

.1 Seal perimeter of sheet vapour retarder as follows:

.1 Apply continuous bead of sealant to substrate at perimeter of sheets.

.2 Lap sheet over sealant and press into sealant bead.

.3 Install staples through lapped sheets at sealant bead into wood substrate.

.4 Adhere sheets using sealant bead at each steel framing member and at top and bottom tracks].

.5 Install sealant bead with no gaps; smooth out folds and ripples occurring in sheet over sealant.

3.4 LAP JOINT SEALS

.1 Seal lap joints of sheet vapour retarder as follows:

.1 Attach first sheet to substrate.

.2 Apply continuous bead of sealant over solid backing at joint.

.3 Lap adjoining sheet minimum 150 mm and press into sealant bead.

.4 Install staples through lapped sheets at sealant bead into wood substrate.

.5 Adhere sheets using sealant bead at each steel framing member and at top and bottom tracks.

.6 Install sealant bead with no gaps; smooth out folds and ripples occurring in sheet over sealant.

3.5 ELECTRICAL BOXES

.1 Seal electrical switch and outlet device boxes that penetrate vapour retarder as follows:

.1 Install moulded box vapour retarder.

.2 Apply sealant to seal edges of flange to main vapour retarder and seal wiring penetrations through box cover.

END OF SECTION

1 General

1.1 SUMMARY

.1 This section includes requirements for supply and installation of under-slab vapour retarder required for the following:

.1 Below-grade Areas.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals:

.1 Samples: Submit samples of materials to Consultant for review and acceptance as follows:

.1 305 mm x 305 mm (12” x 12”) sample for review and acceptance.

.2 Data Sheets: Manufacturer's descriptive literature and recommended method of installation.

.3 Certificates: Manufacturer's certificates attesting that products meet specification requirements.

.3 Informational Submittals:

.1 Product Data: Submit manufacturer’s product literature for each product listed including manufacturer’s recommended installation procedures and any modifications required to suit installation conditions.

1.3 QUALITY ASSURANCE

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

.2 The below-grade vapour retarder shall be inspected by the Consultant prior to concrete work.

1.4 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Deliver materials on manufacturer's original skids, or in original unopened protective packing.

.2 Protect materials during transportation, storage and installation to avoid physical damage.

2 Products

2.1 MATERIALS

.1 Plastic Sheet Vapour Retarder: Polyethylene sheet in accordance with ASTM E1745, including manufacturer’s recommended seam tape, pipe boots and vapour proofing mastic forming a complete system, and as follows:

.1 Vapour Permeance: 0.3 Perm maximum

.2 Water Vapour Transmission Rate: 17 ng/(s·m2·Pa) maximum

.3 Tensile Strength: Class A

.4 Thickness: Not less than 15 mil in accordance with ACI 302R recommendations.

.5 Acceptable Materials:

.1 Perminator 15 mil by W.R. Meadows, Perminator 15 mil.

.2 Stego Wrap Vapour Barrier by Stego Industries.

3 Execution

3.1 INSPECTION

.1 Check graded subgrade for conformity with elevations and cross-sections before placing material.

.2 Check for unstable areas and areas requiring additional compaction.

.3 Notify Consultant of unsatisfactory surfaces and conditions.

.4 Do not begin installation of material until deficiencies have been corrected.

3.2 INSTALLATION

.1 Coordinate placement with other drainage materials and install in accordance with manufacturer's written instructions.

.2 Before placing concrete for slabs on grade, water compacted base; do not use polyethylene. Place interior slabs on premoulded vapour retarder membrane, installed in accordance with manufacturer's written instructions.

.3 Overlap sheet membrane seams 150mm (6") and tape using manufacturer's recommended 100mm (4") seam tape. Tape membrane edge to foundation wall to prevent membrane from moving and ensuring a continuous below-grade vapour retarder.

3.3 PROTECTION

.1 Take extreme care during trenching operations, installation of materials and backfilling not to damage or displace materials or other utilities.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply labour, materials, plant, tools and equipment to complete the Work as shown on the Drawings and as specified herein, including, but not limited to the following:

.1 Materials and installation methods of vapour permeable air barrier membrane system.

.2 Materials and installation methods to bridge and seal the following air leakage pathways and gaps:

.1 Connections of the walls to the roof air barrier. Connections of the walls to the foundations, seismic and expansion points, openings and penetrations of window frames, store front, and other envelope systems, door frames, piping, conduit, duct and similar penetrations, masonry ties, screws, bolts and similar penetrations. All other leakage pathways in the building envelope.

1.2 PERFORMANCE REQUIREMENTS

.1 Provide a vapour permeable air barrier constructed to perform as a continuous air and vapour barrier, and as liquid water drainage plane flashed to discharge any incidental condensation or water penetration.

.2 The building envelope shall be designed and constructed with a continuous air barrier to control air leakage into, or out of the conditioned space.

.3 The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:

.1 Foundations and walls.

.2 Walls and windows or doors.

.3 Different wall systems.

.4 Wall and roof.

.5 Wall and roof over unconditioned space.

.6 Walls, floor and roof across construction, control and expansion joints.

.7 Walls, floors and roof to utility, pipe and duct penetrations.

.8 All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

1.3 QUALITY ASSURANCE

.1 Work in this Section is to be carried out by a skilled applicator approved by manufacturer and in strict accordance with manufacturer's printed instructions. Upon request, provide written confirmation or certification from the vapour permeable air barrier manufacturer that the installer has been trained and is recognized by the manufacturer as suitable for the execution of the work.

.2 Perform Work in accordance with the manufacturer's written instructions of the air barrier membrane and this specification.

.3 Maintain one (1) copy of the manufacturer's written instructions on site.

.4 Compounds used in this section shall be sourced from one (1) manufacturer, including sheet membrane, air barrier sealants, primers, mastics and adhesives.

.5 Pre-Installation Conference:

.1 Convene a pre-installation conference two (2) weeks prior to commencing work of this section. Require attendance of parties directly affecting work of this section, including, but not limited to, the Owner's representative, Consultant, General Contractor, vapour permeable air barrier membrane contractor, vapour permeable air barrier membrane manufacturer's representative and substrate installer.

.2 Contact Consultant two (2) weeks prior to pre-installation conference to confirm schedule.

.3 Review preparation and installation procedures and co-ordinating and scheduling required with related work.

.4 Record discussions of conference and decisions and agreements (or disagreements) reached, and furnish copy of record to each party attending. Review foreseeable methods and procedures related to the vapour permeable air barrier membrane, including the following:

.1 Tour, inspect and discuss condition of substrate, penetrations and preparatory work performed by other trades.

.2 Review surface preparation, minimum curing period and installation procedures.

.3 Review special details and flashings.

.4 Review required submittals, both completed and yet to be completed.

.5 Review and finalize construction schedule related to work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.

.6 Review required inspections, testing, protection and repair procedures.

.7 Review weather and forecasted weather conditions, and procedures for coping with unfavourable conditions.

.6 Arrange for a Manufacturer's Representative to:

.1 Visit the site and discuss any special requirements, procedures and unique conditions, prior to commencement of work.

.2 Inspect substrate surfaces and recommend solutions to accommodate adverse conditions.

.3 Periodically visit and inspect the installation and report unsatisfactory conditions to the Contractor.

.4 Attend final inspection and to submit written certification that the products, systems and assemblies have been installed in accordance with the manufacturer's requirements.

.7 Inspection and Testing:

.1 Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover any installed vapour permeable air barrier membrane until any required inspections, testing approvals have been completed.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Documentation:

.1 Prior to commencing the Work, submit documentation from an approved independent testing laboratory certifying that the air leakage and vapour permeance rates of the air barrier membranes, including primary membrane and transition sheets, exceed the requirements of the NBC.

.2 Prior to commencing the Work submit copies of manufacturer's current ISO certification. Membrane, primers, sealants, adhesives and associated auxiliary materials shall be included.

.3 Prior to commencing the Work submit references clearly indicating that the membrane manufacturer/installer has successfully completed projects on an annual basis of similar scope and nature for a minimum of fifteen (15) years. Submit references for a minimum of ten (10) projects.

.4 Prior to commencing the Work submit manufacturer's complete set of standard details for the air barrier membrane system showing a continuous plane of air tightness throughout the building envelope.

.5 Prior to commencing work provide a material checklist, complete with application rates and minimum thickness of primary membranes.

.3 Shop Drawings:

.1 Show the locations and extent of the vapour permeable air barrier system including details of typical conditions, intersections with other envelope systems and materials, membrane counter-flashings and details showing how gaps in construction will be bridged and how miscellaneous penetrations such as conduits, pipes, etc. are sealed.

.4 Samples:

.1 Submit to Consultant for approval, samples of materials and components to be used in vapour permeable air barrier system, prior to fabrication of work together with name of manufacturer and technical literature. Submit 305mm x 305mm (12" x 12") samples of vapour permeable air barrier membrane.

.5 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on site for reference by workers.

1.5 ENVIRONMENTAL CONDITIONS

.1 Vapour permeable air barrier membrane is not to be applied to surfaces that are either wet, oily, frosted, dirty or contaminated in any way.

.2 Maintain surface of substrates and ambient temperatures constantly between 38 degree C and 5 degree C during application and curing of primers and adhesives for flexible vapour permeable air barrier membrane flashings, except as permitted otherwise by Consultant in writing.

1.6 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries with construction schedule and arrange for proper storage areas.

.2 Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.

.3 Store materials in a clean, dry and protected area, off the floor or ground, in their original containers, sealed and undamaged. Manufacturer's labels are to be easily visible and undamaged. Store rolled materials on end.

.4 Store liquid membrane materials, adhesives and primers at minimum 5 degree C, and store away from open flames, sparks and excessive heat as liquid membrane materials and primers are flammable because of solvent content.

.5 Care and precaution are to be exercised by the applicator so as not to damage the work of other trades. Applicator is responsible to take all necessary precautions to protect work of other trades during application.

.6 In addition to the above, store modified bituminous sheet type flexible vapour permeable air barrier membrane flashings as follows;

.1 Store rolls of membrane tape in accordance with manufacturers written instructions.

.2 Store materials away from direct heat or open flame.

.3 Store rolls away from direct sunlight until ready for use.

.4 For installation in cold weather, store rolls of membrane in heated storage trailer for minimum of 24-hours with the temperature kept at 21 degree C and remove for application with as little exposure as possible to low ambient temperatures.

.7 The vapour permeable air barrier membrane is not designed for permanent exposure, but can be left exposed for up to a maximum of thirty (30) days. As soon as possible after the membrane has cured, protect vapour permeable air barrier membrane from damage by work of other Sections.

1.7 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions, but for a period of two (2) years and agree to repair and replace faulty materials or work which becomes evident during the warranty period, without cost to the Owner. Provide the Owner with a written warranty to this effect.

2 Products

2.1 MATERIALS

.1 Flexible Vapour Permeable Air Barrier Membrane:

.1 Sheet-applied, self-adhering vapour permeable membrane bonded with permeable adhesive layer and split-back poly-release film.

.1 Basis of Design Product: Blueskin VP160 by Henry Company, or approved equivalent.

.2 Flexible Air Barrier Membrane Flashing Primer:

.1 Type A or Type B, as recommended by manufacturer to suit conditions.

.2 Type A: Solvent based, synthetic rubber adhesive type, quick setting, solvent based, roller consistency type primer.

.1 Basis of Design Product: Blueskin Primer by Henry Company, or approved equivalent.

.3 Type B: Water based, polymer emulsion type.

.1 Basis of Design Product: Blueskin Aquaprime by Henry Company, or approved equivalent.

.3 Flexible Air Barrier Membrane Flashings (Transition Flashings):

.1 40 mils (1mm) thick x width to suit, strips of self-adhering, SBS rubberized asphalt laminated to a cross-laminated, high density polyethylene film with a silconized release liner.

.1 Basis of Design Product: Blueskin TWF by Henry Company, or approved equivalent.

.2 Supply additional flexible air barrier membrane flashings in sufficient quantities for steel lintels in masonry to Section 04 26 00.

.4 Reinforcing Fabric (Joint Treatment Mesh):

.1 150mm (6") wide, open weave 20/10 mesh, glass fibre yarn saturated with synthetic resins, reinforcing fabric fabric weighing minimum of 2.5 oz/sq.yd., and conforming to CGSB 37-GP-63M

.1 Basis of Design Product: Yellow Jacket 990-06 by Henry Company, or approved equivalent.

.5 Air Barrier Sealant:

.1 High solids, high flexibility, polymer modified, rubberized asphalt type sealant, compatible to vapour permeable air barrier membrane and conforming to CAN/CGSB-37.29-M.

.1 Basis of Design Product: Polybitume Sealing Compound by Henry Company, or approved equivalent.

.6 Substrate Cleaners:

.1 Petroleum spirits thinner or low flash petroleum spirits (mineral spirits) conforming to CAN/CGSB-1.4, or xylene thinner (xylol) conforming to CAN/CGSB-1.49-M.

.7 Packing Insulation:

.1 Loose, glass fibre or mineral fibre insulation, 1.0 lbs./cu.ft. density, and conforming to CAN/CGSB-51.11.

3 Execution

3.1 EXAMINATION

.1 The installer shall examine conditions of substrates, areas and other conditions under which the vapour permeable air barrier system will be applied for compliance with requirements.

.2 Verify that surfaces and conditions are ready to accept the Work of this section. Surfaces shall be sound, dry, even and free of oil, grease, dirt, excess mortar or other contaminants. Concrete surfaces shall be cured and dry, smooth without large voids, spalled areas or sharp protrusions. Masonry joints shall be flush and completely filled with mortar, and all excess mortar sitting on masonry ties shall have been removed. Verify substrate is visibly dry and free of moisture.

.3 Notify the Consultant in writing of any discrepancies. Commencement of work or any parts thereof shall mean acceptance of the prepared substrate.

.4 Do not proceed with application of vapour permeable air barrier membrane when rain is expected within 16-hours.

3.2 GENERAL

.1 Ensure continuity of the air seal throughout the scope of this section.

.2 Components and membrane materials must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

.3 Install all materials in accordance with the manufacturer's written directions, unless otherwise specified herein.

3.3 SURFACE PREPARATION

.1 Clean, prepare and treat substrates according to manufacturer's written instructions. Surfaces to be coated must be smooth, clean, dry, firm to the touch and free from oil, grease, dirt, excess mortar and other contaminants. Brushing and/or scraping of substrates may be required to adequately prepare surface. Thoroughly wash metal surfaces with mineral spirits or xylol and wipe dry with clean rags.

.2 Vapour permeable air barrier membrane is not to be applied over lightweight, cast-in-place concrete containing high moisture or certain curing compounds. Cast-in-place concrete should be cured for a minimum of two (2) weeks prior to application of vapour permeable air barrier membrane.

.3 Concrete surfaces shall be free of large voids and spalled areas. Fill all spalled concrete areas, form-tie holes/voids and open mortar joints in concrete block with mortar to produce a smooth, even surface. Allow to cure properly before proceeding.

3.4 JOINT AND PROTRUSION TREATMENTS

.1 Prepare only enough vapour permeable air barrier membrane compound as required for joint and protrusion treatments and can be used within compound's usable pot life. Mix vapour permeable air barrier membrane with a double blade agitator attached to a 13mm (1/2") drill in strict accordance with the manufacturer's written instructions.

.2 Exterior sheathing board inside/outside corners: Embed minimum 305mm (12") wide, continuous strip of reinforcing fabric in vapour permeable air barrier membrane, centred over corner.

.3 Fill joints up to 6mm (1/4") wide in exterior grade sheathing board and joints in between panels of exterior grade plywood with trowel application of vapour permeable membrane or mastic as recommended by manufacturer ensuring that joints are completely filled.

.4 Where joints in exterior grade sheathing board are over 6mm (1/4") wide, ensure joints are completely filled with a vapour permeable membrane or mastic and apply continuous flexible air barrier membrane flashing or mesh as specified herein, lapped a minimum of 75mm (3") and fully adhered to both sides of substrate.

.5 Where joints/cracks up to 6mm (1/4") wide occur in concrete or masonry, fill joints/cracks with a thick trowel application of vapour permeable air barrier membrane or mastic, ensuring that joints are completely filled.

.6 Where joints/cracks in concrete or masonry are over 6mm (1/4") wide, apply a vapour permeable membrane or mastic as recommended by manufacturer ensuring that joints are completely filled.

.7 Ensure continuity of air barrier membrane by working air barrier membrane over all exterior sheathing board fasteners and around all masonry ties and anchors and other items.

3.5 APPLICATION - FLEXIBLE AIR BARRIER MEMBRANE FLASHINGS

.1 Apply primer to all substrate areas where flexible air barrier membrane flashings are to be applied. Apply primer using lambs wool roller at rate 100 sq.ft. to 300 sq.ft./gallon (2.044 to 6.131 sq.m./gallon) depending on porosity of substrates. Allow primer to "tack up" for approximately 30-minutes prior to application of flexible air barrier membrane flashings.

.2 Do not use solvent-based primer where it may be in contact with polystyrene insulation.

.3 Install flexible air barrier membrane flashings in strict accordance with the manufacturer's written instructions unless otherwise specified herein.

.4 Ensure a uniform, continuous air barrier effect. Where air barrier membranes are to be provided under other Sections, co-ordinate the work such that air barrier membrane continuity is achieved.

.5 Provide air tight seals at penetrations in flexible air barrier membrane flashings.

.6 Apply flexible air barrier membrane flashings to extend air barrier membrane at peripheries of the installation as required to facilitate joining and sealing of the air barrier provided in adjacent construction, lapping joints minimum of 75mm (3"), extending membrane onto adjacent concrete/metal substrates not less than 150mm (6"), centred over joints.

.7 Apply continuous flexible air barrier membrane flashings at expansion and deflection joints within framing members, lapping joints minimum of 75mm (3"), extending membrane onto adjacent concrete/metal substrates which have no applied air barrier not less than 150mm (6"), centred over joints.

.8 Flexible Weather Barriers:

.1 Provide continuous 457mm (18") side flexible weather barrier membrane in exterior masonry cavity walls at expansion joints.

.2 Install flexible weather barrier membrane to substrate with adhesive, in strict accordance with manufacturer's instructions.

.3 Loop down flexible weather barrier into expansion/control joints approximately two (2) times the width. Lap joints minimum 150mm (6") and seal. Ensure that flexible weather barrier lap joints which are looped into expansion /control joints are sealed with adhesive. Seal tops and bottoms of membrane barrier at change in construction to present continuous, uninterrupted flexible weather barrier.

.4 Pack joint with loose batt insulation with face of insulation down two (2) times the width of expansion from face interior wythe.

3.6 APPLICATION - VAPOUR PERMEABLE AIR BARRIER MEMBRANE - SHEET APPLIED

.1 Apply self-adhering water resistive air barrier membrane complete and continuous to substrate in an overlapping shingle fashion and in accordance with manufacturer's recommendations and written instructions. Stagger all vertical joints.

.1 Align and position self-adhering membrane to substrate, remove top panel of protective release film and press firmly into place.

.2 Ensure alignment, hold membrane in place to avoid wrinkles and sequentially remove remaining panels of protective film and press firmly into place.

.3 Ensure minimum 75mm (3") overlap at all ends and 50mm (2") side laps of subsequent membrane applications.

.4 Apply pressure to all membrane surfaces, laps and flashings using an appropriate roller to provide best possible surface adhesion.

3.7 PROTECTION AND CLEAN-UP

.1 Protect membrane to avoid damage from other trades, and construction materials during subsequent operations.

.2 If the vapour permeable air barrier cannot be covered within thirty (30) days after installation, apply temporary UV protection such as dark plastic sheet or tarpaulins. Contact material manufacturer for further recommendations.

.3 Clean spillage and soiling on adjacent construction that will be exposed in the finished work using cleaning agents and procedures recommended by the manufacturer of the affected construction.

.4 Remove any masking materials after installation.

.5 Applicator is responsible for the removal of surplus and waste material incurred during application.

.6 Equipment and tools can be cleaned using mineral spirits or xylol.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for the supply and installation of cold applied built-up bituminous roofing system.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards

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

.1 ASTM C931/931M: Standard Specification for Exterior Gypsum Soffit Board.

.2 ASTM D4601: Standard Specification for Asphalt-Coated Glass Fibre Base Sheet Used In Roofing.

.2 Canadian Standards Association (CSA):

.1 CSA A123.4 M: Bitumen for Use in Construction of Built Up Roof Coverings and Dampproofing and Waterproofing Systems.

.3 Canadian General Standards Board (CGSB):

.1 CGSB 37 GP 9Ma: Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.

.2 CGSB 37-GP-52M: Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric.

.3 CAN/CGSB 51.33 M: Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

.4 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC-S704: Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

.2 CAN/ULC-S706: Standard for Wood Fibre Thermal Insulation for Buildings.

1.3 PERFORMANCE REQUIREMENTS

.1 Install at specified Roof Area - Cold Process Built Up Roof System Gravelled:

.1 Prime any new metal or wood components using Tremprime WB that are to receive asphaltic materials.

.2 Mechanically fasten 0.5” DensDeck Prime into Low Rise Foam Adhesive.

.3 Install self-adhering AVC membrane and associated primer over existing deck.

.4 Build-up perimeter wood detail to suit new insulation thickness.

.5 Install 2 layers of 3.0” Polyisocyanurate into Low Rise Foam Insulation Adhesive.

.6 Install Cover Board 0.5” Asphalt Coated Fiberboard into Low Rise Foam Insulation Adhesive.

.7 A built up roof membrane – 3 Ply Cold Process

.8 Install Roofing Membrane as follows:

.1 Plies: Three.

.2 Ply Type: Composite Felt, Three plies.

.3 Interply Adhesive: Burmastic Cold Process Adhesive.

.9 Surfacing: 3/8" Clean round pea gravel, free of all fines, splinters etc. into cold process flood coat.

.2 Specified Flashings and accessories: Install flashings at all roof perimeters, projections, and drains incorporating:

.1 Reinforced EPDM/SBR Rubber sheet adhered with Elastomeric Bedding Adhesive as per detail drawings.

.2 Provide Products that are compatible with one another under field conditions, as demonstrated by roofing manufacturer.

.3 Provide watertight roofing system capable of resisting specified uplift pressures, thermally induced movement and exposure to weather without failing during the specified warranty period.

.4 Shop Drawings for Sloped Insulation: Indicate degree of slope and layout of sloping insulation on roof surfaces. Ensure positive drainage to roof drains. Provide drawings for crickets and roof drain sumps as required.

1.4 CERTIFICATES

.1 Manufacturer Certificates: Signed by roofing manufacturer verifying that installer is approved, authorized or licensed by manufacturer to install specified Products.

.2 Installer Certificates: Signed by installer verifying that they have the specified qualifications described below.

.3 Manufacturer's 20 Year Warranty.

1.5 TEST REPORTS

.1 Manufacturer Field Inspection Reports:

.1 Manufacturer's written acceptance of roofing installation based on daily inspections.

1.6 QUALITY ASSURANCE

.1 Manufacturer: qualified manufacturer having roofing systems listed by UL and approved for use by Factory Mutual.

.2 Installer: Company and persons specializing in the application of roofing, with documented experience and approved to apply roofing system specified by manufacturer.

.3 Conform to CRCA Roofing Specifications and roofing membrane manufacturer's instructions.

1.7 PRE-INSTALLATION MEETINGS

.1 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by all relevant personal before commencement of work for this Section.

.2 Agenda for meeting will include; but not be limited to, the following:

.1 Review methods and procedures related to roofing installation, including manufacturer's written installation instructions.

.2 Review construction schedule and confirm availability of Products, Subcontractor personnel, equipment and facilities.

.3 Review deck installation criteria and finishes for conformance with roofing system criteria, including issues of flatness and fastening.

.4 Review structural loading conditions and limitations of roof deck both during and after roofing application.

.5 Review flashing details, special roofing details, roof drainage, roof penetrations, equipment curbs, and other conditions affecting roofing installation.

.6 Review governing regulatory requirements, and requirements for insurance and certificates as applicable.

.7 Review safety requirements, including temporary fall-arrest measures.

.8 Review field quality control procedures.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver and store Products undamaged in original containers with manufacturer's labels and seals intact.

.2 Store Products in designated areas elevated off the ground and protected from ultra-violet radiation, inclement weather and construction activities.

.3 Store solvent-based liquids away from excessive heat and open flame.

.4 Store adhesives and sealants at temperature above -5 degrees C.

.5 Store membrane rolls on end, dry, and protected from moisture and damage. Cover rolls, insulation and other moisture-sensitive Products with tarpaulins.

.6 Store Products on roof deck in a manner to prevent overloading the structure and properly secured to prevent movement due to wind or other forces.

1.9 SITE CONDITIONS

.1 Protect adjacent properties from damage as a result of contract operations.

.2 Protect the Work and the Owner's property from damage as a result of contract operations.

.3 Confine equipment, material storage, and operations of workers to limits indicated by laws, ordinances, permits, and prior arrangements with the Owner.

.4 Do not interrupt or hamper occupant operations without prior written approval.

.5 Remove progressively all debris created by the execution of the Work and dispose of same at appropriate disposal sites.

.6 Alert the General Contractor to the expected presence of odours, fumes, or dust and co-ordinate the shielding of ventilation equipment or scheduling of process to achieve acceptable abatement.

.7 Upon completion of the work, leave premises in original order and condition.

1.10 ENVIRONMENTAL REQUIREMENTS

.1 Do not install roofing during weather that might adversely affect the performance of the system.

.2 Do not install roofing over surfaces that are wet, icy, dirty or otherwise unacceptable to the system being installed.

.3 Secure the Work in a safe and watertight fashion before the onset of inclement weather and at the end of each day's work.

1.11 WARRANTY

.1 Submit warranties in accordance with the General Conditions of the Contract.

.2 Installer's Warranty: standard 2 year warranty, commencing from the date of Substantial Performance of the Work.

.3 Manufacturer's Warranty: a written guarantee that the manufacturer will replace, at no cost to the Owner, any portion of the roofing membrane which experiences actual leaks resulting from defects in the manufacture of the membrane for a period of 20 years, commencing from the date of Substantial Performance of the Work.

1.12 MAINTENANCE

.1 The Manufacturer shall issue a non-prorated warranty for a period of Twenty Years. All components from the vapour retarder up shall be covered under this warranty.

.2 Warranty shall include inspections in years 2 and 5, 10 & 15 of the warranty. The following duties shall be carried out at no extra cost to the Owner as required, by the Manufacturer.

.1 Sealing of flashing seams

.2 Filling of pitch pockets

.3 Repairs to blisters and ridges

.4 Caulking at metal details as required

.5 Written inspection report

.6 Removal of light debris from the roof and premises

.7 Cleaning of drain screens.

.3 Documentation shall be provided that the manufacturer has personnel to carry out above noted warranty requirements and has a history of providing these for a minimum of 5 years.

.4 Upon satisfactory completion, the warranty and all construction information regarding the roof installation shall be placed on an Online Roof Management Program at no additional cost to the Owner.

.5 Prior to the 2 year expiration of the contractor’s warranty, the manufacturer shall carry out an Infra-Red Scan of the roof areas completed under this contract.

2 Products

2.1 MANUFACTURERS

.1 Manufacturers of cold-applied built-up asphalt roofing systems having Products considered acceptable for use as per Tender 6862-KP-18:

.1 Tremco Canada.

2.2 MATERIALS

.1 All primers, adhesives, sealants (including hardener), joint filler, grout, epoxy, sealers, and finishes applied on site and within weather barrier shall meet environmental requirements for low emitting materials.

.2 Primer:

.1 Tremprime WB by Tremco.

.3 Substrate Board:

.1 ½" thick.

.2 DensDeck Prime by Georgia Pacific.

.4 Insulation:

.1 Two (2) layers of Polyisocyanurate 3".

.1 Overlay Insulation, ½" asphalt coated fiberboard.

.2 Tapered Insulation & Sumps: ModulR by Tremco.

.5 Insulation Adhesive:

.1 Low Rise Foam Insulation Adhesive by Tremco.

.6 Vapour Retarder:

.1 AVC Membrane and Primer by Tremco.

.7 Flashing Membrane:

.1 TRA membrane by Tremco.

.8 Cold Applied BUR. Burmastic by Tremco

.1 Three Ply Composite Ply Felt.

.9 Reinforcing Membrane:

.1 Burmesh by Tremco.

.10 Ballast:

.1 3/8" Pea Gravel free of fines and long splinters.

2.3 ACCESSORIES

.1 Stack Flashings: Prefabricated aluminum sleeves as manufactured by Thaler Metal Industries or equivalent.

.2 Drains: Prefabricated drains as manufactured by Altra Metal Specialties.

.1 Mode ABD-CR-X-SS: Aluminum Body Roof Drain complete with clamping ring.

.3 Metal Flashings and Coping:

.1 Metal counter flashings and caps shall be 26 gauge, G90 galvanized Grade A steel conforming to ASTM A525.

.2 Finish to be Stelco 8000 series and colour to be as selected by the Board. Obtain written confirmation of colour prior to ordering.

.3 Two-piece gooseneck flashings are to be installed around all electrical projections.

.4 Sealant:

.1 One-part polyurethane, approved product and manufacturer.

.2 Basis of Design Material: Dymonic by Tremco.

2.4 SHOP FINISHING

.1 Galvanizing: to ASTM A653/A653M, zinc coating, hot dip process, minimum G90 coating.

.2 Shop Painted Finish: Baked ceramic pigmentation coating, applied to a minimum 1 mil dry film thickness and having a specular gloss of 30 (plus or minus 5) gloss units when measured with a Gardner 60 degree gloss meter; eg. Colorite HMP by Valspar, colour as selected by Consultant from standard range of colours.

3 Execution

3.1 PREPARATION – ROOF AREAS AS PER DRAWINGS

.1 Examine all drains and report any plugged drains to the Inspector. Any drains not reported and found plugged at the end of the contract will be deemed the responsibility of the contractor. Use temporary plugs during roof removal operations and remove before the end of each working day or when rain is imminent.

.2 Remove existing counter flashing at tie-in and dispose.

.3 Remove existing roofing, insulation and vapour retarder at tie-in to existing roof.

.4 Verify acceptability of deck, projections, curbs, parapets, walls and other constructions as these pertain to the roofing work and its expected performance.

.5 Correct any deficiencies in these constructions or advise General Contractor of conditions believed to be beyond the Scope of Work.

.6 Fill and pack all joints, cracks, seams, and openings in the deck and its appurtenances to prevent air leakage from the building interior.

3.2 INSTALLATION - ROOF DECK

.1 Deck Reattachment:

.1 Mechanically reattach loose sections of deck to steel or wood support members according to existing fastening pattern.

.2 Deck Replacement:

.1 Remove defective decking. Examine supports. If unsound, contact General Contractor immediately for future action.

.2 Install new decking in accordance with appropriate building regulations and CSSBI, (Canadian Sheet Steel Building Institute).

.3 Deck Protection (Metal):

.1 Remove loose flaking rust, down to clean, dust free, sound metal surface.

.2 Apply one coat of rust inhibitive paint over prepared surface at the rate of 6 m2/litre (250 ft2/gal).

3.3 INSTALLATION - CARPENTRY

.1 Wood Blocking

.1 Construct wood blocking as per details. Blocking, or several thicknesses of wood may be necessary so that the top of the nailer will be level with the top of the roof insulation or top of the deck (if no insulation is used).

.2 Offset blocking layers 300mm (12”) and weave corners.

.3 Assemble blocking using two staggered rows of nailing. Space nails in any row a maximum of 600mm (24”) on centre. Within 2440mm (8’) of outside corners, reduce maximum spacing to 300mm (12”) on centre.

.2 Wood Cants

.1 Install wood cants over nailer. Nail two (2) rows staggered. Spacing in any one (1) row shall not exceed 600 mm (24”).

.2 Within 2440 mm (8’) of outside corner, spacing shall not exceed 300 mm (12”) in any one (1) row. Mitre all inside and outside corners of the wood cant.

3.4 INSTALLATION - THERMAL BARRIER UNDERLAY BOARD

.1 Mechanically fasten underlay board to roof deck using at manufacturers recommended rate.

3.5 INSTALLATION - VAPOUR RETARDER

.1 Self-Adhering Membrane:

.1 Apply primer and install on to substrate, overlapping side and end laps in conformance with manufacturer's written recommendations. Begin work at bottom of slopes, unroll and align on substrate. Ensure all edges are supported.

.2 Remove release sheet and adhere membrane, working in sections to avoid wrinkles in membrane.

.3 Seal membrane at insulation perimeters and around penetrations to ensure sealed connections with base sheet at upstands.

3.6 INSTALLATION - INSULATION

.1 Adhered with Low Rise Foam Insulation Adhesive:

.1 Firmly butt each insulation board to surrounding boards. Do not jam or deform owners.

.2 Minimize elevation variation between boards at joints to provide level surface to accommodate subsequent roofing.

.3 Stagger joints at least 150mm (6”).

.4 Leave no voids at blocking, penetrations, walls, or parapets.

.5 At all drains and scuppers slope insulation for a radius of 1200 mm (48”) to ensure positive drainage.

.6 Adhere insulation into ribbons of low rise foam insulation adhesive in ½” to ¾” beads approximately 200 mm (8”) o.c.

.7 Immediately after placement, walk insulation boards into adhesive to achieve solid contact.

3.7 INSTALLATION - COLD APPLIED BUR

.1 Three Ply – Cold:

.1 Starting at the low point of the Roof, install three (3) plies of ply sheet, shingle fashion. Overlap starter strips 660 mm (26”) with first ply, then overlap each succeeding ply 625 mm (24 2/3”). Place ply sheets to ensure water will flow over or parallel to; but never against exposed edges.

.2 Embed into Cold Process Adhesive, 300, 600 and 900 mm (12”, 24” and 36”) wide plies to start and finish roof membrane along roof edges and terminations.

.3 Solidly coat each ply of felt for the full width with Cold Process Adhesive. Immediately after installation, broom and/or roll ply sheet. Ensure complete and continuous seal and contact between adhesive and felts, including ends, edges and laps without wrinkles, fish mouths, or blisters.

.4 Extend all plies to the top edge of all cant strips and cut off evenly.

.5 Apply uniform and continuous pressure to exposed edge and end laps to ensure complete adhesion.

.6 Avoid walking on plies until adhesive has set.

.7 Overlap previous days’ work 600 mm (24”) as required.

.8 Cut out fishmouths/side laps which are not completely sealed and patch. Replace all sheets which are not fully and continuously bonded.

.9 Lap ply membrane ends 150 mm (6”). Stagger end laps 1m (3’) minimum.

.10 Adhesive application rate: Minimum 1.0 Litres/Sq. Metre (2.5 Gals per 100 Sq. ft).

3.8 TEMPORARY WATERSTOP/TIE-INS

.1 Remove embedded gravel, dirt and debris from top ply of felt along termination for a distance of 450 mm (18”).

.2 Extend roofing system at least 300 mm (12”) onto prepared area installing insulation fillers as required.

.3 Seal edge with 150 mm (6”) wide reinforcing membrane embedded between alternate courses of temporary waterstop adhesive.

.4 At beginning of next day's work, remove temporary connection by cutting felts evenly along edge of existing roof system and remove insulation fillers.

.5 Temporary waterstop adhesive application rate:

.1 Cold: 3.3 l/m2 (12 ft2/gallon).

3.9 PERMANENT WATERSTOP/TIE-INS

.1 Remove embedded gravel, dirt and debris from top ply of felt along termination for a distance of 450 mm (18”).

.2 Install 450 mm (18”) wide ply sheet(s) from exposed deck to the existing roofing with a continuous application of permanent waterstop adhesive.

.3 Extend roofing system beyond permanent waterstop ply sheet and at least 300 mm (12”) onto prepared area of adjacent roofing.

.4 Seal leading edge of new membrane with 300 mm (12”) wide reinforcing membrane embedded between alternate courses of flashing adhesive.

.5 Permanent waterstop adhesive application rate:

.1 Cold Adhesive 3.3 l/m2 (12 ft2/gallon)

3.10 FLASHINGS

.1 Gravel Stop:

.1 Prior to setting and nailing horizontal flanges of edge flashings, uniformly trowel a (0.060") 1.5 mm thick layer of cold flashing adhesive to roofing surface designated to receive metal flange.

.2 Install metal gravel stop with formed drip edge, incorporating lock-type joints to allow expansion and contraction. Set flange in cold flashing adhesive.

.3 Nail interior portion of flange to wood blocking (3") 75mm OC, staggered.

.4 Prime metal flange with asphaltic primer.

.5 Fully adhere a sufficiently wide strip of elastomeric sheeting to flashing with flashing adhesive. Ensure complete bond and continuity without wrinkles or voids lap sheeting ends (4") 100mm and adhere with flashing adhesive. Elastomeric sheeting to cover gravel stop completely and overlapping onto adjacent roof minimum (6") 150mm.

.6 Seal edge of flashing membrane at metal upturn.

.2 Low Parapet Flashing:

.1 The exposed joint between the wall and deck shall be sealed securely to provide a complete air seal.

.2 Adhere elastomeric sheeting completely to flashing surface, cant, and roofing with flashing adhesive.

.3 Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends 100 mm (4”); and adhere with flashing adhesive.

.4 Extend elastomeric sheeting up and over parapet at least 38 mm (1.5”) and face nail with 38 mm (1.5”) common roofing nails, 200 mm (8”) O.C.

.5 Overcoat lap edges with end lap stripping adhesive and membrane.

.6 Tie in leading edge of sheeting with stripping ply membrane embedded between alternate courses of stripping ply adhesive.

.3 Metal Flashings:

.1 Installation of metal flashing shall be in accordance with the metal flashing section of the Canadian Roofing Contractors' Association (CRCA) manual.

3.11 SURFACING APPLICATION

.1 Gravel Finish:

.1 Prior to application of surface treatment system, contractor shall inspect roof with manufacturer's representative.

.2 Ensure surface is clean and dry. Flood coat the entire roof with specified flood coat bitumen at the rate of 6 gallons per square (cold adhesive) or 60 lbs. per square

.3 Immediately broadcast minimum 25 kg per sq. metre (500 lbs. per 100 sq. ft.) of new, clean, dry roofing gravel. Cover flood coat material completely.

.4 Rake out gravel to provide a neat even surface.

3.12 CLEANING

.1 Clean drains of debris, ensuring free drainage.

.2 Clean adjacent roof surfaces, levels and ground level areas of debris and excess Products.

3.13 PROTECTION

.1 Adequately protect Products and work from damage by weather, traffic and other causes.

.2 At the end of each Working Day, seal exposed edges of roofing membrane to be watertight.

.3 Protect adjacent Work from damage. Repair damage.

END OF SECTION

1 General

1.1 SUMMARY

.1 Furnish labour, materials and other services to complete the fabrication and installation of the following:

.1 Cap and base flashing; curb flashings,

.2 Roof edge flashing,

.3 Flashing at intersection of roof with vertical surfaces,

.4 Break metal flashings where shown,

.5 Prefinished flashings where indicated,

.6 Any other flashing as indicated on the drawings or as required, including all materials and fitments required for the operation of any unit furnished, in the manner, direction and performance shown on the shop drawings and specified herein.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

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

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

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.108-M, Bituminous Solvent Type Paint

.2 CAN/CGSB-1.181, Ready Organic Zinc-Rich Coating

.3 CAN/CGSB-19.24-M, Multicomponent, Chemical-Curing Sealing Compound

.3 Canadian Roofing Contractors Association

.1 CRCA Specifications Manual

1.3 SUBMITTALS

.1 Submit shop drawings indicating material, thickness and finish.

.2 Submit duplicate 4 sq.in. samples of each type of sheet metal material, colour and finish for review by Consultant prior to fabrication.

1.4 QUALITY ASSURANCE

.1 Fabricator and tradesmen executing the work of this Section shall have had a minimum five (5) years continuous experience in successful manufacture and installation of Work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Erection of metal flashing systems shall be by workmen especially trained and experienced in this type of work. Have a senior, qualified representative at the job site to direct the work of this Section at all times.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Store materials flat at site under protection to prevent staining from the work of other trades or from collection of water on material and secured against wind damage.

.2 Carefully store preformed sheet metal work in such a manner as to prevent twisting, bending and rubbing.

.3 Protect sheet metal work from corrosive materials and dissimilar metals.

1.6 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with General Conditions, but for a period of two (2) years. Agree to promptly make good defects which become evident during warranty period without cost to the Owner.

.2 Without restricting the generality of the Warranty, defects shall include deformation, buckling, leakage, weather tightness, failure of anchors and fastenings, failure of paint coating and sealants.

.3 Promptly make good defects and/or failures in the work of this Section upon written notification by the Owner that such exist. Remedy shall include labour, materials, equipment and services required to make good defective work, and to replace components and finishes and Owner's property damaged or disturbed in the course of remedying defects.

2 Products

2.1 MATERIALS

.1 Sheet Metal Materials: Prefinished galvanized sheet steel to ASTM A653/A653M Grade A with G90 designation zinc coating to ASTM A653/A653M, factory precoated with Series 8000 paint finish, minimum 26 gauge.

.2 Hold-down, fastener clips - 20 ga. galv. steel sheet as above, unpainted.

.3 Nails, bolts screws and rivets: Material - galvanized steel, stainless steel or same metal as material to be fastened. Type - to approved samples.

.4 Bituminous Paint: Conforming to CAN/CGSB-1.108-M, Type 2.

.5 Field Touch-Up Paint: Zinc rich anti-corrosion primer, conforming to CAN/CGSB-1.181, 'Galvafroid, Grade SB' by W.R. Meadows of Canada Limited and top coating of type and colour to match finish sheet.

.6 Underlay for metal flashing: Asphalt laminated 3.6 to 4.5 kg kraft paper.

.7 Sealant: Multi-component, chemical curing epoxidized polyurethane type sealant conforming to CAN/CGSB-19.24-M, 'DYmeric 240' by Tremco (Canada) Ltd., or approved equal. Colour as selected later by Consultant. Provide primers, bond breakers and cleaning agents as recommended by the sealant manufacturer.

.8 All other materials not specifically described but required for a complete and proper installation of the work of this Section shall be new first quality of their respective kinds and subject to the approval of the Consultant.

2.2 FABRICATION

.1 Fabricate metal flashings and other sheet metal work to applicable CRCA 'FL' series specifications and as detailed.

.2 Form flashings, counter flashings, scuppers and copings as required to suit each condition. Use prefinished sheet steel in all locations. Form pieces in 2440mm (8') maximum lengths. Make allowance for expansion at joints.

.3 Fabricate sheet metal components with lines, arrises and angles sharp and true and plane surfaces free from objectionable wave, warp or buckle.

.4 Mitre and seal corners with sealant. Form drip edging at 45 deg angle, secure with a continuous 20 ga. hold-down clip.

.5 Exposed edges of sheet metal shall be folded back to form a 13mm (1/2") wide hem on the side concealed from view. Prefabricate corner pieces for flashings and copings. The workmanship and methods employed for forming, anchoring, cleating and the provision for expansion and contraction of sheet metal work shall be to the approval of the Consultant.

.6 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.7 Fabricate scuppers and overflow scuppers to applicable CRCA 'FL' Series details and as detailed.

.8 Apply two coats of bituminous paint to metal surfaces to be in contact with masonry, concrete, mortar or dissimilar metals.

2.3 FINISHING

.1 Provide 8000 series finished sheet for all work.

.2 Colour: As selected by the Consultant from the Manufacturers full colour range. Allow for three (3) colours in Base Bid.

3 Execution

3.1 EXAMINATION

.1 Inspect substrate surfaces on which the work of this Section is erected for any irregularities detrimental to the application and performance of the Work. Confirm conditions satisfactory before proceeding.

.2 Report to Consultant in writing, defects of work prepared by other trades and unsatisfactory site conditions.

.3 Commencement of work implies acceptance of surfaces and conditions.

3.2 INSTALLATION

.1 Metal flashing shall be in compliance with best sheet metal trade practice and shall in no way be contrary to sheet metal practice that will qualify for the Guarantee Certificate specified.

.1 Install with "S" lock expansion joints or standing seams incorporated on end of flashing length and all joints sealed with mastic.

.2 Provide continuous starter strips to present true, non-waving leading edge. Provide clips and anchor to backup in an approved manner to provide rigid, secure installation. Conceal fastenings in completed flashing. Lap, lock and seal all seams.

.3 Provide underlay under sheet metal. Secure in place and lap joints 100mm (4").

.4 Install sheet metal flashings, cap flashings and copings as indicated on drawings using flat lock seams. Make joints to permit thermal movement. Make surfaces free from buckling, warp, wave, dents, oil canning or other defects. Make corners square and surfaces straight and in true planes. Equally space joints in cap flashings to suit wall panel module. Space seams not farther apart than 2439mm (8').

.5 All sheet and strip flashing to be held in place by 14 gauge galvanized iron clips of a size and type to be determined by the construction requirements, except where specifically detailed on the drawings.

.6 Caulk flashing at cap flashing with sealant.

.7 Lock end joints and caulk with sealant.

.8 Use rubber-asphalt sealing compound for joints between sheet metal and bitumen.

.9 Supply rigid flashing, copings and sheet metal back-up to other trades where required to be built into other work at doors, windows, block openings, curbs and where shown on drawings.

.10 Take careful note of fans, vents, etc., on mechanical drawings to determine whether flashing and counter flashing is required or whether units are self-counter flashing.

.11 Caulking shall be installed as per written manufacturer's recommendations.

.12 Exposed fastenings will be permitted where indicated or where concealed fastening is not possible. Obtain Consultant's approval of exposed fastenings and methods of making same.

.13 If exposed screws or bolts are used, use cupped neoprene washers.

.14 Install scupper drains and overflow scupper drains as indicated on drawings, in strict accordance with CRCA manual.

3.3 CLEANING

.1 Remove, as the work progresses, all excess or foreign material which would set up or become difficult to remove from finished surfaces.

.2 Do all final cleaning upon completion of the Work of this Section. Leave building and Work in condition to meet the approval of the Consultant.

.3 Remove excess sealant by the moderate use of mineral spirits or other solvent acceptable by the sealant manufacturer.

END OF SECTION

1 General

1.1 SUMMARY

.1 Provide all labour, materials, equipment and services necessary for the complete and proper installation of all sprayed fire protection and related work as shown on the drawings or where specified herein, and in accordance with all applicable requirements of the Contract Documents, and having a fire resistance rating indicated on the Drawings.

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

.1 Application of applied fireproofing to prepared acceptable substrate, complete with approved fireproofing sealer, and;

.2 Work required to patch, repair and make good after installation of adjacent materials that may cause damage to completed work of this Section.

.3 The material and installation shall conform to the applicable building code requirements of all authorities having jurisdiction.

.4 Structural steel elements that are protected by masonry, concrete, or a rated gypsum board assemblies do not require protection using materials specified in this Section provided that the applied fireproofing system meets required fire resistance ratings for the application, as determined from the latest edition of the local Building Code.

1.2 COORDINATION OF WORK EXECUTED UNDER OTHER SECTIONS

.1 Cleaning of surfaces to receive sprayed fire protection, shall be the responsibility of the General Contractor or Steel Erector, as indicated in the Structural Specifications.

.2 Coordinate installation of the following materials and/or systems prior to the application of spray-applied fire resistive materials identified in this Section:

.1 Installation of clips, hangers, supports, sleeves and other attachments to the substrate;

.2 Installation of concrete work onto steel floor decks scheduled to receive spray-applied fire resistive materials on the underside of the deck;

.3 Installation of roofing materials is complete, all penthouse construction has concluded, and mechanical units have been installed.

.1 Prohibit roof traffic in areas above application of spray-applied fire resistive materials.

.3 Coordinate installation of the following materials and/or systems after the application of spray-applied fire resistive materials identified in this Section:

.1 Installation of ducts, piping, conduit or other suspended equipment in the area where spray-applied fire resistive materials is scheduled to be installed.

1.3 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

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

.1 ASTM E84, Surface Burning Characteristics of Building Materials.

.2 ASTM E119, Fire Tests of Building Construction and Materials.

.3 ASTM E136, (Noncombustibility) Behavior of Materials in a Vertical Tube Furnace at 750ºC.

.4 ASTM E605, Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members.

.5 ASTM E736, Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.

.6 ASTM E759, Effect of Defection of Sprayed Fire-Resistive Materials Applied to Structural Members.

.7 ASTM E760, Effect of Impact on Bonding of Sprayed Fire-Resistive Materials Applied to Structural Members.

.8 ASTM E761, Compressive Strength of Sprayed Fire-Resistive Materials Applied to Structural Members.

.9 ASTM E859, Air Erosion of Sprayed Fire-Resistive Materials Applied to Structural Members.

.10 ASTM E937, Corrosion of Steel by Sprayed Fire-Resistive Materials Applied to Structural Members.

.2 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC-S101, Standard Methods of Fire Endurance Tests of Build Construction and Materials

.2 CAN/ULC S102 Surface Burning Characteristics of Building Materials and Assemblies

.3 CAN/ULC S114, Standard Test Method for Determination of Non-combustibility in Building Materials.

.4 ULC List of Equipment and Materials

.3 National Fire Protection Association (NFPA):

.1 NFPA 251, Standard Methods of Fire Tests of Building Construction and Materials

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordinate installation of the following, prior to installation of applied fireproofing identified in this Section:

.1 Hangers, inserts, clips and similar items to surfaces needing protection;

.2 Ducts, pipes, conduits and similar items that could obstruct spraying operations.

.2 Coordinate patching of fireproofing after installation of materials installed subsequent to installation of fireproofing.

.3 Delegated Design:

.1 When required to identify design intent, provide engineered judgements and certification for work performed by this Section in accordance with requirements of Authority Having Jurisdiction.

1.5 SUBMITTALS

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

.1 Product Data: Submit product data including certified copies of test reports verifying fire resistant material applied to substrate as constructed on project will meet or exceed requirements of specification.

.2 Installation Schedule: Submit schedule listing surfaces to which fire resistant material is to be applied indicating minimum thickness required a minimum of two (2) weeks prior to scheduled application of applied fireproofing material.

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

.1 Certificates: Submit test results in accordance with CAN/ULC S101 for fire endurance and CAN/ULC S102 for surface burning characteristics.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements: Use materials and methods required to achieve fire resistance ratings required for the Project to the satisfaction of the Authority Having Jurisdiction, latest edition of the local Building Code and in accordance with referenced standards.

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

.1 Applicator: Use applicators that are licensed or approved by manufacturer of fire resistant material.

.2 Materials: Use materials produced under label service of an agency that has tested material, or assemblies containing material, in accordance with specified test standards.

.3 Air Quality: Provide ventilation in areas receiving fire resistant material during and twenty-four (24) hours after application to dry material; maintain non-toxic, unpolluted working area; provide temporary enclosure to prevent spray from contaminating air.

.3 Certifications: Provide the following during the course of the Work:

.1 Provide compliance certification from manufacturer indicating tested performance requirements required by Authorities Having Jurisdiction.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.1 Deliver in original undamaged sealed containers with manufacturer's labels, application instructions, and labelling agency's labels intact.

.2 Storage and Handling Requirements:

.1 Store materials in dry protected area, raised off ground and away from damp surfaces and conditions that have deleterious effect on materials.

.2 Keep materials dry until ready for use.

.3 Discard material that has been exposed to water before actual use, and use stock before its expiration date.

1.8 SITE CONDITIONS

.1 When the prevailing outdoor temperature at the building is less than 4°C (40°F), a minimum substrate and ambient temperature of 4°C (40°F) shall be maintained prior to, during, and a minimum of twenty-four (24) hours after application of spray-applied fire resistive material.

.2 If necessary for job progress, provide enclosures and heat to maintain proper temperatures and humidity levels.

.3 Provide ventilation to allow proper drying of the sprayed fire protection during and subsequent to its application.

.1 Ventilation must not be less than four (4) complete air exchanges per hour until the material is dry. When spraying in enclosed areas such as basements, stairwells, shafts, and small rooms, additional air exchanges may be necessary.

1.9 SEQUENCING AND SCHEDULING

.1 Complete all fire protection work on a single floor prior to proceeding to the next floor.

.2 Cooperate in the coordination and scheduling of fire protection work to avoid delays in job progress.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design products are named in this Section; additional manufacturers offering similar spray-applied fire resistive materials (SFRM) may be incorporated into the work provided they meet the performance requirements established by the named products.

.2 Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section and as established by the Basis-of-Design Materials, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:

.1 Isolatek International Inc., Cafco Industries Limited

.2 Carboline Company, A/D Fire Protection Systems Inc.

.3 Grace Construction Products

2.2 DESIGN CHARACTERISTICS

.1 Adhesion: Provide materials that meet or exceed adhesion requirements in accordance with ASTM E736.

.2 Thickness and Weight: Determine application thickness and weight of fireproofing based on tests of assemblies in accordance with CAN/ULC S101, ASTM E119 or NFPA 251; apply same thickness of fireproofing material to all structural components forming a part of the assembly including; but not limited to, cross bracing, support angles and hangers.

.3 Spray-applied fire resistive materials shall contain no detectable asbestos. Material manufacturer shall provide certification of such upon request.

.4 Defection: When tested in accordance with ASTM E759, the material shall not crack or delaminate when the non-concrete topped galvanized deck to which it is applied is subjected to a one time vertical centerload resulting in a downward defection of 1/120th of the span.

.5 Bond Impact: When tested in accordance with ASTM E760, the material shall not crack or delaminate from the concrete topped galvanized deck to which it is applied.

.6 Density: When tested in accordance with ASTM E605, the material shall meet the minimum individual and average density values as listed in the appropriate UL / ULC design or as required by the authority having jurisdiction.

.7 Air Erosion: When tested in accordance with ASTM E859, the material shall not be subject to losses from the finished application greater than 0.025 grams per sq. ft. (0.27 grams per square meter).

.8 Corrosion Resistance: When tested in accordance with ASTM E937, the material shall not promote corrosion of steel.

.9 Non-combustibility: When tested in accordance with ASTM E136 or CAN/ULC-S114, the material shall be non-combustible.

.10 Surface Burning Characteristics: When tested in accordance with ASTM E84 or CAN/ULC-S102, the material shall exhibit the following surface burning characteristics:

.1 Flame Spread: 0

.2 Smoke Developed: 0

.11 Engineered Judgements: When required, provide engineered judgment acceptable to Authority Having Jurisdiction where assembly being protected differs from the tested assembly used to determine thickness.

.1 Engineered Judgements are not required when a tested assembly, published by ULC or cUL, is identified for the application in question.

2.3 STANDARD/COMMERCIAL DENSITY APPLIED FIREPROOFING

.1 Gypsum Based, Standard/Commercial Density Spray-Applied Fire Resistive Material (SFRM):

.1 Durable, wet mix, commercial density spray-applied fire resistive material (SFRM) designed to provide fire protection to concealed floor and roof assemblies, steel beams, columns, joists and concrete assemblies in building construction projects.

.2 Material Characteristics:

.1 Density (ASTM E605): 15 pcf (240 kg/m^3).

.2 Cohesion/Adhesion (bond strength): When tested in accordance with ASTM E736, the material applied over uncoated or galvanized steel shall have an average bond strength of 150 psf (7.2 kPa).

.3 Compressive Strength: When tested in accordance with ASTM E761, the material shall not deform more than 10 percent when subjected to a crushing force of 1,440 psf (68.9 kPa).

.4 Acoustical Performance when tested to ASTM C423:

.1 25mm (1”) thickness (NRC): 0.50

.5 Thermal Performance: 0.30 BTU in/hr ft2°F @ 75°F (0.043 W/mK @ 24°C): R-1.85/inch.

.3 Basis of Design Material: CAFCO 300 / ISOLATEK Type 300 spray-applied fire resistive material by Isolatek International Inc.

2.4 APPLIED FIREPROOFING ACCESSORIES

.1 Water: Clean, fresh, suitable for domestic consumption, and free from such amounts of mineral or organic substance as would affect set of fire resistant material.

.2 Primer/Adhesive and Applied Fireproofing Sealer:

.1 Water based sealer, as recommended by applied fireproofing manufacturer, allowing installation of approved coloured surface coatings or spray foam insulation to applied fireproofing.

.2 Basis of Design Material: CAFCO® BOND-SEAL / ISOLATEK TYPE EBS by Isolatek International Inc.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions:

.1 Verify that environmental conditions and surfaces receiving fireproofing meet manufacturer's requirements before beginning installation products specified in this Section.

.2 All unsuitable substrates must be identified by the installer and made known to the General Contractor and corrected prior to application of the spray-applied fire resistive material.

.3 Installation of products will denote acceptance of site conditions.

3.2 PREPARATION

.1 Protection of Existing Conditions:

.1 Provide and maintain temporary enclosures to prevent spray from marring adjacent construction, close off and seal installed duct work to prevent contamination of air supply system.

.2 Provide and maintain masking, drop cloths and polyethylene coverings to protect surfaces exposed in final construction from over spray.

.2 Surface Preparation:

.1 All surfaces to receive spray-applied fire resistive material shall be free of oil, grease, loose mill scale, dirt, paints/primers or other foreign materials which would impair satisfactory bonding to the surface.

.2 Prime surfaces as required by manufacturer to achieve bond of fireproofing materials to substrates.

3.3 APPLICATION

.1 Application of spray-applied fire resistive material shall not commence until certification has been received by the General Contractor that surfaces to receive sprayed fire protection have been inspected by the applicator and are acceptable to receive spray-applied fire resistive material.

.2 Provide masking, drop cloths or other suitable coverings to prevent overspray from coming in contact with surfaces not intended to be sprayed.

.3 Apply fireproofing in accordance with manufacturers written installation requirements and as required to obtain fire resistance ratings indicated for the Project.

.4 Apply fireproofing in coats not exceeding recommended by manufacturer for fire resistance ratings indicated for the Project.

.5 Mix each batch of material separately in accordance with manufacturer's instructions to achieve required density and thickness; do not re-temper material or use frozen, caked, or lumpy material.

.6 Apply fireproofing sealer as per the appropriate UL/ULC fire resistance design and manufacturer's written recommendations.

3.4 SITE QUALITY CONTROL

.1 Site Testing and Inspections: Site testing and inspections will be performed in accordance with requirements, and as follows:

.1 Appoint third party inspection and testing agency to confirm that installation of fireproofing materials meets requirements of ASTM E605 and ASTM E736.

.2 One series of tests will be performed using both laboratory and site testing for each 1000 m^2 of floor area sprayed; patch and repair inspection locations after completion of cut tests.

.3 Testing Agency shall distribute test results to Consultant, Contractor and Subcontractor at completion of each floor.

.2 Non-Conforming Work:

.1 Repair deficiencies identified in test results; patch damage to fireproofing caused by other work of the Project before fireproofing is concealed; or if exposed, before substantial performance.

3.5 CLOSEOUT ACTIVITIES

.1 Patching and Repair:

.1 Perform all patching and repair of damaged spray-applied fire resistive material, under this Section, and paid for by the trade responsible for the damage.

.2 Repair damage to fire resistant material caused by installation of subsequent Work.

.2 Cleaning:

.1 Remove equipment and clean exposed wall and floor areas to remove deposits of sprayed fireproofing materials after completion of fireproofing work.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install materials in accordance with published 'Through-Penetration Firestop Systems' in UL's Fire Resistance Directory or the publication of another approved independent laboratory.

1.2 REFERENCE STANDARDS

.1 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S115-18, Standard Method of Fire Tests and Firestop Systems

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

.1 ASTM E814-23a, Standard Test Method for Fire Tests of Penetration Firestop Systems

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Shop Drawings:

.1 Provide details indicating all reinforcing, anchorages, fastening and proposed method of installation for the various conditions within the project.

.3 Samples:

.1 Submit samples of each type of firestop and smokeseal material and accessory.

1.4 QUALITY ASSURANCE

.1 Applicator shall be licensed by the manufacturer of fireproofing materials.

.2 Conform to flame and temperature ratings established by CAN/ULC-S115 and ASTM E814.

.3 Submit manufacturer's certification that materials meet or exceed specified requirements.

.4 Maintain flame and temperature ratings equal to surrounding materials.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Deliver materials in original, unopened packages bearing name of manufacturer and product identification.

.2 Store materials off ground, under cover, and away from damp surfaces.

1.6 SITE CONDITIONS

.1 Do not apply materials when temperature of substrate material is below 4 deg C and surrounding air temperature is below 4 deg C, for 24 hours prior to application.

2 Products

2.1 MATERIALS

.1 Bears UL, ULC or Warnock Hersey label and confirmation of compliance with ASTM E814 or CAN/ULC-S115.

.2 Provide fire stopping and smoke sealing systems in accordance with CAN/ULC-S115 and shall also conform to special requirements in part 3.5 of the Building Code.

.3 Fire-resistant rating of fire stopping material assemblies must meet or exceed the fire-resistance rating of the floor or wall section being penetrated.

.4 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control shall be elastomeric seal type. Do not use a cementitious, or rigid seal at such locations.

.5 Primers shall be to manufacturer's recommendation for specific material, substrate, and end use.

.6 Damming and backup materials, supports and anchoring devices shall be to manufacturer's recommendations, and in strict accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.7 Sealants for vertical joints, shall be non-sagging type.

3 Execution

3.1 PROTECTION

.1 Mask adjacent work of other Sections as necessary to avoid spillage onto adjoining surfaces. Remove stains on adjacent surfaces as required.

3.2 PREPARATION

.1 Examine sizes and conditions to establish correct thickness and installation of backup materials. Ensure surfaces are dry and frost free.

.2 Clean bonding surfaces of deleterious substances including dust, paint, rust, oil, grease and other foreign matter which may otherwise impair effective bonding.

.3 Do not apply firestops and smokeseals to surfaces previously painted or treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Prepare surfaces in accordance with manufacturer's instructions.

.5 Priming and Sealing: Prime surfaces in accordance with manufacturer's instructions.

3.3 APPLICATION

.1 Mix materials in accordance with manufacturers' written instructions.

.2 Apply in strict accordance with ULC certification and manufacturer's recommendations to provide a temperature and flame rated seal equal as a minimum to the rating of the wall or floor surrounding.

.3 Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

.4 Seal all joints to ensure an air and water resistant seal, capable to withstand compression due to thermal, wind or seismic joint movement.

.5 Consult with Mechanical Engineer and project manager prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

.6 Apply to mechanical and electrical service through-penetrations, to formed, sleeved, or cored openings in smoke and fire rated masonry, or gypsum wallboard stud walls and structural floors and ceilings.

.1 Coordinate with plumbing, HVAC and electrical contractors to ensure proper firestopping application, providing smokeseal around penetrations through fire rated assemblies. Ensure that end joints between lengths of firestopping material have been properly sealed.

.7 Apply to head of smoke and fire rated gypsum wallboard stud wall abutting underside of structure (concrete or steel deck).

.8 Apply to control joints in rated stud walls.

.9 Apply to penetrations for passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire rated vertical barriers (walls and partitions), horizontal beams (floor/ceiling assemblies) and vertical service shaft walls and partitions.

.10 Apply to safing slots gaps between edge of floor slabs and curtain walls.

.11 Apply to openings between structurally separate sections of walls and floors.

.12 Apply to gaps between tops of walls and ceiling or roof assemblies.

.13 Apply to expansion joints in fire rated walls and floors.

.14 Apply to openings and penetrations in fire rated partitions or walls containing fire doors.

.15 Apply to openings around structural members which penetrate fire rated floors or walls.

.16 Apply firestop and smokeseal materials in accordance with manufacturer's directions, with sufficient pressure to properly fill and seal openings.

.17 Tool or trowel exposed surfaces.

.18 Remove excess compounds promptly as work of this Section progresses and upon completion of work of this Section.

3.4 CURING

.1 Cure materials in accordance with manufacturer's instructions.

.2 Do not cover up materials until proper curing has taken place.

3.5 IDENTIFICATION

.1 Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

.1 The words: "Warning: Through-Penetration Firestop System - Do Not Disturb"

.2 Contractor's name, address and telephone number.

.3 Designation of applicable testing and inspection agency.

.4 Date of installation.

.5 Manufacturer's name for firestop materials.

3.6 CLEAN UP AND REPAIRS

.1 Clean adjacent surfaces immediately and leave work neat and clean.

.2 Remove excess materials using recommended procedures, as work progresses.

.3 Remove dams after initial set of firestops and smokeseals as required.

.4 Correct staining and discolouring of adjacent surfaces as directed by Consultant.

.5 Remove all debris and excess materials entirely from the site and leave the work in a neat and tidy condition.

.6 Perform one simulated smoke test for each penetration type once per day. Simulate smoke at a rate of four seconds/100 cubic feet (2.8 cubic metres) and maintain the fog density until inspection is complete.

.7 After inspection is complete, repair all defective firestopping and smokeseals and test again. Continue this procedure until all firestopping and smokeseals passes test.

END OF SECTION

1 General

1.1 SUMMARY

.1 Read other Sections of the Specification for extent of sealant specified in those Sections. Do all other sealing indicated, specified or required.

.2 Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on drawings and/or herein, including all labour, materials, equipment and incidentals necessary and required for the completion of the sealant.

1.2 REFERENCE STANDARDS

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

.1 ASTM C509-06(2021), Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material

.2 ASTM C920-18, Standard Specification for Elastomeric Joint Sealants

.3 ASTM C1382-16(2023), Standard Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints

.4 ASTM D2240-15(2021), Standard Test Method for Rubber Property - Durometer Hardness

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-19.13-M87, Sealing Compound, One-Component, Elastomeric, Chemical Curing

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

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

.1 Manufacturer's Data: Submit manufacturer's literature describing each material to be used in the work of this Section. Literature shall contain a statement that the material complies with the specified standard.

.2 Samples: Submit for approval and colour selection sample of each type of compound, recommended primers and joint filler or fillers proposed to be used.

.3 Mock-Up:

.1 If requested by the Consultant, construct mock-ups where directed to show location, size, shape, colour and depth of joints complete with back-up material, primer and sealant. Mock-up may be part of finished work.

.2 Allow 24-hours for inspection of work before proceeding with work.

.4 Safety Data Sheets: Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on Site for reference by workers.

1.4 QUALITY ASSURANCE

.1 Adhere to Manufacturer's recommendations for mixing or preparation of materials listed in this Section.

.2 Pot life or installation times shall not be exceeded.

.3 Integral materials which compose a joint detail shall be compatible.

.4 Component parts, where possible, shall have the same manufacturer.

.5 A representative of sealant material manufacturer shall visit the site during application to ensure that all Work is carried out according to the manufacturer's printed instructions.

1.5 SITE CONDITIONS

.1 Apply sealants only to completely dry surfaces, and at air, substrate and material temperatures above minimum established by manufacturer's written specifications.

1.6 DELIVERY, STORAGE HANDLING AND PROTECTION

.1 Deliver all materials to the jobsite in their original, unopened containers, with all labels intact.

.2 Receive and store materials as recommended by materials manufacturer.

.3 Maintain containers and labels in undamaged condition.

1.7 WARRANTY

.1 Provide a written warranty endorsed and issued in the name of the Owner stating that all sealant work of this Section is warranted against leakage, cracking, crumbling, melting, running, deterioration, shrinkage, loss of cohesion, loss of adhesion, staining of adjoining or adjacent work or surfaces, or failure to provide intended seal for a period of five (5) years from the Date of Substantial Performance of the Work, and that any defects will be made good including, related materials and installation at no additional cost to the Owner.

2 Products

2.1 MATERIALS

.1 Joint Cleaner:

.1 Non-corrosive solvents as recommended by sealant manufacturer for applicable substrate material(s).

.2 Primer:

.1 Non-staining type as recommended by sealant manufacturer, for use on substrate conditions outlined, and compatible with specified sealant being applied.

.3 Joint Back-Up – Backer Rod:

.1 Round, open cell, reticulated foam, 50% compression, compatible with sealant and primer, non-adhering to sealant.

.4 Bond Breaker:

.1 Pressure sensitive plastic tape, not bondable to sealant as recommended by sealant manufacturer.

.5 Sealant Type "A" – Joints around Interior Door Frames, Windows and Under Exterior Thresholds:

.1 One-part, low or medium modulus, neutral curing 100% silicone joint sealant, conforming to ASTM C920-11, Type S, Grade NS, Class 35.

.1 DC CWS by Dow Corning.

.2 SWS by GE

.3 SikaSil WS-305CN by Sika

OR

.2 One component, low modulus, moisture curing, polyurethane joint sealant, conforming to ASTM C920-11, Type S, Grade NS, Class 25.

.1 Dymonic FC by Tremco Ltd., division of RPM Company.

.2 Sikaflex 1A by Sika Canada Inc.

.3 Sonolastic NP1 by BASF.

.4 Pourthane NS by W.R MEADOWS

.6 Sealant Type "C" – Floor Control Joints:

.1 Multi-component, chemical curing, self-levelling, polyurethane joint sealant, conforming to ASTM C920-11, Type M, Grade P, Class 25.

.1 THC-900 by Tremco (Canada) Ltd., division of RPM Company.

.2 Sonolastic SL2 by Sonneborn Building Products, division of BASF Building Systems.

.3 Sikaflex 2c SL by Sika Canada Inc.

.7 Sealant Type "E" – Mould and Mildew Resistant:

.1 Mould and mildew resistant, Shore A Hardness 15-25, conforming to ASTM C920-11, Type S, Grade NS, Class25, use NT, G, and A:

.1 SCS1700 by GE

.2 DC 786 by Dow Corning

.3 Tremsil 200 by Tremco

.4 Omni Plus by Sonneborn

.5 SikaSil –GP by Sika

.8 Sealant Type "F" – Glazing Joints:

.1 Silicone Sealant: Butt glazing, one part, moisture curing, shore A hardness 15-25, conforming to CAN/CGSB-19.13-M, Classification C-1-40-B-N and C-1-25-B-N and ASTM C920-11, Type S, Grade NS, Class 25, use NT, G, A, O; Colour: clear (translucent):

.1 DC 795 by Dow Corning

.2 SCS2000 by GE.

.3 Multiseal by Chemtron.

.4 Spectrum 2 by Tremco

.5 SikaSil WS-295 by Sika

.9 Sealant Type "G" – Exterior Wall Joints:

.1 Air-seal sealant: One part, silicone, shore A hardness 15-25, conforming to CGSB 19-GP-13M, classification C-1-40-B-N and C-1-25-B-N and ASTM C920-11, Type S, Grade NS, Class 25. Use NT, M, G, A and O:

.1 DC 791 by Dow Corning

.2 UltraPruf II SCS 2902 by GE

.3 Spectrum 3 by Tremco

.4 SikaSil N-Plus by Sika

.10 Sealant Type “I” – HVAC Sealant:

.1 One-part, RTV, acetoxy-cure silicone sealant for heating, ventilation, air conditioning and refrigeration applications:

.1 Dow Corning HVAC Silicone Sealant

.11 Sealant Type “J” – Electrical Sealant:

.1 One-part, white, non-flowing moisture cure adhesive for electrical applications:

.1 Dow Corning 738 Electrical Sealant

.12 Sealant Type “K” - Interior Acoustical Sealant:

.1 Non-skinning, non-hardening, single component synthetic rubber sealant, conforming to CAN/CGSB-19.21-M:

.1 Tremco Acoustic Sealant

.2 Chemtron Metaseal

.13 Preformed Compression Seal:

.1 Compartmental open cell neoprene extrusion type conforming to ASTM C509-06(2011), complete with liquid lubricant adhesive recommended by manufacturer.

3 Execution

3.1 INSPECTION

.1 Verify at site that joints and surfaces conditions provided will not adversely affect execution, performance or quality of completed work.

.2 Ensure masonry and concrete have cured 28 days minimum.

.3 Ascertain that sealers and coatings applied to substrates are compatible with sealant used and that full bond of the sealant and substrate is attained. Request samples of the sealed or coated substrate from their fabricators for testing of compatibility and adhesion, if necessary.

.4 Verify that specified recommended environmental conditions are present before commending work.

.5 Defective work resulting from application to unsatisfactory joint conditions will be considered the responsibility of those performing the work of this section.

.6 Do not start work of this Section until conditions are satisfactory.

3.2 PREPARATION

.1 Clean joint surfaces using joint cleaner as necessary, to remove dust, paint, loose mortar, and other foreign matter and dry joint surfaces.

.2 Remove dust, silt, scale and coatings from ferrous metals by wire brush, grinding or sandblasting.

.3 Remove oil, grease and other coatings from non-ferrous metals with approved cleaning solvent.

.4 Ensure surfaces are free of frost, rust, lacquers, laitance, release agents, moisture or other matter which might adversely affect adhesion of sealant.

.5 Examine joint sizes and correct as required to allow for anticipated movement and to achieve proper width/depth ratio per manufacturer's written recommendations for specified sealant.

.6 Support joint filler on horizontal traffic surfaces against vertical movement which might result from traffic loads or foot traffic.

.7 Prepare surfaces as recommended by sealant manufacturer.

.8 Fully remove existing sealant scheduled to be removed and replaced with new sealant, in areas indicated on the Drawings.

.1 Follow manufacturers procedures for removal of existing sealant and test areas for adhesion of new sealant. Provide the Consultant with field report identifying results of adhesion testing.

.9 Install joint backing material or apply bond breaker tape to achieve correct joint depth and prevent three-sided adhesion.

.10 To protect adjacent surfaces, mask adjacent surfaces with tape prior to priming and/or sealing.

.11 Prime sides of joints using two cloth method in accordance with manufacturer's directions immediately prior to sealing.

.12 Before any sealing is commended, a test of the material shall be made for indications of staining, poor adhesion or other undesirable effects.

.13 Seal joints in surfaces to be painted before painting. Where surfaces to be sealed are prime painted in shop before sealing, check to make sure prime paint is compatible with primer and sealant. If incompatible inform Consultant, consult the manufacturer, and change primer and sealant to approved compatible types.

.14 Check form release agent used on concrete for compatibility with primer and sealant. If incompatible inform Consultant and change primer and sealant to approved compatible types or clean concrete to Consultant's approval.

3.3 APPLICATION

.1 Apply sealant in accordance with manufacturer's directions, using a gun with proper nozzle size, ensuring to fill voids and joints completely, to leave a weathertight, airtight installation. Superficial pointing with skin bead is not acceptable.

.2 Neatly tool surface to a slight concave profile. Surface of sealant shall be smooth, free from ridges, wrinkles, sags, air pockets and embedded impurities.

.3 Clean adjacent surfaces immediately and leave Work neat and clean. Remove excess sealant and droppings, using recommended cleaners as Work progresses. Remove masking tape after tooling of joints.

3.4 CLEANING AND PROTECTION

.1 Remove all waste materials from site. Sealant shall be cleaned of all foreign material as recommended by the sealant manufacturer. Leave work in a condition satisfactory to the Consultant.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply and installation of the following:

- .1 Exterior and Interior Steel Doors.
- .2 Exterior and Interior Steel Door Frames.
- .3 Sidelight Frames.
- .4 Fire rated door and frame assemblies.

1.2 DEFINITIONS

.1 Base Metal Thickness: Thickness dimensions are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic coated steel sheets.

.2 Opening Sizes: Standard metric door sizes indicated in the Door Schedule on Drawing A0.3 Assemblies and Door Schedule are considered nominal dimensions, measured from frame rabbet width and height, with allowances for nominal clearances between head, jamb and door bottom in accordance with CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames.

1.3 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

- .1 American National Standards Institute (ANSI):
  - .1 ANSI/SDI A250.7, Nomenclature for Standard Steel Doors and Steel Frames
  - .2 ANSI/SDI A250.11, Recommended Erection Instructions for Steel Frames.
- .2 American Society for Testing and Materials (ASTM):
  - .1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - .2 ASTM A879/A879M, Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface
  - .3 ASTM A924/A924M, Standard Specification for General Requirements for Sheet Steel, Metallic-Coated by the Hot-Dip Process.
- .3 Canadian General Standards Board (CGSB):
  - .1 CAN/CGSB 1.132-M, Primer, Zinc Chromate, Low Moisture Sensitivity
  - .2 CAN/CGSB 41-GP-19Ma, Rigid Vinyl Extrusions for Windows and Doors
  - .3 CAN/CGSB 82.5-M, Insulated Steel Doors

.4 Canadian Standards Association (CSA):

.1 CSA W59, Welded Steel Construction (Metal Arc Welding)

.5 Canadian Steel Door Manufacturers Association (CSDMA):

.1 Recommended Dimensional Standards for Commercial Steel Doors and Frames

.2 Fire Labelling Guide, Latest Edition

.6 National Fire Protection Association (NFPA):

.1 NFPA 80, Fire Doors and Windows

.2 NFPA 252, Fire Tests of Door Assemblies

.7 Underwriters Laboratories Canada (ULC):

.1 CAN/ULC S104, Fire Tests of Door Assemblies

.2 CAN/ULC S105, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC S104

.3 CAN/ULC S106, Standard Method for Fire Tests of Window and Glass Block Assemblies

1.4 SUBMITTALS

.1 Provide requested information in accordance with Division 01.

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

.1 Product Data:

.1 Submit product data for each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, fire resistance ratings, and finishes.

.2 Shop Drawings:

.1 Show each type of frame, door, hardware blanking, reinforcing, tapping and drilling arrangements, metal gauges, thicknesses and finishes.

.2 Show details of doors including vertical and horizontal edge details.

.3 Submit door and frame schedule identifying each unit. Each unit shall bear a legible identifying mark corresponding to that listed in the door and frame schedule.

.3 Samples:

.1 Supply for Consultant's review, if requested, sample of frame corner showing construction, workmanship and finish.

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

.1 Source Quality Control Submittals: Submit information on zinc coating treatment and primer spot treatment, including instructions for surface treatment before site painting and any restrictions or special coating requirements.

.5 Certificates: Submit the following certificates or letters of compliance:

.1 Oversize Compliance: Submit oversize construction evidence indicating compliance with fire labelling for door and frame assemblies required to be fire protection rated and exceeding size limitations of labelled assemblies.

1.5 QUALITY ASSURANCE

.1 Manufacturer: Obtain hollow metal doors and frames from single source of supply and from a single manufacturer, and as follows:

.1 Fabricate work of this Section to meet the requirements of the Canadian Steel Door and Frame Manufacturer's Association, Manufacturing Specification for Doors and Frames as a minimum, and as further modified in this section.

.2 Fabricator shall be a member in good standing of the Canadian Steel Door and Frame Manufacturer's Association.

.2 Supplier: Obtain hollow metal doors and frames from single source of supply and from a single manufacturer.

.3 Installer: Use installers who are experienced with the installation of hollow metal doors and frames of similar complexity and extent to that required for the Project.

.4 Testing Agencies: Provide doors produced under label service program of a testing agency acceptable to Authorities Having Jurisdiction, and as follows:

.1 Steel Fire Rated Doors and Frames: Labelled and listed by an organization accredited by Standards Council of Canada for ratings specified or indicated.

.2 Provide fire labelled frame products for those openings requiring fire protection ratings, as scheduled:

.1 List by nationally recognized agency having factory inspection service and construct as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.2 Fabricate all rated doors, frames and screens to labelling authority standard.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Adequately protect units against rust and damage during manufacture, delivery and storage.

.3 Store materials on planks in a dry area and cover to protect from damage. Make good immediately any damage done. Clean scratches and touch-up with rust-inhibitive primer.

1.7 SITE CONDITIONS

.1 Site Measurements: Verify actual dimensions of openings by site measurements before fabrication and indicate measurements on shop drawings; coordinate fabrication schedule with construction progress to avoid delaying the Work.

.2 Established Measurements: Establish dimensions and proceed with fabricating doors and frames without site measurements where site measurements cannot be made without delaying the Work; coordinate construction to ensure that actual site dimensions correspond to established dimensions.

2 Products

2.1 MATERIALS

.1 Sheet Steel:

.1 Exterior Doors and Frames: Galvanized, AS120, steel sheets in accordance with ASTM A924/M924; coated to meet requirements of ASTM A653/A653M, Commercial Steel (CS), Type B; stretcher levelled standard of flatness where used for face sheets.

.2 Interior Doors and Frames (Normal Humidity): Electrolytic zinc coated steel sheets in accordance with ASTM A879/A879M, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher levelled standard of flatness.

.2 Gauges:

.1 Door and Screen Frames:

.1 Gauge: 16 msg

.2 Doors (Honeycomb or Polystyrene Core):

.1 Door Faces:

.1 Gauge: 18 msg.

.3 Top and Bottom End Channels:

.1 Gauge: 18 msg.

.4 Reinforcements:

.1 Lock and Strike Reinforcements:

.1 Gauge: 16 msg.

.2 Hinge Reinforcements:

.1 Gauge: 10 msg.

.3 Flush Bolt Reinforcements:

.1 Gauge: 16 msg.

.4 Door Closer or Holder Reinforcements:

.1 Gauge: 12 msg.

.3 Anchors:

.1 As required to suit condition.

.4 Rubber Bumpers:

.1 3 per door.

.5 Weatherstrip:

.1 Extruded aluminum with vinyl insert #W13 for head and jambs and #W5 for pairs of doors without mullions, manufactured by Crowdertrack Limited.

.6 Door Cores:

.1 Interior doors, except fire rated doors: Structural small cell; 1” maximum, kraft paper honeycomb; minimum weight 36 kg/ream; minimum density 16.5 kg/m^3; sanded to required thickness.

.2 Exterior doors: Rigid extruded, closed cell insulation, fire retardant treated meeting the requirements of ULC S701, Type 4, minimum thermal resistance R-Value 4.5/1” thickness.

.7 Adhesives:

.1 Core Adhesive: Heat resistant, single component adhesive recommended by manufacturer.

.8 Touch-Up Primer: Rust inhibitive primer meeting CAN/CGSB 1.132, touch up zinc coatings using shop applied primer; grey or red coloured primer, clear primer not acceptable; provide additional primer for site touch-up to repair damaged zinc and shop applied coatings.

.9 Accessories:

.1 Glazing Stops:

.1 Glass mouldings: Formed steel having 1/32" metal core thickness, screw fixed.

.2 Accurately fit and butt at corners glazing trim and stops; located on secure side of door, or interior of room window frame.

.2 Sealant: As specified in Section 07 92 00.

.3 Glass and Glazing: As specified in Section 08 80 00.

.4 Door Silencers (Bumpers or Mutes): Manufacturer's standard black or grey neoprene silencers; three silencers on strike jambs of single door frames; two silencers on heads of double-door frames; stick on bumpers are not acceptable.

.10 Materials for fire rated doors shall conform to ULC or ULI requirements.

2.2 FABRICATION AND MANUFACTURE

.1 Gauges of metal shall be as specified. No deviations or substitutions will be accepted

.2 Reinforcing specified is the minimum acceptable. Provide additional reinforcement where required to ensure a permanent, rigid, trouble free installation able to withstand the stresses of heavy commercial usage.

.3 Cut, shear, straighten and work the steel in manner to prevent disfigurement of the finished work.

.4 Punch frames for rubber door bumpers.

.5 Fill seams, joints and weld depressions with epoxy metal filler, disc sand to a smooth, flat, uniform scratch-free surface, with all arrises sharp and true to line. Drilled and punches holes shall be reamed and have all burrs removed.

.6 Finished work shall be free of warp, open seams, buckles, weld and grind marks and other surface defects detrimental to the production of a good paint finish.

.7 Fastenings shall be concealed except those required for loose glazing stops.

.8 Welding shall conform to CSA W59.

.9 Hardware Requirements:

.1 Blank, mortise, reinforce, drill and tap doors and frames to receive templated hinges and other hardware as required. Check hardware lists for requirements.

.10 Frames:

.1 Fabricate frames to profiles shown. Frames shall be fabricated to suite the header conditions of masonry work. Mitre corners of frames. Cut frame mitres accurately and weld continuously on inside of frame. Fabricate header frame to suit. Where site welding or splicing is required due to size of unit, the location of field joints shall be shown on the shop drawings and strictly adhered to.

.2 Protect strike and hinge reinforcements and other openings with mortar guard boxes welded to frame.

.3 Cutouts in doors for mortise lock sets shall be fitted with leaf spring clips and back limit stop to facilitate easy positioning and setting of locksets.

.4 Weld floor clip angles to inside of each jamb profile, two holes in each for anchorage to floor. Where required provide adjustable type floor clip angles.

.5 Fit frames with channel or angle spreaders, two per frame, to ensure proper frame alignment. Install stiffener plates or spreaders between frame trim where required, to prevent bending of trim and to maintain alignment when setting and during construction.

.6 Where frames occur in masonry provide and adjustable T-strap type or wire type anchor for every 610mm (24”) of jamb length. Special anchors for frames to be set in concrete shall be as detailed.

.7 Construct door frames of labelled fire doors as approved by ULC or ULI. Ratings for frames shall match doors. Locate label on the frame jamb midway between the top hinge and the head of door frame so that it is concealed when the door is closed.

.8 Provide continuous weatherstripping at head and jambs of exterior door frames. Properly secure in place with screws and adjust as required.

.9 Insulate exterior frames to provide continuous thermal barrier in exterior frames.

.11 Doors:

.1 Fabricate doors to present one continuous face free from joints, tool markings and abrasions.

.2 Reinforce, stiffen honeycomb doors with small cell honeycomb core laminated to the inside faces of panels. The core shall completely fill the inside hollow of the door.

.3 Reinforce around frame openings required for glazing or louvers. Provide glazing stops with countersunk oval head screws.

.4 Exterior doors shall be completely filled with polystyrene foam core.

.5 Reinforce door edges with channel reinforcing. Bevel stiles 3mm (1/8"). Assemble by tack welding and fill.

.6 Provide flush top edge on exterior doors.

.7 Fabricate fire rated door assemblies in accordance with ULC or ULI requirements. Provide labels for all fire rated doors. Locate label on the door midway between the top hinge and the head of the door so that it is concealed when the door is closed.

.8 Provide cutouts in doors for glazed lites as indicated on drawings and schedules. Glazing stops shall be square formed steel in single piece lengths sized to suit. Accurately mitre corners and finish in proper plane. Secure stops in place with flush, countersunk screws.

.12 Finishing

.1 Shop apply zinc rich primer to repair damaged zinc coatings arising from fabrication; cure primer fully before shipping to site; include compatible primer for site finishing and correction of surface abrasions to zinc coatings and factory applied primer.

.2 Remove weld slag and splatter from exposed surfaces.

.3 Fill and sand smooth tool marks, abrasions and surface blemishes to present smooth uniform surfaces.

3 Execution

3.1 EXAMINATION

.1 Examine substrates, door swing arcs, areas of installation and conditions affecting installation for compliance with requirements for manufacturer's installation tolerances and other conditions affecting performance of work of this Section.

.2 Verify roughing-in for embedded and built-in anchor locations before installing frames.

.3 Verify door and frame size, door swing and ratings with door opening number before installing frames.

.4 Installation of hollow metal doors and frames will denote acceptance of site conditions.

3.2 INSTALLATION

.1 Install steel doors, frames, and accessories in accordance with reviewed shop drawings, ANSI A250.11, CSDMA Installation Guide, manufacturer's data, and as specified in this Section.

.2 Door Frames:

.1 Remove temporary spreaders before installing door frames, leaving exposed surfaces smooth and undamaged.

.2 Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set; limit of acceptable frame distortion 1.6mm (1/16") out of plumb measured on face of frame, maximum twist corner to corner of 3mm (1/8"); align horizontal lines in final assembly.

.3 Brace frames rigidly in position until adjacent construction is complete; install wooden spreaders at third points of frame rebate to maintain frame width, install centre brace to support head of frames 1220mm (4') and wider in accordance with ANSI A250.1; do not use temporary metal spreaders for bracing of frames.

.4 Install glazing materials and studded door silencers.

.5 For frames over 1220mm (4') in width, provide vertical support at the centre of head.

.3 Frame Tolerances: Install frames to tolerances listed in ANSI A250.11, and as follows:

.1 Squareness: Maximum 0.8mm (1/32") measured across opening between hinge jam and strike jamb.

.2 Plumbness: Maximum 0.8mm (1/32") measured from bottom of frame to head level.

.3 Alignment: Maximum 0.8mm (1/32") measured offset between face of hinge jamb and strike jamb relative to wall construction.

.4 Twist: Maximum 0.8mm (1/32") measured from leading edge of outside frame rabbet to leading edge of inside frame rabbet.

.4 Doors:

.1 Fit hollow metal doors accurately in frames within clearances required for proper operation; shim as necessary for proper operation.

.2 Install hardware in accordance with manufacturers' templates and instructions.

.3 Adjust operable parts for correct clearances and function.

.4 Install glazing materials and door silencers.

.5 Install fire rated doors within clearances specified in NFPA 80.

.6 Install louvers and vents.

.5 Adjusting and Cleaning

.1 Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of air-drying primer compatible with factory applied primer, and as follows:

.1 Clean exposed surfaces with soap and water to remove foreign matter before site touch-up.

.2 Finish exposed site welds to a smooth uniform surface and touch-up with site applied rust inhibitive primer.

.3 Site apply touch-up primer on exposed surfaces where zinc coating or factory applied primer has been damaged during installation or handling.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply and installation of the following:

.1 Interior Solid Core Wood Doors

1.2 REFERENCE STANDARDS

.1 AWMAC (Architectural Woodwork Manufacturers' Association of Canada) - Quality Standards Illustrated (QSI), latest edition.

.2 CAN/CSA-0132.2 Series - Wood Flush Doors.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Shop Drawings:

.1 Submit shop drawings showing types of cores and construction details, glazing and stops, openings required, material designation and door schedules.

.3 Samples:

.1 Submit for Consultant's review, if requested, two 305mm x 305mm (12" x 12") corner samples of each type of door specified herein showing construction, workmanship and finish including face veneers, core materials, edge strips and stops.

1.4 QUALITY ASSURANCE

.1 Except where otherwise specified, meet requirements of CAN/CSA-0132.2 Series and applicable provisions of AWMAC Quality Standards Illustrated (QSI), Custom Grade.

.2 Fire rated doors shall conform to NFPA for fire rated class and bear label of an approved testing agency.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location.

.2 Do not permit delivery of work to job site until building is sufficiently dry, wet trades are completed and the moisture readings of surfaces in proposed storage area is less than 18%.

.3 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Store doors flat on level surface. Protect materials with suitable non-staining waterproof coverings, but allow air circulation at sides.

.4 Label each door with manufacturers' name, product identification, door size and type.

1.6 WARRANTY

.1 Warrant that the doors shall be free from defects in materials or workmanship in accordance with General Conditions but for a period of one (1) year and agree to promptly make good defects by replacing defective doors in finish to match adjacent similar doors or of original door finish to match by and in a manner satisfactory to Owner. Defects shall include, but not be limited to delamination of edges, warp, twist, bow exceeding 1/4".

.2 "Replace" as used herein includes installing hardware, finishing, hanging and fitting.

2 Products

2.1 ACCEPTABLE MANUFACTURERS

.1 The following manufacturers are acceptable provided they comply with the requirements of this section:

.1 Baillargeon

.2 Lampton Doors

.3 Mowhawk Flush Doors

.4 VT Industries

2.2 MATERIALS

.1 Conform to Quality Standards for Architectural Woodwork published by Architectural Woodwork Manufacturers Association of Canada (AWMAC) for Architectural Grade Doors, except where specified otherwise.

.2 Unless otherwise specified herein, materials shall comply with requirements of CAN/CSA O132.2.

.3 Wood for cores: White Pine, Western Red Cedar or other approved low density species, kiln dried to 5% to 8% moisture content.

.4 Particle board for cores: CAN3-O188.1-M, extruded particle board having spruce particles in melamine based binder, minimum density of 480 kg/cu.m. (30 pcf).

.5 Mineral Cores (for fire-rated doors): Comply with the requirements of the label issuing authority for the scheduled fire ratings, as acceptable to the authorities having jurisdiction.

.6 Hardwood Face Veneer for Flush Wood Doors Scheduled to have Transparent/Stained Finish:

.1 Minimum 1/8" thick AWMAC Architectural Quality Grade, selected "Maple - Flat Cut, Grade A face and No. 1 back", and or other species, as indicated on drawings and conforms to requirements of AWMAC Custom Grade and NHLA Select Grade.

.2 Hardwood face veneers shall be selected for architectural quality, uniformity of colour, figure, grain, character, architectural "book matched" and all sheets numbered in sequence, parallel clipped, jointed by tapeless splicer and edge glued.

.3 Face veneers shall also have a high standard of finished appearance, including being free of, but not limited to the following; mineral streaks, discolouration, grain ruptures, loose texture, shakes, open joints, face depressions, glue stains, patches, plastic wood repairs, and any other manufacturing defects or irregularities.

.7 Flitch assembly: Uniform, clean, four piece book matched Maple, without open defects, patches, plastic repair or natural characteristics which in the opinion of the Consultant are detrimental to appearance.

.8 Crossbanding: 1/16" thick hardwood veneer, both faces of core.

.9 Edge Bands: Laminated to core with adhesive:

.1 Stiles: Laminated softwood and 5/8" thick hardwood edge, total width 4-1/2", at wood veneer faced doors provide hardwood edge matching wood veneer, at plastic laminate faced doors provide hardwood edge, between plastic laminate faces.

.2 Rails: 2-3/4" softwood.

.10 Wood Stiles, Rails and Hardware Reinforcement: Low density hardwood species, kiln dried to 8% moisture content.

.11 Stiles and Rails: Hardwood. Stile thickness minimum 1-1/2" and rail thickness minimum 1-1/8".

.12 Adhesive: Conforms to CAN/CSA-0132.2 Series, Type II.

.13 Sealer:

.1 Interior alkyd primer-sealer, conforming to CAN/CGSB-1.84.

2.3 FABRICATION - GENERAL

.1 Unless otherwise or more specifically required herein, door construction and tolerances shall comply with requirements of CAN/CSA O132.2, for flush doors.

.2 Completely seal wood top, bottom and edges and edges of cut-outs, before units are shipped from the manufacturer's mill or are placed in the open air or unheated storage areas at the mill which would allow change in the specified moisture content of the wood.

.1 Apply sealer in accordance with the manufacturer's printed instructions without dilution or alteration of any kind. Give particular attention to finish.

.2 Obtain approval of Consultant of the finishes before proceeding with sealing. Should this procedure not be followed replace all doors which have been improperly sealed.

.3 Provide blocking for closers, panic hardware, locksets and other door hardware as required.

.4 Cut-Outs: Fabricate doors in factory for cut-outs to receive glass lites as indicated on drawings and schedules. Stops shall be solid hardwood to match face veneer of doors with cut-outs, in single length pieces sized to suit openings with accurately Mitred corners finished in the proper plane. Fit loose stops and tack in place.

.5 Bevel edges of single acting doors 3 mm (1/8") on lock side and 1.5 mm (1/16") on hinge side.

.6 Undercut doors for carpet in the plant.

2.4 FABRICATION - SOLID CORE DOORS

.1 Flush wood doors: Solid core to AWMAC Standard.

.1 Solid Particleboard Core: Minimum 57 mm stile and rail frame bonded to particleboard core and as follows:

.1 Construction: 5-ply.

.2 Core: Agrifibre Core.

.3 Use: Interior use.

.2 Door Thickness: 45 mm overall, unless otherwise indicated on the Drawings.

2.5 FABRICATION - DOORS FOR NATURAL OR STAIN FINISH

.1 Fabricate doors for natural or stain finish with solid cores.

.2 Provide solid wood cross banding at right angles to door face, minimum 2.5 mm (1/10") thick.

.3 Provide face veneer minimum 0.91 mm (1/28") thick of species indicated on Door Schedule.

.4 Face veneer: complying with CAN/CSA O132.2.

2.6 FABRICATION - FACTORY FINISH

.1 Complete fabrication of doors before applying factory finishes including, but not limited to fitting doors for openings and machining for recessed hardware.

.2 Factory finish all four edges, edges of cut outs, and mortises the same as for faces, except that stains and fillers may be omitted on bottom edges, edges of cut outs, and mortises, and as follows:

.1 Finish doors at factory that are indicated to receive finish, other than paint finish.

.3 Steam out deep scratches and ease sharp edges by sanding before starting factory finishing; block sand using 150/180 grit in direction of grain on all surfaces to remove handling marks and fingerprints.

.4 Perform filling, sanding and finishing in horizontal position wherever possible.

.5 Do not use water based primers, stains or combination stain sealers as they raise natural wood grain and may cause veneer splitting and highlighting of veneer joints.

.1 Use caution when staining Birch, Oak, or any light wood to another colour; achieve uniform colour by thoroughly block sanding veneer faces to ensure consistent fibre raise; apply thin sealer coat prior to staining to prevent blotchiness and reduce the barber pole effect; do not use penetrating stains.

.2 Use caution when working with Oak to prevent blue stain, caused when natural tannic acid in the wood comes into contact with iron and moisture:

.1 Do not use steel wool on bare wood.

.2 Do not store transparent finish in unlined metal containers.

.3 Remove blue stain prior to finishing using a solution of oxalic acid made by dissolving one part acid to 7 parts of lukewarm water; allow solution to work, rinse with clear water; dry and sand with 150/180 grit sandpaper.

.6 Transparent Finish:

.1 Grade: Premium.

.2 Staining: As selected by Consultant from manufacturer's full range.

.3 Effect: Open-grain finish.

3 Execution

3.1 EXAMINATION

.1 Verify that frames are in accordance with indicated requirements for type, size, location, and swing characteristics and are installed with level heads and plumb jambs.

.2 Exam all doors thoroughly before installation or finishing; reject any defective doors and obtain replacements from manufacturer at no additional cost to the Owner or Project.

.3 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

.1 Install doors and hardware in accordance with manufacturer's printed instructions; refer to Section 08 70 00 and Hardware Schedule for hardware types and groups; pre-drill pilot holes for hinges, cylindrical locks and similar surface mounted hardware; cut mortises and pre-drill pilot holes for recessed hinges.

.2 Trim doors as required for proper fit and function; refinish all cut or planed surfaces immediately to match finish.

.3 Do not impair structural strength of door by the application of hardware, cutting and altering the door for lights, louvers or other special details.

.4 Install stops ready to receive finish.

.5 Glaze doors at site with glass of type and thickness indicated, in accordance with Section 08 80 00 using elastomeric glazing sealant as specified in Section 07 92 00; secure glass in place with removable wood stops.

3.3 CLOSEOUT ACTIVITIES

.1 Deficient Work: Replace, rework or refinish work that does not meet AWS requirements as directed by Consultant.

.2 Adjusting and Cleaning: Readjust doors and hardware just prior to completion of building to function freely and properly and as follows:

.1 Re-hang or replace doors that do not swing or operate freely.

.2 Replace doors that are damaged or that do not comply with requirements of this Section; doors may be repaired or refinished where work complies with requirements and shows no evidence of repair or refinishing in completed work.

END OF SECTION

1 General

1.1 SUMMARY

.1 Furnish labour, materials and other services to complete the fabrication and installation of the following:

.1 Glazed aluminum window framing.

.2 Manual swing glazed aluminum doors.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

.1 Aluminum Association (AA):

.1 Aluminum Design Manual, Latest Edition

.2 American Architectural Manufacturers Association (AAMA):

.1 AAMA 501, Methods of Test for Exterior Walls

.2 AAMA 611, Voluntary Specification for Architectural Anodized Aluminum

.3 AAMA 1503, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections

.4 AAMA 2603, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels

.5 AAMA 2604, Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coating on Aluminum Extrusions and Panels

.6 AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performance Organic Coating on Aluminum Extrusions and Panels

.7 SFM-1, Aluminum Storefront and Entrance Manual

.3 American National Standards Institute (ANSI):

.1 ANSI H35.1, Alloy and Temper Designation Systems for Aluminum

.2 ANSI/BHMA A156.1, Butts and Hinges

.3 ANSI/BHMA A156.3, Exit Devices

.4 ANSI/BHMA A156.4, Door Controls - Closers

.5 ANSI/BHMA A156.5, Cylinders and Input Devices for Locks

.6 ANSI/BHMA A156.6, Architectural Door Trim

.7 ANSI/BHMA A156.8, Door Controls - Overhead Stops and Holders

.8 ANSI/BHMA A156.16, Auxiliary Hardware

.9 ANSI/BHMA A156.21, Thresholds

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

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

.2 ASTM A167, Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

.3 ASTM B209/209M, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

.4 ASTM B221/B221M, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

.5 ASTM B308/B308M, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles

.6 ASTM B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube

.7 ASTM E330, Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

.8 ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

.9 ASTM E783, Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

.10 ASTM E1105, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference

.5 Canadian Standards Association (CSA):

.1 CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels

.2 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures

.3 CSA W47.2, Certification of Companies for Fusion Welding of Aluminum.

.4 CSA W59, Welded Steel Construction (Metal Arc Welding), Metric.

.5 CSA W59.2-M, Welded Aluminum Construction

.6 Canadian Welding Bureau (CWB Group Industry Services):

.1 CWB 112E, 93-1, Welding Symbols Study Guide

.2 CWB 113E, 94-1, Weld Quality and Examination Methods Study Guide

.7 The Society for Protective Coatings (SSPC)/National Association of Corrosion Engineers (NACE International):

.1 Surface Preparation Guidelines:

.1 SSPC-SP COM Surface Preparation Commentary for Steel and Concrete Substrates

.2 SSPC-PS Guide 12.00, Guide to Zinc-Rich Coating Systems

1.3 WORK SUPPLIED BUT INSTALLED BY OTHER SECTIONS

.1 Supply inserts, anchors and other items to be built into work of other sections and required for support of aluminum framed entrances and storefronts.

.2 Provide clear instructions and, if required setting templates to ensure accurate setting of components.

1.4 QUALITY ASSURANCE

.1 System Manufacturer's Qualifications:

.1 Minimum five (5) years continuous experience in successful production of work of type and quality specified. Submit proof of experience upon Consultant's request.

.2 Erector's Qualifications:

.1 Manufacturer's forces or forces licensed by manufacturer. Work of this section shall be performed by workers trained and experienced in the type of work specified. A manufacturer's representative shall be at the site during erection of system to direct the various stages of operations.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Construction Meeting: Conduct a pre-construction meeting in accordance with Division 01, on site to review methods and procedures related to aluminum framed entrances and storefronts including, but not limited to, the following:

.1 Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.

.2 Review location and alignment of vertical and horizontal elements as they relate to the aesthetic criteria indicated on the Drawings, and the technical requirements indicated on the shop drawings.

1.6 DESIGN AND PERFORMANCE REQUIREMENTS

.1 Details and information indicated on drawings are schematic, showing general intent only and shall not be considered or construed to be the engineering design for the system or to be complete or adequate to meet the design criteria.

.2 Make thorough examination of drawings and details, check anchorage, structural deflections, shading factors, size and shape of glass, system of sealing, location of heating units, interfacing requirements with work of other sections and other factors influencing design and performance of aluminum framed entrances and storefronts.

.3 Design, fabricate and erect aluminum framed entrances and storefront systems to meet or exceed the following minimum requirements:

.1 Design system based on the rain screen, pressure equalization principle. The storefront system must form an air sealed envelope on the building. Ensure that all ties to other building envelope components are air sealed.

.2 Design components to sizes and profiles indicated, reinforced if required, to limit deflection to L/200 maximum under positive and negative peak wind design gust pressures, in accordance with OBC Climatic Design Data (30 year probability), in accordance with ASTM E330.

.3 Make provisions to accommodate thermal and structural movement, including building structural framing deflection and creep, in component parts of system and fastenings without joint seal failure, glass breakage and other detrimental effects.

.4 Prevent water infiltration into building through system, when system is subjected to water spray at 5 gals/sf/hr maintained for 15 minutes with static pressure difference across system of 4 psf, in accordance with ASTM E331.

.5 Limit air infiltration and exfiltration through system to maximum .02 cfm/sf when subjected to static pressure of 1.57 psf, in accordance with ASTM E283.

.6 Provide effective vapour seal at inside face of system, designed to prevent detrimental condensation and ice build-up within system.

.7 Prevent condensation and frosting on inside surfaces of system when subjected to outside temperature of -25 deg C and 15 mph wind and inside temperature of +20 deg C/25% R.H.

.8 Limit temperature difference between central and edge portions of any pane of glass to less than the maximum permissible value stated by glass manufacturer.

.9 Design thermal barrier connection to achieve complete metal-to-metal separation between main framing and glass retention members except for screw fasteners. Assembled frame section shall have a maximum "U" factor of .455 Btu/(sf/hr/deg F).

1.7 SUBMITTALS

.1 Submit submittals in accordance with Division 01.

.2 Shop Drawings:

.1 Furnish complete shop and erection drawings required for the work of this section to the Consultant for review prior to fabrication. Shop drawings shall bear the seal and signature of a Professional Engineer registered to practise at the Place of Work.

.2 Co-ordinate shop drawings for work of this section with those for other trades to ensure correct interface details required to provide watertight installation.

.3 Shop drawings shall incorporate plans, elevations, sections and details for all work in this Section. The details shall show and specify all metal and glass thicknesses, types and finishes; areas to be sealed and sealant materials; gaskets; glazing methods; direction and magnitude of thermal expansion; type of construction including joinery, fasteners and welds; all anchorage assemblies and components; connections, fastenings, shapes and finishes; the fabrication and erection tolerances for the work in this section and the adjoining related work of other sections.

.3 Product Data:

.1 Product Data: Submit product data including construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.

.4 Test Data:

.1 If requested by Consultant, submit test data from a recognized independent testing agency, acceptable to Consultant, verifying that specified requirements are being met. Test results may be from a previous testing program conducted on a system similar to that specified herein.

.5 Samples:

.1 Submit duplicate minimum 50mm x 100mm (2" x 4") samples of each type of aluminum finish specified. Upon Consultant's request, furnish samples of glass types, gaskets, tapes and sealants.

.6 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on site for reference by workers.

.7 Maintenance and Glazing Instructions:

.1 On completion of work of this section, supply maintenance and glazing instructions for insertion into the Operating and Maintenance Manual.

1.8 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Co-ordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location.

.2 Assembled units and their component parts shall be transported, handled and stored in a manner to preclude damage of any nature.

.3 Ship and store pre-glazed units in upright position only or use method which will positively prevent extrusion of sealants and shifting of glass within framing.

.4 Accessory materials required for erection at the site shall be delivered to the site in manufacturer's labelled containers.

.5 Remove all units or components which are cracked, bent, chipped, scratched or otherwise unsuitable for installation and replace with new.

1.9 SITE CONDITIONS

.1 Provide safe and adequate equipment on the site to execute the work of this section, including scaffolding, staging, hoisting, safety protection equipment, tools, plant and other equipment required for the completion of the work of this section.

.2 Site Measurements: Verify actual locations of structural supports for aluminum framed entrance and storefront systems by site measurements before fabrication and indicate measurements on Shop Drawings.

.3 Established Dimensions: Establish dimensions and proceed with fabricating aluminum framed entrance and storefront systems where site measurements cannot be made without delaying the Work; coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.10 WARRANTY

.1 Warrant work of this section against any defects in materials and workmanship in accordance with the General Conditions but for an extended period of ten (10) years and agree to promptly and without cost to Owner make good defects which become evident during warranty period. Without restricting the generality of the warranty, defects shall include leaking, deformation of members, breaking of glass due to thermal or structural movement, discolouration of finishes and failure of sealants.

.2 Warrant insulating glass units in accordance with General Conditions for a period of five (5) years. Warrant that units will be free from material obstruction of vision as a result of dust or film formation on internal glass surfaces by any cause other than extrinsic glass breakage.

.3 Warrant that any unit failing shall be removed and replaced without cost to the Owner.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design products are named in this Section; additional manufacturers offering similar aluminum framed entrance and storefront systems may be incorporated into the work provided they meet the performance requirements established by the named products.

.2 Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section and as established by the Basis-of-Design Materials, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:

.1 Kawneer Canada Ltd

.2 Alumicor Limited

.3 Oldcastle Building Envelope

2.2 MATERIALS

.1 Aluminum:

.1 Extrusions: AA6063-T5 alloy, anodizing quality, conforming to ASTM B221.

.2 Plate and Sheet: AA1100-H14 alloy, anodizing quality unless otherwise indicated minimum 0.125" thick, conforming to ASTM B209.

.3 Thresholds and Sills: AA6061-T6 alloy, anodizing quality, conforming to ASTM B221.

.4 Exposed surfaces of aluminum shall be free of die marks, scratches, blisters, "leave-off" marks, or other blemishes, whether left unfinished or finished.

.5 Aluminum Welding Materials: Conforms to CSA W59.2.

.2 Structural Steel Sections and Steel Plate:

.1 Conforms to CAN/CSA-G40.20/G40.21, Grade 300W. Hollow steel sections shall conform to CAN/CSA-G40.20/G40.21, Grade 350W, Class H.

.2 Steel Welding Materials: Conforms to CSA W59.

.3 Galvanized Steel Sheet:

.1 Commercial grade, stretcher levelled or temper rolled conforming to ASTM A525 with galvanized zinc G90 (Z275) coating conforming to ASTM A526/A526M.

.4 Insulating Glass and Spandrel Panel: As indicated in Section 08 80 00 Glass and Glazing.

.5 Glazing Materials: As indicated in Section 08 80 00 Glass and Glazing.

.6 Insulation Materials: As indicated in Section 07 21 16.

.7 Sealant Materials:

.1 Perimeter Sealant: Multi-component, chemical curing epoxidized polyurethane type sealant conforming to ASTM C920, 'Dymeric 240' by Tremco (Canada) Ltd., or CWS/CCS by Dow Corning, or approved equal. Colour as selected later by Consultant.

.2 Threshold Sealant: Oil based sealant conforming to CAN/CGSB-19.6.

.3 Backer Rod: Round open cell foam, extruded polyethylene, Shore A hardness of 20, tensile strength 140 to 200 kPa, oversized 30-50%, compatible with sealant and primer, non-adhering to sealant, 'Ethafoam SB' by Dow Chemical Canada Inc., or 'Sof Rod' by Tremco (Canada) Ltd., or approved equal.

.4 Joint Primers: As recommended by sealant manufacturer.

.5 Solvents, Cleaning Agents and Other Accessory Materials: As recommended by sealant manufacturer in writing.

.6 Bond Breakers: Where required, shall be polyethylene tape (or equal) as recommended by manufacturer of sealant in writing.

.8 Zinc Rich Paint:

.1 Ready mixed, zinc rich primer conforming to CAN/CGSB-1.181, 'Sealtight Galvafroid Zinc-Rich Coating' by W.R. Meadows of Canada Limited, or 'Zinc Clad No.7 Organic Zinc Rich Primer' by Sherwin Williams Company of Canada Ltd.

.9 Bituminous Paint: Conforming to CAN/CGSB-1.108, Type 2.

.10 Fasteners: "400" Series stainless steel, or "300" Series stainless steel.

.11 Flexible Flashings: As indicated in Section 07 27 39.

.12 Firestopping: Non-combustible, semi rigid, compressible, mineral wool insulation, with "Z" shaped galvanized sheet steel impale clips, ULC listed for required fire resistance rating, 'Fire-Bloc' by M.W. McGill and Associates Limited, or 'Fire Barrier' by A/D Fire Protection Systems Inc., or 'Paroc Safing Insulation' by Partek Insulations Ltd.

.13 Aluminum Flashings: As indicated in Section 07 62 00.

.14 Aluminum Sills:

.1 Extruded or formed type aluminum sills, minimum 2.4mm (3/32") thick, with three coat fluoropolymer thermal setting enamel finish to match aluminum caps.

2.3 EXTERIOR ENTRANCE DOORS

.1 Manufacturer's extruded aluminum glazed doors for manual swing operation, reinforced as required to withstand traffic conditions.

.2 Exterior Door Type:

.1 Construction: Medium stile, thermally broken frame sections.

.2 Glazing Method: Square stops for sealed glazing, with non-removable glazing stops on outside of door.

.3 Basis-of-Design Material: Alumicor Insuldoor Entrance Doors Series 400A, or Kawneer 360 Insulclad Thermal Entrances Series.

2.4 EXTERIOR WINDOW FRAMING

.1 Manufacturer's standard extruded aluminum framing members of thickness required and reinforced as required to support imposed loads.

.2 Exterior Frame Type:

.1 Construction: Thermally broken, pressure plate glazed.

.2 Dimensions of Frame Profile: As indicated on Drawings; Glazing throat to accommodate glazing unit indicated in Section 08 80 00.

.3 Cover: Matching width of frame profile, and supplied by aluminum framed entrance and storefront manufacturer to ensure compatibility.

.4 Glazing Method: Glazed from exterior.

.5 Installation Method: Single span, storefront.

.6 Operable Units: None.

.7 Basis-of-Design Material: Kawneer TRIFAB 451T Wall System.

2.5 DOOR HARDWARE

.1 Manufacturer's heavy duty hardware units in sizes and types as required to meet entrance use as indicated on Drawings, with the following opening force limitations:

.1 Pushes: 'Style "Classic CP-II" Push' with clear anodized finish by Kawneer Company of Canada Limited, or approved equal.

.2 Pulls: 'Style "Classic CO-9" Pull' with clear anodized finish by Kawneer Company of Canada Limited, or approved equal.

.3 Egress Doors: Maximum 135 N to set door in motion and not more than 70 N to open door to minimum required width.

.4 Accessible Interior Doors: Maximum 20 N to operate door through entire range of movement.

.5 Delayed Egress Locks: Lock releases within 15 seconds after applying a force of not more than 70 N for not more than 3 seconds.

.6 Latches and Exit Devices: Not more than 70 N required to release latch.

.2 Provide door hardware in accordance with the requirements of this Section; using products that are recommended and supplied by entrance system manufacturer; in accordance with referenced standards, meeting requirements for description, quality, type, and function listed in hardware schedule.

.3 Hinges:

.1 Pivot Hinges: In accordance with BHMA A156.4, Grade 1, with 3 offset pivots located at top, intermediate and bottom of each door leaf.

.2 Ball Bearing Butts: In accordance with BHMA A156.1, Grade 1, radius corner; manufactured with non-removable pins from nonferrous metal, with 4 hinges for each door leaf.

.1 Continuous Geared Hinges: Roton continuous geared hinges incorporating lubricated bearings between the knuckles, #780-112HD by Kawneer.

.4 Locking Devices: Manufacturer's standard locking mechanism that do not require use of key, tool, or special knowledge for operation, and as follows:

.1 Mortise Auxiliary Locks: Lock body manufactured in accordance with BHMA A156.5, Grade 1, fabricated from corrosion resistant steel to fit into door stile specified and as follows:

.1 Bolt Action: Deadbolt:

.1 Deadbolt: Maximum security deadbolts with cam and mortise with strike trim, 1850 Series by Adams-Rite Manufacturing Co. Locks shall be in one leaf of each pair of doors. Double doors shall be key operated on exterior side and thumb turn on the interior side (one leaf of each pair). Face of rails not having cylinders, shall not be drilled.

.2 Function: Single Action Latching, latch retracted to allow for two way traffic by key, and manually retracting for security and exiting.

.3 Faceplate Shape: To match profile of leading entrance stile.

.4 Finish: To match adjacent entrance stiles.

.5 Door Operation: Single swinging door operation.

.2 Mortise Cylinders and Turns: In accordance with BHMA A156.5, Grade 1, keyed from interior to match lock body, provided by Section 08 70 00.

.3 Automatic and Self Latching Flush Bolts: In accordance with BHMA A156.3, Grade 1.

.4 Trims:

.1 Strikes: Provide strike with black plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

.2 Closers: In accordance with BHMA A156.4, Grade 1, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to meet site conditions and requirements for opening force; having accessories required for complete installation.

.1 Heavy-duty, concealed mounted, top jamb overhead type with hold-open feature, conforming to CAN/CGSB-69.20-M, 2030 Series by LCN Closers, or approved equal by Norton Door Controls.

.3 Concealed Overhead Holders: In accordance with BHMA A156.8, Grade 1.

.4 Surface Mounted Holders: In accordance with BHMA A156.16, Grade 1.

.5 Door Stops: In accordance with BHMA A156.16, Grade 1, floor or wall mounted as appropriate for door location indicated with integral rubber bumper.

.1 GJ-100 Series by Glynn-Johnson, to suit condition.

.6 Silencers: In accordance with BHMA A156.16, Grade 1.

.7 Thresholds: Raised thresholds bevelled with a slope of not more than 1:2, with maximum height of ½"; in accordance with BHMA A156.21.

.1 Thresholds by K.N. Crowder Mfg. Inc., or approved equal, to suit condition.

2.6 FABRICATION

.1 Aluminum components shall be extruded sections and shapes, unless otherwise specified or shown.

.2 Components required, for which extruded sections are not available shall be accurately formed to profiles indicated. Use minimum 14 gauge sheet aluminum unless otherwise indicated.

.3 All fastenings and connections shall be concealed unless approved by Consultant.

.4 Joints between horizontal and vertical mullions shall be accurately cut and fitted. Horizontal and vertical mullions shall be in true plane with interior and exterior faces in line.

.5 Mechanically joined sections shall have hairline joints.

.6 Reinforce members as required to withstand loads and to maintain deflection within allowable limits.

.7 Internally reinforce framing members where work of other trades is to be fastened thereto.

.8 Install air cut-offs in continuous vertical members to prevent stack effect of enclosed air columns.

.9 Framing members shall have internally formed keyed slots to receive and retain preformed gaskets, seals and thermal separators.

.10 Pressure plates shall be designed with integrally formed keyed slots to receive seals and of thickness necessary to provide permanent, uniform, sealing pressures for glazing units, without deformation.

.11 Fabricate system to accommodate and interface with work of other sections by means of rabbets, interlocks, miscellaneous angles, trim and filler sections as required.

.12 Prepare aluminum storefront framing and aluminum doors for installation of finish door hardware including but not limited to; deadlocks and other door finish hardware as specified in Section 08 70 00 and the Hardware Schedule.

.13 Do not expose welds. Burn, discolour, distortion, impairment, deterioration or delamination of finish surfaces will be rejected.

.14 Form covers, closures, mouldings and trim integral with or immediately adjacent to work of this Section to profiles indicated, of minimum 14 gauge sheet aluminum.

.15 Fabricate extruded or formed aluminum sills to profiles indicated to suit wall conditions and minimum 3/32" thick. Provide drip deflectors at sill ends and at abutting vertical surfaces. Open ends of sills shall be fitted with neatly applied closure plates. Anchors shall be designed not to work loose after installation. Unless otherwise detailed, provide "flush" slip joint at intermediate sill joints.

2.7 FINISHES

.1 Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

.2 Protect finish with strippable protective film.

.3 As Fabricated Finish (Mill Finish): AA-M10, as fabricated mechanical finish.

.4 High Performance Organic Finish:

.1 Two (2) Coat PVDF or FEVE Coating:

.1 Manufacturer's standard 2 coat, thermo-cured system consisting of specially formulated inhibitive primer and colour topcoat, and apply coating to exposed metal surfaces in accordance with AAMA 2605 and with coating and resin manufacturers' written instructions.

.2 Colour: White.

.3 Basis of Design Materials: PPG Duranar.

.5 Steel (Concealed):

.1 Hot-dip galvanized in accordance with CAN/CSA-G164, with minimum coating of 2 oz./sq.ft., or zinc rich paint.

.6 Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact. Use bituminous paint, butyl tape or other approved divorcing material.

3 Execution

3.1 EXAMINATION

.1 Check structural elements and adjoining work of other sections on which work of this section is dependent, verify governing dimensions, floor elevations, floor to floor heights, minimum clearances between framing system and structure. Confirm that conditions are satisfactory before proceeding. Commencement of work of this section indicates acceptance of surfaces and conditions.

3.2 INSTALLATION

.1 General:

.1 Erect storefront framing curtain wall systems plumb, level and square, in correct relation to work of other sections, within a maximum non-cumulative deviation of 1/8" per 12' length of member, and with members accurately fitted and aligned at joints and intersections.

.2 Anchor system to building structure, adjusting as required to meet erection tolerances and secure to prevent movement other than that which is expected due to structural deflection and creep and thermal expansion and contraction.

.3 Provide all devices and components required for erection of system.

.4 Use concealed fastenings only.

.5 Touch up steel anchoring components, after installation, with zinc rich paint.

.6 Provide aluminum flashings, fillers, covers and sealants indicated and as required to render system weather tight and to meet specified performance criteria. Ensure effective seal at laps, end joints and changes of direction.

.7 Provide aluminum sills, complete with chairs, anchors, expansion plates, drip deflectors as detailed at windows. Provide sills in longest practicable lengths. Provide flush slip joints at maximum 10' O.C.

.8 Provide continuity of thermal and air seal/vapour barriers with adjacent thermal and air seal/vapour barrier systems. Pack spaces between frames and adjacent building elements and where shown with fibrous insulation.

.9 Seal joints between storefront framing system and adjacent building elements, and between frames, sills and other materials. Caulk inside and outside, with sealant as specified herein.

.10 Install all door hardware on doors. Test all doors on completion of installation and adjust as required for smooth and efficient operation.

.11 Completed installation shall be of adequate strength to support operating entrance doors, and wind loading as specified without glass shaking or vibrating when entrance doors are in use.

.12 Leave final installation water and weathertight.

.2 Glazing:

.1 Install glass types as indicated in Section 08 80 00.

.2 Size glass units to accurately fit openings with appropriate clearance all around.

.3 Identify glazed openings, mark each light of glass. Indicate presence of glass.

.4 Replace all damaged or broken glass at no expense to Owner, prior to completion of work. Remove all broken glass from premises.

.5 Locate and install setting blocks and spacers according to glass manufacturer's directions. Centre and space each piece of glass on premoulded neoprene rubber spacers. Provide minimum of two spacers on each edge of each piece of glass and four where dimension exceeds 48”. Use spacers of size to accurately fit each thickness of glass.

.6 Clean glass and metal surfaces to present clean, dry, grease and oil free surfaces to receive glazing tapes, gaskets or seals.

.7 Glazing to be undertaken at temperatures recommended by manufacturer of glazing materials.

.8 Provide sealed double glazed units at all locations.

.3 Sealants:

.1 Apply sealants in strict conformance with manufacturer's written directions.

.2 Gun apply 3 continuous beads of threshold sealant under extruded aluminum thresholds. Bead diameter shall be sufficient to ensure full width seal. Remove excess sealant by approved methods.

.3 Apply sealant under pressure with hand or power actuated gun or other appropriate means. Gun shall have nozzle of proper size and provide sufficient pressure to completely fill joints as designed. All joint surfaces shall be tooled to provide the contour as indicated on drawings. For application of sealant when air temperature is below 40 deg F (4 deg C) consult sealant manufacturer for recommendations.

.4 Thoroughly clean all joints, removing all foreign matter such as dust, oil, grease, water, surface dirt, frost and old caulking materials. Sealant must be applied to the base surface. Previously applied paint or primer must be entirely removed.

.5 Non-porous surfaces shall be cleaned either mechanically or chemically. Protective coating on metallic surfaces shall be removed by a solvent that leaves no residue. Solvent shall be used with clean cloths or with lintless paper towels. Do not allow solvent to air dry without wiping. Wipe dry with clean, dry cloth or lintless paper towels.

.6 All joints to receive sealant shall be as indicated on shop drawings. Do not seal joints until they are in compliance with drawings, or meet with the approval of the Consultant.

.7 Joints to receive sealant shall be a minimum of 1/4" wide by 1/4" deep, unless otherwise approved.

.8 For joints in metal, glass and other non-porous surfaces, sealant depth shall be a minimum of half the applied sealant width, and shall in no case exceed the applied sealant width.

.9 Install backer rod or joint filler, of type and size specified, at proper depth in joint to provide sealant dimensions as detailed. Backer rod shall be of suitable size and shape, compressed 25-50% to fit joints as required. Sealant shall not be applied without back-up material and/or bond breaker strip. When using backer rod stock, avoid lengthwise stretching and do not twist or braid it.

.10 Apply masking tape, where required, in continuous strip in alignment with joint edge.

.11 Prime surfaces where required with primer as recommended by sealant manufacturer.

.12 Sealants applied both in factory and at the job site shall be used in strict accordance with specific recommendations supplied by sealant manufacturer.

.13 All hidden joints, or joints to be concealed by metal covers, shall be cleaned, sealed and tooled, inspected and approved prior to replacing metal covers.

.14 Apply, tool and finish sealant as required. When tooling sealants, use tooling solution recommended by sealant manufacturer. Remove masking tape immediately after joints have been tooled.

.15 Clean adjacent surfaces free of sealant as work progresses. Use solvent or cleaning agent as recommended by sealant manufacturer. All finished work shall be left in a neat clean condition.

3.3 FINAL CLEANING

.1 At completion of work of this section, remove all labels from glass and clean inner and outer faces of glass and all exposed metal surfaces at interior and exterior. Remove all protective metal coatings, stains and foreign matter, and leave in uniform colour and in first-class condition, to Consultant's satisfaction.

.2 Replace scratched or broken glass and make good any damaged materials, all in accordance with Division 01.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install door hardware listed in the Door Hardware Schedule, prepared by an Architectural Hardware Consultant, establishes the quality standards, finishes, manufacturers and functions.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Submission of Substitutions: Materials other than the named products for the Project may be acceptable to the Consultant. Submit manufacturer's names and complete catalogue number of alternative hardware types proposed for supply and submit this list for review before preparing shop drawings.

.2 Consultant will review all proposed alternates prior to close of bids when submitted no later than five (5) days prior to bid closing date

.3 Substitutions for materials of this section will be considered after the close of bids.

.4 Pre-installation Conference: Arrange a preconstruction meeting to discuss the following:

.1 Keying Conference: Conduct keying conference at Project site and incorporate decisions into final keying schedule after reviewing door hardware keying system.

.2 Electrified Hardware Conference: Conduct pre-installation conference at Project site and review methods and procedures related to electrified door hardware.

.5 Coordination: Obtain and distribute templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Coordinate with shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware.

1.3 SUBMITTALS

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

.1 Product Data: Submit product data indicating installation details, material descriptions, dimensions of individual components and profiles, and finishes.

.2 Shop Drawings: Submit shop drawings indicating details of electrified door hardware including, but not limited to, the following:

.1 Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer installed and site installed wiring.

.3 Samples:

.1 Submit samples of complete line of hardware and finishes, if and when requested, to accompany any proposal for substitution. Fully label each sample as to manufacture, type, size and location for use proposed.

.4 Hardware Schedule: Submit door hardware schedule prepared by Architectural Hardware Consultant (AHC), detailing fabrication and assembly of door hardware, as indicated on Drawing A700.

.2 Do not order hardware from manufacturers until samples have been approved. Hardware and finishes supplied shall be identical with approved samples.

1.4 PROJECT CLOSEOUT SUBMISSION

.1 Operation and Maintenance Data: Provide operations and maintenance information.

.2 Spare Parts and Tools: Submit unique parts and tools for maintaining hardware system.

1.5 DELIVERY, HANDLING AND PROTECTION

.1 Pack hardware in suitable wrappings and containers to protect from injury during shipping and storage. Enclose accessories, fastening devices and other loose items with each item. Mark packages for easy identification as indicated on approved delivery schedule. Hand over hardware to designated installer.

1.6 WARRANTY

.1 Warrant door closers to remain free from defects in materials and workmanship in accordance with the General Conditions, but for a period of five (5) years, and locks and locksets for two (2) years. Agree to promptly make good defects which become apparent within warranty periods without cost to Owner.

2 Products

2.1 GENERAL

.1 Supply to the job site all items of finishing hardware as indicated in the Hardware Scheduled appended to this Section. All items to be supplied with complete and adequate fixing and anchoring devices necessary for satisfactory installation into or upon the various surfaces to which it is to be affixed.

.2 Cooperate with all trades using hardware supplied under this Section.

.3 Render a complete service to the metal fabrication contractor wherein full cooperation is assured them of the supply of hardware information, and templates as requested.

.4 Supply for installation by others where specified, as scheduled or indicated on the drawings.

.5 In case of dispute the Consultant's decision will be binding in all cases.

.6 Provide six, (6) copies of the hardware specification for field construction and office use.

.7 All hardware shall be of the best quality and design, construction and finish, free from all defects.

.8 All blank strikes shall be ASA with no lip.

.9 Lock strikes shall be ASA with lip.

.10 All deadlock strikes shall be ASA with no lip.

.11 Where door pulls are scheduled on one side of door and a push plate on the other side, the contractor shall be responsible for fixing, so that the pull shall be secured through the door from the reverse side and the push plate installed to cover the thru bolts which will be countersunk flush with door.

.12 All door closers shall be non sized and where possible non handed. They shall be sized and adjusted by the installer to suit the site conditions.

.13 Panic sets are to be of style specified and completely plated.

.14 Before installing any hardware, carefully check all architectural drawings of Work requiring hardware, verify door swings, door and frame material and operating conditions. Ensure hardware will fit Work.

.15 Provide ULC approved hardware to ULC labelled doors.

.16 Check shop drawings and frame and door lists affecting hardware type and installation. Certify to correctness or advise Consultant in writing of required revisions.

.17 Templates:

.1 Check hardware schedule, drawings and specifications. Furnish promptly to applicable trades any patterns, templates, template information and manufacturer's literature required for proper preparation for and application of hardware, in ample time to facilitate progress of Work.

.2 Exposed screws for installing hardware shall have Phillips or Robertson heads.

.3 All door closers shall have back-checking features and shall be of proper size to operate door efficiently.

.4 Use no wall stops on drywall.

.5 Rim Panic Device strikes shall be mortise type application. Equip panic devices with hex bolts.

.18 Hinges

.1 Provide mortise type hinges, steel based for interior doors and stainless steel or brass for exterior doors or interior doors exposed to moisture.

.2 Provide hinges with stainless steel pins; non removable for exterior and public interior exposure, non rising for non security exposure.

.3 Provide full length continuous geared hinges, continuous pin and barrel hinges or full mortise type heavy weight butt hinges on all high frequency use or extreme weighted doors.

.4 Where doors are required to swing 180 degrees, provide ball bearing type swing clear hinges sufficient to clear trim.

.19 Locks, Cylinders, Latches and Bolts

.1 Locks are to be ANSI Grade 1 mortise type unless specified otherwise.

.2 Equip all locks with anti-friction latches with auxiliary latch guard. All fire rated doors must have a minimum latch throw as indicated on the fire door label.

.3 Where lever trim is required, provide levers containing concealed mounting and constructed of solid cast or forged material.

.4 Locks must be lever type.

.5 Provide locks in accordance with current barrier free accessibility requirements as set out by the OBC or by the jurisdiction having authority, when located in the barrier free path of travel.

.6 Strikes shall be ANSI standard size with curved lip strikes for latch bolts and no lip strikes for deadlocks. Provide complete with wrought iron boxes finished to match strike.

.7 Provide Cylinders and thumb turns with the correct cam or tailpiece to operate hardware correctly.

.8 Automatic flush bolts are to be equipped on all fire rated pairs of doors with regular use. Provide a coordinator in conjunction with automatic flush bolts.

.9 Provide a filler bar when using coordinators for a clean architectural appearance.

.20 Exit Device

.1 All exit devices installed on labelled fire doors shall carry a ULC or Warnock Hersey Label.

.2 Coordinate exit devices with astragals, coordinators, carry open bars and thresholds for correct and safe operation.

.3 All exit devices shall have exposed metal to match architectural finishes used on other hardware.

.4 Exit devices are push pad style only.

.5 Provide non-fire rated exit devices with hex key dogging feature (Cylinder dogging may be required in lieu of hex key dogging).

.6 Provide Power supplies of same manufacturer when using electrified exit devices.

.7 Match style and finish of trims on exit devices for locksets used.

.21 Closers

.1 All closers shall be hydraulically controlled and full rack and pinion in operation.

.2 All closers shall be fully adjustable including the following features: back check, speed control, and latch speed control.

.3 Provide mounting plates where required on special frame applications.

.4 Install all necessary attaching brackets, mounting channels, and cover plates where necessary for correct application of door closers.

.5 Supply to the Owner any special keys and wrenches as usually packed with door closers.

.6 Closers complete with a cover unless specified otherwise by the Consultant. Provide cover of matching architectural finish to the other hardware used in the project.

.7 Coordinate closers with overhead stops & holders.

.22 Push Plates and Door Pulls

.1 Provide and install stainless steel plates in type #304 stainless steel and install secure with screw fastening.

.2 Length of kick plates shall be 1-1/2" less than door width for single doors and 1" less than door width for doors in pairs.

.3 All stainless steel plates are 0.050" thick, free of rough or sharp edges. Corners and edges to have slight radiuses. Install kick plates and armor plates on both sides of the door with 3M tape or counter sunk screws as specified.

.4 Where door pulls are scheduled on one side of door and push plates on other side, issue installations instructions to ensure that the pull is secured through door from reverse side and countersunk flush with door installation of push plate. Locate push plate to cover fasteners for door pulls.

.23 Door Stops and Holders

.1 Wall stops are only to be used on wall conditions such as block or masonry. If necessary to mount on drywall, provide proper backing to ensure no damage to the wall.

.2 Supply floor stops of sufficient height to suit floor conditions and the undercut of the door.

.3 Provide gray rubber exposed resilient parts.

.4 Surface mount overhead door stops may be used unless they conflict with the door closer. All overhead stops are to be set to 90 degree opening unless stated otherwise.

.24 Door Seals

.1 Perimeter seals must be provided that fully seal all gaps between the floor, door and frame. Perimeter seal must protect against weather, smoke and sound.

.2 Frame gasketing must be constructed of neoprene. The aluminum housing must have a rib to prevent against distortion during installation.

.3 Provide aluminum frames with felt inserts by door supplier.

.25 Thresholds

.1 Size: 100mm (4”) wide x 13mm (1/2”) high, fluted top aluminum door threshold.

.2 Finish: Mill.

.3 All thresholds shall be aluminum and installed with lead shields and stainless steel screws.

.4 Cut ends of thresholds to follow exactly the door frame profile.

.5 Install Thresholds in a manner that ensures the door bottom comes in full contact.

.6 Door Threshold Basis of Design Material: National Guard Door Threshold, Model #WWG45VT92, supplied by Grainger Canada.

2.2 HARDWARE FINISHES

.1 P - Primed

.2 32D - Brushed Stainless Steel

.3 AL - EN - Aluminum Paint

.4 26D - Brushed Chrome

.5 15 - Brushed Nickel

.6 28 - Anodized Aluminum

.7 CAD - Cadmium Plated

.8 26 - Polished Chrome

.9 3 - Polished Brass

.10 EAB - Brass Paint

.11 BRN – Brown

.12 630 – Stainless Steel

3 Execution

3.1 INSTALLATION

.1 Subcontractor installing the hardware shall carefully follow manufacturers' instructions for installation of all finish hardware.

.2 For mounting heights of various hardware items refer to the following, unless otherwise indicated on the Draiwngs:

.1 Locksets: 1024mm (40-5/16") from centre of knob to finished floor.

.2 Deadlocks: 1220mm (48") from centre of cylinder to finished floor.

.3 Mortise Night Latches: 1024mm (40-5/16") from centre of cylinder to finished floor.

.4 Panic Bolts: 1024mm (40-5/16") from centre of crossbar to finished floor.

.5 Push Plates: 1143mm 45" from centre of plate to finished floor.

.6 Guard Bars: 1024mm (40-5/16") from centre of bar to finished floor.

.7 Door Pulls: 1067mm (42") from centre of pull to finished floor.

.8 Blank Strike: 1024mm (40-5/16") from centre of strike to finished floor.

.9 Blank Fronts: 1024mm (40-5/16") from centre of strike to finished floor.

3.2 PERFORMANCE

.1 Adjustment and Cleaning:

.1 Provide services of competent mechanic without additional cost to Owner. Mechanic shall inspect installation of all hardware furnished under this Section and supervise all adjustments (by trades responsible for fixing) necessary to leave hardware in perfect working order.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and installation of automatic swing door operator, surface mounted onto suitable transom, and complete with accessories required for complete finish, installation and operation.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

.1 American National Standards Institute (ANSI):

.1 ANSI A156.19 – Power Assist and Low Energy Power Operated Doors

.2 ANSI 117.1 – Accessible and Usable Buildings and Facilities

.2 American Association of Automatic Door Manufacturers (AAADM)

.3 Builders' Hardware Manufacturers Association (BHMA)

.4 Underwriters Laboratory Canada (ULC)

.5 Canadian Standards Association (CSA)

.6 National Fire Protection Association (NFPA)

.7 International Code Council (ICC)

1.3 SYSTEM DESCRIPTION

.1 Performance Requirements:

.1 Design system to operate, hold open and close doors under design wind and suction loads calculated in accordance with applicable code.

.2 Provide for thermal expansion and contraction of door and frame units, transmitted to operating equipment.

.3 Provide for dimensional distortion of components during operation.

.4 Operating Temperature Range: -33 deg. C to 72 deg. C ambient.

.5 Eliminate system performance interference by ambient light and radio frequencies.

.6 Provide for manual open and close operation of door leaves in the event of power failure.

1.4 QUALITY ASSURANCE

.1 Manufacturer's Qualifications: Manufacturer to have at least (5) five years experience in the fabrication of automatic and manual entrance systems.

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

.3 The installation shall be in conformity with laws, by-laws and regulations which govern the design and installation of automatic entrance doors.

.4 Installer's Qualifications: Products specified shall be represented by a factory authorized and trained distributor. Distributor shall be AAADM Certified and maintain a parts inventory and trained service personnel capable of providing service

.5 Pre-installation Conference:

.1 Schedule a pre-installation conference no later than one week prior to commencing work of this Section.

.2 Contact Contractor two weeks prior to proposed meeting to confirm schedule.

.6 All automatic equipment to comply with UL325 and CAN/CSA-C22.2 No 247-92.

.7 All automatic equipment to comply with ANSI A156.19.

1.5 SUBMITTALS

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

.1 Product Data: Submit product data indicating installation details, material descriptions, dimensions of individual components and profiles, and finishes.

.2 Shop Drawings: Submit shop drawings indicating details of electrified door hardware including, but not limited to, the following:

.1 Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer installed and site installed wiring.

.2 Submit complete elevations, details and methods of anchorage to location; installation of hardware; size, shape, joints and connections; and details of joining with other construction.

.3 Templates and Diagrams: As needed shall be furnished to fabricators and installers of related work for coordination of swinging door system with concrete work, electrical work, and other related work.

.4 Samples: Submit to Consultant for approval, before fabrication of the work, samples of materials, components, and finishes to be used in the work.

.5 Maintenance Data and Operating Instructions: On completion of work of this Section, supply three (3) copies of maintenance instructions for insertion into Operating and Maintenance Manual.

1.6 PROJECT CLOSEOUT SUBMISSION

.1 Operation and Maintenance Data: Provide operations and maintenance information.

.2 Spare Parts and Tools: Submit unique parts and tools for maintaining hardware system.

1.7 DELIVERY, HANDLING AND PROTECTION

.1 Pack hardware in suitable wrappings and containers to protect from injury during shipping and storage. Enclose accessories, fastening devices and other loose items with each item. Mark packages for easy identification as indicated on approved delivery schedule. Hand over hardware to designated installer.

1.8 SITE CONDITIONS

.1 Site Survey: Verify site conditions including, but not limited to the following; opening sizes, floor conditions, plumb and level mounting surfaces.

.1 Substrates shall be of proper dimension and material.

.2 Coordinate installation with glass, glazing hardware and electrical to avoid construction delays.

1.9 WARRANTY

.1 Warrant work of this Section against defects in materials and workmanship in accordance with the General Conditions, but for a period of two (2) years and agree to promptly make good defects which become evident during warranty period without cost to the Owner.

.2 Warrant that any unit failing shall be removed and replaced without cost to the Owner.

2 Products

2.1 MANUFACTURERS

.1 Supply all automatic door operators and accessories from one manufacturer to ensure compatibility of system components.

.2 Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:

.1 Besam Ltd.

.2 Horton Automatics

.3 Gyro Tech Inc

.4 Record-USA

2.2 AUTOMATIC SWING DOOR SYSTEM

.1 Coordinate the work of all trades, including glass and glazing, masonry, and electrical requirements covered in manufacturer's details and appropriate sections of the specifications.

.2 Coordinate with electrical contractor for provision of service to each operator from junction box for multiple operators.

.3 Coordinate with electrical contractor and provide electrical conduit and wiring from specified controls to operators as outlined on manufacturer's drawings.

.4 Finish Hardware Supplier: Provide and install the following automatic door operators and connecting hardware, and power on/off switch and safety sensor.

.1 Concealed Side Access (Type A): Provide and install overhead concealed swing door operator, for single or double doors, consisting of operator and electronic Overhead control, aluminum header.

.1 Basis of Design Material: Besam SW200i-OS by ASSA ABLOY.

.2 Surface Mount Single Push (Type B): High performance, heavy use application, surface mounted operator, complete with aluminum header case and arm link.

.1 Basis of Design Material: Besam SW200i by ASSA ABLOY.

.3 Automatic entrance equipment: comply with ANSI A156.10 or A156.19.

.4 Aluminum header extrusions: minimum nominal 4 mm wall thickness with finish anodized AA-M12-C22-A31 clear.

.5 Equipment must operate between -35 deg. C and +55 deg. C in all climate conditions.

.6 Operator: Electro-mechanical system installed in a header to resist dust, dirt and corrosion; entire operator shall be removable from the header as a unit.

.7 Bearings: Fully lubricated and sealed to minimize wear and friction.

.5 Electrical Control:

.1 Solid-state microprocessor unit, allowing the opening speed, closing speed, back check and latch check speed each to be adjusted separately and independently from each other to meet specific site conditions.

.2 Adjustable opening and closing speeds shall be set in accordance with ANSI A156.19.

.3 Control shall include time delay. All adjustments shall be specific and reproducible.

.6 The door forces and speeds generated during power opening, and manual opening in both directions of swing, and spring closing in both directions of swing shall conform to the requirements of ANSI A156.10 or A156.19.

.7 Verify that no defects or errors are present in completed phases of the work that would result in poor application or installation, or cause latent defects of the automatic door equipment.

.8 Installation and warranty adjustments shall be performed by authorized distributors' factory trained technician.

2.3 ACTIVATING DEVICES

.1 Wall Switches: Round push plate switch, 150mm (6") diameter stainless steel surface, engraved, mounted to pushbutton box, mounted to wall or frame, as indicated on the drawings.

3 Execution

3.1 INSTALLATION

.1 Automatic door equipment shall be installed by AAADM Certified, factory-trained installers in compliance with ANSI A156.19, manufacturer's recommendations and approved shop drawings.

3.2 CLEANING AND PROTECTION

.1 After installation, clean framing members as recommended by the manufacturer.

.2 Protect aluminum surfaces in contact with masonry, concrete or steel by use of neoprene gaskets, where indicated, or a coat of bituminous paint to prevent galvanic or corrosive action.

.3 Advise general contractor to protect unit from damage during subsequent construction activities.

3.3 PERFORMANCE

.1 Provide services of certified technician without additional cost to Owner, to inspect and adjust installation of all hardware furnished under this Section to assure compliance with ANSI A156.10.

END OF SECTION

RIVETT ARCHITECTURAL HARDWARE LTD.

B/F WASHROOM DOOR C/W AUTOMATIC OPERATOR & #OCC KIT

"ASSISTANCE REQUESTED" ANNUNCIATOR & SOUNDER TO BE MOUNTED ON EXTERIOR SIDE OF DOOR G.C. TO MOUNT 2" X 4" SINGLE GANG BOX AT THIS LOCATION

ELECTRICAL SERVICE 120 VAC 50/60 HZ. 15/20A BY ELECTRICAL CONTRACTOR

OPERATOR NORMALLY INSTALLED ON PUSH SIDE OF DOOR. CUSTOM PULL ARM IS REQUIRED IF OPERATOR HAS TO BE INSTALLED ON PULL SIDE OF DOOR.

10" X 4 3/4" LIGHTED OCCUPIED SIGN MOUNT TO/OWNER ARCHITECTS DIRECTIONS

CX-33 WASHROOM CONTROL UNIT (MOUNTED IN DOOR OPERATOR HEADER CASE)

OCCUPIED

2 LOW VOLTAGE 22 AWG STRANDED WIRES FROM OPERATOR TO OCCUPIED SIGN LOCATION

2 LOW VOLTAGE 22 AWG STRANDED WIRES FROM OPERATOR TO EACH ACTIVATION DEVICE

NOTE THAT IF WAVE BUTTONS ARE BEING USED THE 4 WIRES ARE REQUIRED.

DOOR OPERATOR | CX-33

4 LOW VOLTAGE 22 AWG STRANDED WIRES FROM OPERATOR

MAGNETIC DOOR CONTACT SWITCH WIRED TO EMF-1 TO RE-SET SYSTEM ONCE DOOR IS CLOSED

2 LOW VOLTAGE 18 GAUGE STRANDED WIRES FROM OPERATOR TO ELECTRIC STRIKE

ISH FOR EMERGENCY SITANCE PUSHBUTTON STAINLESS STEEL BUTTON MOUNTED NEXT TO TOILET TO MOUNT 2" X 4" SINGLE BOX AT THIS LOCATION

EXTERIOR SWITCH PUSHBUTTON 4 1/2" SQUARE STAINLESS STEEL MOUNTING HEIGHT C/LINE TO BE 39 ½" (1000mm TO 43 3/8"(1100mm) OUTSIDE WASHROOM G.C. TO MOUNT 2" X 4" OR SINGLE GANG BOX AT THIS LOCATION

INTERIOR SWITCH PUSHBUTTON 4 1/2" SQUARE STAINLESS STEEL MOUNTING HEIGHT C/LINE TO BE 39 ½" (1000mm TO 43 3/8"(1100mm) INSIDE WASHROOM G.C. TO MOUNT 2" X 4" OR SINGLE GANG BOX AT THIS LOCATION

PUSH TO LOCK BUTTON

PUSH TO LOCK PUSHBUTTON 4 ½" SQUARE STAINLESS STEEL BUTTON MOUNTING HEIGHT 39 ½" MIN. TO 43 3/8"MAX. INSIDE WASHROOM G.C. TO MOUNT 2" X 4" SINGLE GANG BOX AT THIS LOCATION

ELECTRIC STRIKE FAIL-SAFE OR ***FAIL – SECURE FOR FIRE RATED APPLICATIONS***

STOREROOM FUNCTION LEVER LOCK

HOLLOW METAL OR WOOD FLUSH DOOR AND FRAME BY OTHERS

EXPLANATION OF USE:

B/FREE OPERATION

1. TO OPEN DOOR ACTIVATE THE DOOR BY THE EXTERIOR HANDICAPPED PUSHPLATE AND THE DOOR WILL SLOWLY POWER OPEN, TIME OUT AND SLOWLY CLOSE
2. TO LOCK DOOR FOR PRIVACY ACTIVATE PUSH TO LOCK SWITCH. POWER WILL BE CUT TO EXTERIOR HANDICAPPED PUSH PLATE CREATING PRIVACY.
3. ALSO ON ACTIVATION OF THE INTERIOR PUSH TO LOCK SWITCH THE EXTERIOR LIGHTED "OCCUPIED SIGN WILL LITE UP.
4. TO EXIT WASHROOM ACTIVATE INTERIOR HANDICAPPED PUSHPLATE AND THE DOOR WILL SLOWLY OPEN
5. EMF-1 UNIT HAS BUILT IN TIMER THAT CAN BE TURNED ON OR OFF . THIS TIMER WILL UNLOCK AND RESET THE SYSTEM AFTER 15 MINUTES.

MANUAL NON B/FREE OPERATION

6. IN A ***NON FIRE RATED*** APPLICATION. IF THE WASHROOM IS VACANT THE DOOR CAN BE MANUALLY PUSHED OPEN AS THE ELECTRIC STRIKE WILL NOT BE ENGAGGED
7. IN A ***FIRE RATED*** APPLICATION A KEY WILL BE REQUIRED TO OPERATE THE DOOR MANUALLY. THE KEY WILL UNLOCK THE STOREROOM FUNCTION LOCKSET AS THE ELECTRIC STRIKE MUST BE ENGAGED TO MEET THE FIRE CODE REQUIERMENT FOR SELF LATCHING. OR EXTERIOR ACTUATOR WILL OPEN DOOR WHEN NOT OCCUPIED

NOTES:

1. THIS WIRING SCHEMATIC DIAGRAM IS APPLICABLE TO BESAM POWERSWING OR SW200i DOOR OPERATORS ONLY. COORDINATE WITH RIVETT ARCHITECTURAL HARDWARE FOR WIRING DETAILS.
2. DOOR OPERATOR SYSTEM SHALL BE SUPPLIED AND INSTALLED BY RIVETT ARCHITECTURAL HARDWARE LTD.
3. 120VAC WIRING TO DOOR OPERATOR HEADER AND LOW VOLTAGE WIRING WITH ELECTRCIAL BOXES FOR SWITCHES WILL BE BY ELECTRICAL CONTRACTOR

Suddaby Public School
NEW ELEVATOR, SPRINKLERS, AND ACCESSIBILITY

1 General

1.1 SUMMARY

.1 Furnish glazing materials and accessories to complete the fabrication and installation of:

.1 Hollow Metal Doors, Frames and Sidelights,

.2 Glazed Aluminum Window Framing.

.3 Glazed Aluminum Doors.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

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

.1 ASTM C542, Standard Specification for Lock-Strip Gaskets

.2 ASTM C920, Standard Specification for Elastomeric Joint Sealants

.3 ASTM C1172, Standard Specification for Laminated Architectural Flat Glass

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-12.1, Tempered or Laminated Safety Glass

.2 CAN/CGSB-12.3, Flat, Clear Float Glass

.3 CAN/CGSB-12.8, Insulating Glass Units

.4 CGSB-12.20, Structural Design of Glass for Buildings

1.3 SUBMITTALS

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

.1 Product Data: Submit manufacturer's product data for each type of product specified. Data shall indicate compliance with specification and installation recommendations of manufacturer of products being used.

.2 Samples: Submit samples of materials if required by Consultant before commencing work of this section. Samples shall be clearly labeled with manufacturer's name and type.

.3 Shop Drawings: Submit shop drawings, to the Consultant for review prior to fabrication.

.4 Samples for Initial Selection: Submit samples for initial selection by Consultant:

.5 Samples for Verification: Submit samples for verification including sample sets showing the full range of variations expected where products involve normal colour variations.

.6 Maintenance Data: Upon completion of installation, supply instructions covering re-glazing, adjustments and other relevant maintenance data.

1.4 QUALITY ASSURANCE

.1 Conform to the requirements of the Flat Glass Marketing Association Glazing Manual, latest Edition.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: Deliver packaged materials in their original containers with manufacturer's labels and seals intact.

.2 Storage and Handling Requirements: Store vertically, blocked off the floor in a weatherproof enclosure in original containers with manufacturers labels and seals intact until read for installation, and as follows:

.1 Install glass as soon as possible after delivery to site.

.2 Handle glass carefully to its place of installation.

.3 Prevent damage to glass, adjacent materials and surfaces.

1.6 SITE CONDITIONS

.1 Ambient Conditions: Maintain temperature, humidity and solar exposure conditions of Glass Glazing materials during shipping, storage and site installation as required by manufacturer to maintain warranty and performance of installed products.

1.7 WARRANTY

.1 Provide manufacturer’s warranty for the following types of glass listed, against defects in materials and workmanship for the period indicated, commencing from the date of Substantial Performance of Work:

.1 Seal Failure: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions.

.2 Evidence of Failure: Obstruction of vision by dust, moisture, or film on interior surfaces of glass.

.3 Allowable Specific Exclusions: Breakage resulting from thermal stress will be accepted as a limitation to the warranty in accordance with CAN/CGSB 12.20.

.4 Warranty Period: Ten (10) Years.

2 Products

2.1 MATERIALS

.1 Float Glass: In accordance with CAN/CGSB-12.3, glazing quality and as follows:

.1 Clear Glass: No tint

.2 Tempered Glass (TG1):

.1 Conforming to CAN/CGSB-12.1, Type 2, Class 'B'. Tempering shall be performed using horizontal tong free method.

.3 Gaskets:

.1 Neoprene/EPDM thermoplastic rubber type gaskets of sufficient thickness to be compressed 25% when installed, having 2,000 psi tensile strength, with 50 durometer shore A hardness plus/minus 5, maximum 30% resistance to permanent set, resistance to ozone without cracking, minimum elongation at break of 300% and conforming to ASTM C542.

.2 Colour - "Black".

.4 Sealant:

.1 One component, silicone base, solvent curing sealant conforming to ASTM C920. Colour as selected Later by Consultant.

.5 Glazing Compound:

.1 Non-hardening modified oil type glazing compound.

.6 Setting Blocks:

.1 Neoprene/EPDM rubber type, 4" long, with 40 to 50 durometer shore A hardness plus/minus 5; resistant to sunlight, weathering, oxidation and permanent deformation under load and wide enough to extend from fixed stop to opposite face of glass of thickness suitable to glazing condition to provide adequate glazing "bite".

.7 Spacer Shims:

.1 Neoprene/EPDM rubber type, with 40 to 50 durometer shore A hardness plus/minus 5; resistant to sunlight, weathering, oxidation and permanent deformation under load and of adequate thickness to provide correct glass to face clearance at least 1/8".

.8 Glazing Tape:

.1 Macro-polyisobutylene preformed glazing tape, 'Polyshim' or 'Vision Strip' by Tremco Ltd., division of RPM Company, or approved equal.

2.2 INSULATING GLASS

.1 Insulating Glass Units: Provide sealed insulating glass units in accordance with CAN/CGSB-12.8 in configurations indicated, and as specified herein.

.2 Manufacture sealed insulating glass units without edge channels or tape, that is, with bare glass edges.

.3 Use two stage seal method of manufacture, as follows:

.1 Primary Seal: Polyisobutylene sealing compound between glass and metal spacer/separator. Colour: Black.

.2 Secondary Seal: Structural silicone based, filling gap between the two lites of glass at the edge up to the spacer/separator and primary seal. Colour: Black.

.4 Install stainless steel capillary breather tubes to equalize pressure differentials between insulating glass fabricating location and insulating glass installation location; crimp tube immediately prior to installation in accordance with glass fabricators written instructions.

.5 Insulating Glass Unit (SDG1): Vitro Solarban 60 (2) Solarblue + Clear by Vitro Glass.

.1 Conformance: ASTM E2190.

.2 Outboard Lite: Vitro Glass Solarblue float glass.

.1 Annealed Tinted Float Glass: ASTM C1036, Type 1, Class 2, Quality q3.

.2 Glass Thickness: 6 mm (1/4”).

.3 Heat Treatment: Tempered; ASTM C1048, Kind FT; CPSC 16CFR-1201; ANSI Z 97.1.

.3 Air Space: 12 mm (1/2”) wide, hermetically sealed, dehydrated air space.

.4 Inboard Lite:

.1 Annealed Clear Float Glass: ASTM C 1036, Type 1, Class 1, Quality q3.

.2 Coating on Surface No.2: Solarban 60 by Vitro Glass.

.3 Glass Thickness: 6 mm (1/4”).

.4 Heat-Treatment: Tempered; ASTM C 1048, Kind FT; CPSC 16CFR-1201; ANSI Z 97.1

.5 Glass Unit Performance Characteristics:

.1 Visible Light Transmittance: 45 percent

.2 Visible Light Reflectance Outdoors: 7 percent

.3 Winter U-Value Nighttime: 0.29

.4 Summer U-Value Daytime: 0.24

.5 Solar Heat Gain Coefficient: 0.28

.6 Edge Seals: ASTM E 2188, with aluminum spacers, dual-sealed with a primary seal of polyisobutylene and a secondary seal of silicone sealant for glass-to-spacer seals.

.7 Sealant: Approved by glass manufacturer.

2.3 FABRICATION AND MANUFACTURE

.1 Label each light of glass with the registered name of the product and the weight and quality of the glass.

.2 Check dimensions on site before cutting materials.

.3 Minimum bite or lap of glass on stops and rabbets as recommended by glass manufacturer. Finish surfaces shall be free of tong marks.

.4 Cut glass true to dimensions, square, plumb and level. Verify all dimensions prior to fabrication.

.5 Distortion, pock marking or defects detrimental to appearance and/or performance, as determined by the Consultant, will be rejected.

3 Execution

3.1 EXAMINATION

.1 Examine areas of work affecting the work of this section. Report in writing all defects, errors and discrepancies immediately to the Consultant.

.2 Commencement of work implies acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Openings shall be free from moisture, frost, rust, dirt and foreign matter.

.2 Clean surface to receive sealant with a clean cloth dampened with xylol or a 50-50 mixture of acetone and xylol. Wipe dry with a clean, dry cloth.

3.3 INSTALLATION

.1 Conform to the recommendation of the glazing manual, Flat Glass Marketing Association, latest edition and as specified herein.

.2 Unless otherwise indicated on drawings otherwise, provide tempered glass at all doors, transoms, sidelights and vision lites within 2'-6" of grade and/or finished floor.

.3 Glaze doors scheduled to be glazed.

.4 Set sheet glass with draw lines horizontal.

.5 Glaze interior openings using compound or glazing tapes or gaskets.

.6 Install removable stops. Insert spacer shims between glass and stops at 24" O.C. and not less than 1/4" below "sight lines". Fill remaining voids with sealant or glazing compound to "sight lines" and trim sealant/glazing compound to produce clean, sharp, straight lines without voids or depressions.

.7 Replace loose stops in their original positions, tighten all screws.

.8 Refer to drawings and door and frame schedule for locations of each type of glass.

3.4 CLEANING

.1 Repair all defects caused by the work of this section. Remove as work progresses, all excess or foreign materials or droppings which would set or become difficult to remove from surfaces at time of final cleaning.

.2 Immediately prior to acceptance of work of this section by Consultant, remove temporary protection, clean and polish exposed surfaces of all work of this section. Use proper cleaning materials and methods to prevent damage to surfaces, finishes, sealer or work of other trades. Make good such damage to Consultant's satisfaction.

.3 Do not use steel wool, wire brushes or steel scrapers on any finished surfaces.

.4 Replace or make good to Consultant's satisfaction, upon completion of work of this section, all defective, scratched or damaged work, at no extra cost to the Owner.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirement for supply and installation of components required for a complete ULC fire resistance rated shaft wall assembly with proprietary components forming a system consisting of:

.1 Commercial steel framing system;

.2 Gypsum shaft wall liner panels;

.3 Gypsum board facer panels;

.4 Screws, tape, joint compound and all other accessories required for a non-load bearing shaft wall partition.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards

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

.1 ASTM A653/653M, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, General Requirements

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

.3 ASTM C645, Standard Specification for Non-structural Steel Framing Members

.4 ASTM C1002, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

.5 ASTM C1396/C1396M, Standard Specification for Gypsum Board

.6 ASTM C1658/C1658M, Standard Specification for Glass Mat Gypsum Panels

.7 ASTM E90, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

.8 ASTM E413, Classification for Rating Sound Insulation

.2 Gypsum Association (GA):

.1 GA-214, Recommended Levels of Gypsum Board Finish

.2 GA-216, Application and Finishing of Gypsum Panel Products

.3 GA-600, Fire Resistance Design Manual

.3 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S101, Standard Methods of Fire Endurance Tests of Building Construction and Materials

.2 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.3 ULC List of Equipment and Materials

.4 Underwriters' Laboratories (UL), Standards for Safety acceptable to the Standards Council of Canada (SCC)

1.3 SUBMITTALS

.1 Provide required information in accordance with Division 01.

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

.1 Product Data: Submit product data indicating compliance with deflection, loading and fire resistance ratings required by this Section; identify any changes to standard systems and assemblies that may be required to meet project requirements.

.2 Design Submittals: Submit written design information acceptable to Authorities Having Jurisdiction to Consultant before to starting construction of shaft wall assemblies.

1.4 QUALITY ASSURANCE

.1 Regulatory Requirements:

.1 Provide materials and construction identical to those tested in assembly indicated according to CAN/ULC S101, and labelled and listed by UL, ULC or ITS/Warnock Hersey, or another independent testing and inspection agency acceptable to Authorities Having Jurisdiction for fire resistance ratings of specific assemblies indicated on Drawings.

.2 Provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by a qualified independent testing agency for STC ratings of specific assemblies indicated on Drawings.

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

.1 Installation Requirements: Conform to product manufacturer's written instruction and ULC Design Requirements to provide STC and fire ratings required for project.

.3 Certifications: Provide the following during the course of the Work:

.1 Compliance Certification: Provide certificates from manufacturer indicating tested performance requirements required by Authorities Having Jurisdiction.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: Deliver materials in undamaged, original factory wrappings with labels and seals intact and stored on job site in a dry, weatherproof, heated area.

.2 Storage and Handling Requirements:

.1 Store materials flat, blocked off the ground in a manner to prevent kinking or permanent set.

.2 Store boards flat, in piles, without overhanging boards, protected from moisture and physical damage.

1.6 SITE CONDITIONS

.1 Ambient Conditions: Maintain room, surface and material within temperature range and for duration before, during and after application in accordance with manufacturer's written requirements.

2 Products

2.1 MANUFACTURERS

.1 Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:

.1 CertainTeed

.2 Georgia-Pacific Canada, Inc.

.3 CGC Inc.

2.2 DESIGN

.1 Design mechanical shaft walls, and other vertical shaft walls for maximum deflection as follows:

.1 Deflection: Use L/360 Modulus for deflection under sustained load.

.2 Fire Rating: Design shaft wall in accordance with ULC requirements to attain fire ratings indicated on Drawings.

.2 Design elevator hoistway for maximum deflection as follows:

.1 Deflection: Use L/240 Modulus for deflection under intermittent load.

.2 Air Pressure: Design hoistway to withstand an air pressure load of 240 Pa over 1,000,000 elevator cycles.

.3 End Reaction and Bending Stress: Do not exceed maximum allowable for given stud height.

.4 Fire Rating: Design hoistway in accordance with ULC requirements to attain fire ratings indicated on Drawings.

2.3 MATERIALS

.1 Gypsum Shaft Liner Boards: Meeting requirements of ASTM C1396 and ASTM C1658; ULC fire rated; maximum permissible length and width; end square cut, bevelled edges; fibreglass mat glass faced; 25mm (1") thickness to suit manufacturers standard system and fire rating indicated on Drawings.

.1 Acceptable materials:

.1 DensGlass Ultra Shaftliner by Georgia-Pacific Canada, Inc.

.2 ProRoc Moisture and Mould Resistant Shaftliner Type X by CertainTeed Gypsum, Inc.

.2 Gypsum Shaft Wall Face Boards: Meeting requirements of ASTM C1396 and ASTM C1658 fibreglass mat faced , ULC fire resistant type (Type X); thickness as indicated on Drawings; long edges tapered, end square cut; paper/paper faces:

.1 Basis-of-Design Materials:

.1 Sheetrock Brand Gypsum Panels, Firecode Core by CGC Inc.

.2 ProRoc Type X by CertainTeed Gypsum, Inc.

.3 Shaft Wall Framing System: To ASTM C645 manufacturer's standard shaft wall steel framing system having ASTM A653M, Z180, hot-dip galvanized zinc coating; minimum steel thickness of 2.54mm (0.1") thick or heavier as required by detailed design required by manufacturer for indicated spans; including head and bottom rails, channels, trim and accessories required for a complete installation:

.1 Acceptable materials:

.1 C-H Stud Framing System by CGC Inc.

.2 C-T Stud Framing System by Georgia-Pacific Canada, Inc.

.3 Series IV – I Studs by CertainTeed Gypsum, Inc.

.4 Fastening Devices: Screws to ASTM C1002 type S or other approved devices of type and size to suit application and to rigidly secure furring, framing and boards in place.

.5 Insulation: Mineral fibre batts conforming to ULC Guide No. 40U18.2, 10mm (3/8") thick, 6mm (1/4") wide, secured as detailed in referenced guide.

.6 Joint Tape: To ASTM C475, perforated paper with tapered edges as recommended by gypsum board manufacturer.

.7 Joint Compound: To ASTM C475, bedding and finishing types recommended by gypsum board manufacturer; casein, vinyl or latex base.

.8 Corner and Casing Beads: To ASTM C645, minimum 0.43mm (0.017") core thickness galvanized sheet steel to ASTM A653M with Z275 zinc finish, type with perforated flanges, to be finished with joint compound.

.9 Sealant: Refer to Section 07 92 00.

.10 Access Panels: Refer to Section 09 29 00, rated to suit shaft wall fire rating where required.

3 Execution

3.1 INSTALLATION

.1 Install in accordance with the manufacturer's written instructions and the contract documents, plumb, true, level and rigid.

.2 Sequence installation in accordance with manufacturer's instructions to achieve a system that is finished from one side and constructed from the other side.

.3 Erect gypsum board and tape joints to GA standards, minimum 3 coats; Level 4 finish, unless otherwise indicated on the Drawings.

.4 Sealant: Seal perimeters of shaft wall; as well as all penetrations, to prevent air whistling and to maintain sound rating, using flexible sealant specified under Section 07 92 00.

.5 Access Panels:

.1 Install access panels in shaft wall to maintain fire rating of assembly.

.2 Confirm location of access panels with the Consultant prior to installation.

.3 Minor adjustments to location within wall system may be required where panel interferes with architectural appearance.

END OF SECTION

1 General

1.1 SUMMARY

.1 Section Includes the following:

.1 Non-load-bearing steel framing systems for interior partitions.

.2 Suspension systems for interior ceilings and soffits.

.3 Grid suspension systems for gypsum board ceilings.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

.1 American Society for Testing and Materials International (ASTM):

.1 ASTM A641/A641M-19, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

.2 ASTM A653/A653M-23, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.3 ASTM A792/A792M-22, Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

.4 ASTM A875/A875M-23, Specification for Steel Sheet, Zinc-5% Aluminum Alloy-coated by the Hot Dip Process

.5 ASTM A1003/A1003M-23, Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members

.6 ASTM C645-18, Standard Specification for Nonstructural Steel Framing Members

.7 ASTM C754-20, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

.8 ASTM C840-20, Standard Specification for Application and Finishing of Gypsum Board

.9 ASTM C954-22, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

.10 ASTM C955-18e1, Standard Specification for Cold-Formed Steel Structural Framing Members

.11 ASTM C1002-22, Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

.2 Canadian Standards Association (CSA):

.1 CSA S136-16(2021), North American Specification for the Design of Cold Formed Steel Structural Members

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-7.1, Lightweight Steel Wall Framing Components

.4 Canadian Sheet Steel Building Institute (CSSBI):

.1 CSSBI S6, Guide Specification for Lightweight Steel Framing

.5 Steel Stud Manufacturers Association (SSMA)

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

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

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

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

.1 Product Certificates: For each type of code-compliance certification for studs and tracks.

.2 Shop Drawings: Submit shop drawings showing the design, construction and relevant details of furring, enclosures and partitions which require a fire rating.

1.4 QUALITY ASSURANCE

.1 Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association (SSMA).

.2 Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, enclosed, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

.2 STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 FRAMING SYSTEMS

.1 Framing Members, General: Comply with ASTM C754 for conditions indicated.

.1 Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.

.2 Steel sheet components shall comply with ASTM C645 requirements for metal, unless otherwise indicated.

.3 Steel for non-loadbearing members shall have metallic coats that conform to ASTM A653M or ASTM A792M with minimum metallic coating weighs (mass) of Z120 and AZM150 respectively.

.4 Framing members shall comply with the CAN/CSA S136 - North American Specification for the Design of Cold Formed Steel Structural Members, for conditions indicated.

.5 Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact. Use bituminous paint, butyl tape or other approved divorcing material.

.2 Studs and Tracks: ASTM C645.

.1 Steel Studs and Tracks:

.1 Minimum 0.0179" (25 gauge), screwable with crimped web and returned flange. Provide knockout openings in web at 150mm (6") O.C. to accommodate (if required) horizontal mechanical and electrical service lines, and bracing. Widths as indicated on drawings. Provide structural studs where indicated.

.2 Framing behind all fire resistant gypsum board shall be minimum 0.0329" (20 gauge).

.3 Where metal stud framing forms walls are to be thermally insulated as indicated on drawings, provide metal studs with integrated fastening system for glass fibre/mineral fibre insulation.

.4 Provide special shapes indicated on drawings as part of steel stud/drywall assemblies.

.3 Slip-Type Head Joints: Where indicated, provide one of the following:

.1 Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 2” (51-mm) minimum vertical movement.

.2 Double-Track System: ASTM C645 top outer tracks, inside track with 2” (51 mm) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.

.3 Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

.4 Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

.1 Minimum Base-Steel Thickness: As indicated on Drawings.

.5 Cold-Rolled Channel Bridging: Steel, 0.0538” (1.367 mm) minimum base-steel thickness, with minimum ½” (13 mm) wide flanges.

.1 Depth: As indicated on Drawings.

.2 Clip Angle: Not less than 1-1/2” x 1-1/2” (38 mm x 38 mm), 0.068” (1.72 mm) thick, galvanized steel.

.6 Hat-Shaped, Rigid Furring Channels: ASTM C645.

.1 Depth: As indicated on Drawings.

.7 Resilient Furring Channels: ½” (13 mm) deep, steel sheet members designed to reduce sound transmission.

.1 Configuration: hat shaped.

.8 Cold-Rolled Furring Channels: 0.053” (1.34 mm) uncoated-steel thickness, with minimum ½” (13 mm) wide flanges.

.1 Depth: As indicated on Drawings

.2 Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329” (0.8 mm).

.3 Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062” (1.59 mm) diameter wire, or double strand of 0.048” (1.21 mm) diameter wire.

.9 Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4” (32 mm), wall attachment flange of 7/8” (22 mm), minimum uncoated-steel thickness of 0.0179” (0.455 mm), and depth required to fit insulation thickness indicated.

2.3 GYPSUM BOARD SUSPENSION SYSTEMS

.1 Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062” (1.59 mm) diameter wire, or double strand of 0.048” (1.21 mm) diameter wire.

.2 Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16” (4.12 mm) in diameter.

.3 Flat Hangers: Steel sheet, in size indicated on Drawings.

.4 Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538” (1.367 mm) and minimum ½” (13 mm) wide flanges.

.1 Depth: As indicated on Drawings.

.5 Furring Channels (Furring Members):

.1 Cold-Rolled Channels: 0.0538” (1.367 mm) uncoated-steel thickness, with minimum ½” (13 mm) wide flanges, ¾” (19 mm) deep.

.2 Steel Studs and Tracks: ASTM C645.

.1 Depth: As indicated on Drawings.

.3 Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch (22 mm) deep.

.4 Resilient Furring Channels: 1/2’” (13 mm) deep members designed to reduce sound transmission.

.1 Configuration: Hat shaped.

.6 Grid Suspension System for Gypsum Board Ceilings (CA2): ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.

2.4 AUXILIARY MATERIALS

.1 General: Provide auxiliary materials that comply with referenced installation standards.

.1 Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

.2 Isolation Strip at Exterior Walls: Provide one of the following:

.1 Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.

.2 Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8” (3.2 mm) thick, in width to suit steel stud size.

3 Execution

3.1 EXAMINATION

.1 Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

.1 Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

.2 Coordination with Sprayed Fire-Resistive Materials:

.1 Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24” (610 mm) o.c.

.2 After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

.1 Installation Standard: ASTM C754.

.1 Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

.2 Install framing and accessories plumb, square, and true to line, with connections securely fastened.

.3 Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

.4 Install bracing at terminations in assemblies.

.5 Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

.1 Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

.2 Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

.3 Install studs so flanges within framing system point in same direction.

.4 Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

.1 Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

.2 Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

.1 Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

.3 Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

.4 Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

.5 Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

.5 Direct Furring:

.1 Screw to wood framing.

.2 Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

.6 Z-Shaped Furring Members:

.1 Erect insulation, vertically and hold in place with Z-shaped furring members spaced 24” (610 mm).

.2 Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24” (610 mm) o.c.

.3 At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12” (305 mm) from corner and cut insulation to fit.

.7 Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8” (3 mm) from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

.1 Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

.1 Hangers: 48” (1219 mm).

.2 Carrying Channels (Main Runners): 48” (1219 mm)

.3 Furring Channels (Furring Members): 24” (610 mm), unless otherwise indicated on the Drawings.

.2 Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

.3 Suspend hangers from building structure as follows:

.1 Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

.1 Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

.2 Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

.1 Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

.3 Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.

.4 Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.

.5 Do not attach hangers to steel roof deck.

.6 Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.

.7 Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.

.8 Do not connect or suspend steel framing from ducts, pipes, or conduit.

.4 Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

.5 Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

.6 Installation Tolerances: Install suspension systems that are level to within 1/8” in 12’ (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirement for supply and installation of components required for a complete gypsum board assembly with proprietary components as follows:

.1 Gypsum Board Panels:

.1 Standard Gypsum Board

.2 Gypsum Ceiling Board

.3 Impact/Abuse Resistance Gypsum Board

.4 Exterior Sheathing Board

.2 Gypsum Wallboard Accessories:

.1 Screws, tape, joint compound and all other accessories required for gypsum board ceiling and wall partitions.

.2 Access Panels.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

.1 American Society for Testing and Materials International (ASTM):

.1 ASTM A653/A653M-23, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.2 ASTM C475/C475M-17(2022), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board

.3 ASTM C840-20, Standard Specification for Application and Finishing of Gypsum Board

.4 ASTM C954-22, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

.5 ASTM C1002-22, Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

.6 ASTM C1047-19, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base

.7 ASTM C1177/C1177M-17, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.8 ASTM C1396/C1396M-17, Standard Specification for Gypsum Board

.9 ASTM C1629/C1629M-19, Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

.10 ASTM C1658/C1658M-19e1, Standard Specification for Glass Mat Gypsum Panels.

.11 ASTM D3273-21, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

.12 ASTM D3274-09(2021), Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation

.2 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S101, Standard Methods of Fire Endurance Tests of Building Construction and Materials

.2 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.3 CAN/ULC S114, Standard Method of Test for Determination of Non-Combustibility in Building Materials

.4 ULC List of Equipment and Materials

.5 Underwriters' Laboratories (UL), Standards for Safety acceptable to the Standards Council of Canada (SCC)

1.3 SUBMITTALS

.1 Provide submittals in accordance with the requirements of Division 01.

.2 Shop Drawings: Submit shop drawings showing the design, construction and relevant details of furring, enclosures and partitions which require a fire rating.

.3 Product Data: Submit manufacturer's current technical literature for each component.

.4 Samples: Supply for Consultant's review, if requested, samples of the following:

.1 Board: Submit sample of each panel product specified, 150mm (6") square.

.2 Trim: Submit sample of each type of trim specified, 305mm (12") long.

.5 Quality Assurance Submittals:

.1 Design Data, Test Reports: Provide manufacturer's test reports indicating product compliance with indicated requirements.

.2 Manufacturer's Instructions: Provide manufacturer's written installation instructions.

1.4 QUALITY ASSURANCE

.1 Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified.

.2 Submit proof of experience upon Consultant's request.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, enclosed, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Protect bagged products from excessive moisture or wetting. Store metal component sections in crates to prevent damage to material. Do not use bent or deformed material.

1.6 SITE CONDITIONS

.1 Establish and maintain environmental conditions for application and finishing gypsum wallboard to comply with ASTM C 840 and in accordance with manufacturer's written instructions.

.2 In cold weather (outdoor temperatures less than 13 deg. C, controlled heat in the range of 13 deg. C to 21 deg. C must be provided. Recommended temperature must be maintained twenty-four (24) hours before, during, and after entire gypsum board joint finishing and until the permanent heating system is in operation or the building is occupied.

.1 Minimum temperature of 10 deg. C shall be maintained during gypsum board application.

.3 Ventilate building spaces to remove excess moisture and humidity during the drying process. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

2 Products

2.1 MATERIALS - WALLBOARD

.1 Standard Gypsum Board:

.1 Conforming to ASTM C1396, ivory paper faced, tapered edges, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, 16mm (5/8") thick, unless otherwise indicated on Drawings.

.2 Acceptable Materials and Manufacturers:

.1 Sheetrock Brand Gypsum Panels by CGC Inc.

.2 ProRoc Regular by CertainTeed.

.3 ToughRock Gypsum Wallboard by Georgia-Pacific Canada.

.4 Or approved equivalent.

.2 Gypsum Ceiling Board:

.1 Sag Resistant Gypsum Board: Meeting requirements of ASTM C1396M, ceiling board manufactured to have more sag resistance than regular type gypsum board with long edges tapered, and as follows:

.1 Location: Ceiling surfaces.

.2 Acceptable Materials:

.1 Sheetrock Interior Ceiling Board by CGC Inc.

.2 Tough Rock CD Ceiling Board by Georgia Pacific Canada.

.3 ProRoc Interior Ceiling Board by CertainTeed.

.3 Impact/Abuse Resistant Gypsum Board:

.1 Manufactured to produce greater resistance to surface indentation and impact penetration resistance than standard gypsum panels:

.1 Gypsum panels with glass fibre reinforced core, tapered edges, minimum 5/8” thickness, conforming to ASTM C1396M and tested to the following performance ratings.

.2 Acceptable Materials:

.1 Sheetrock Abuse Resistant by CGC Inc.

.2 Abuse Resistant by CertainTeed.

.3 ToughRock Abuse Resistant by Georgia Pacific Canada.

.4 Exterior Sheathing Board:

.1 Glass mat faced, water-resistant treated core gypsum board, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, and as follows:

.1 13mm (1/2") thick, silicone treated gypsum core, front and back faces penetrated with inorganic glass fibre mats, square edge, conforming to ASTM C1177.

.2 Mould resistant panel score of 10 when tested in accordance with ASTM D3273 and evaluated to ASTM D3274.

.3 Acceptable Materials:

.1 Securock Glass-Mat Sheathing by CGC Inc.

.2 Dens-Glass Gold by Georgia-Pacific Canada.

.3 GlasRoc Sheathing by CertainTeed.

2.2 ACCESSORIES

.1 Concrete Anchors:

.1 Self-drilling tie wire anchors, "Red-Head No. T-32" by Phillips Drill Company, Division of ITT Industries of Canada Ltd., or approved equal.

.2 Concrete Inserts:

.1 Hot-dip galvanized "turtle back" type concrete inserts to suit conditions as approved by Consultant, by Acrow-Richmond National Concrete Accessories, Division of Premetalco Inc., or approved equal.

.3 Gypsum Wallboard Accessories:

.1 In general, gypsum wallboard accessories shall conform to ASTM C1047.

.2 Corner Beads:

.1 Made from galvanized steel sheet conforming to ASTM A653, minimum 0.0179" (25 gauge). Minimum width of flanges 28mm for 13mm (1-1/8" for 1/2") thick wallboard and 32mm for 16mm (1-1/4" for 5/8") thick wallboard.

.3 Casing Beads:

.1 Made from galvanized steel sheet conforming to ASTM A653, minimum 30 gauge, U-shaped designed for finishing with joint compound.

.4 Control Joints:

.1 Made from galvanized sheet steel conforming to ASTM A653, minimum 0.0179" (25 gauge), or roll-formed zinc-alloy to resist corrosion, with expansion joint material perforated flanges.

.5 Reveals:

.1 Galvanized sheet steel conforming to ASTM A653, minimum 0.0179" (25 gauge), in profiles as indicated on drawings.

.4 Wallboard Screws:

.1 Corrosion resistant, self-drilling, self-tapping gypsum wallboard screws conforming to ASTM C1002 (Type S) and ASTM C954 (Type S-12), 25mm (1") long No. 6 for single layer application, 41mm (1-5/8") long No. 7 for double layer application.

.2 At fire rated construction, type and size of wallboard screw shall be same as used in fire-rating test.

.5 Joint Compound for Interior Gypsum Board:

.1 Conforming to ASTM C475 and as recommended by gypsum wallboard, fire-rated gypsum wallboard and exterior wallboard manufacturers to suit conditions.

.6 Joint Compound for Exterior Sheathing Boards and Soffit Panels:

.1 Fibreglass mesh tape.

.7 Joint Compound for Abuse-Resistant Panels:

.1 ToughRock™ Sandable Joint Compound, by Georgia-Pacific.

.2 Durabond/Sheetrock Setting-Type Joint Compound, by CGC Canada Inc.

.8 Resilient Sponge Tape:

.1 Closed cell neoprene sponge type tape with self-sticking adhesive on one side. 'Permastik 122X' by Jacobs and Thompson Ltd., or foamed vinyl type tape, 'Arnofoam' by Arno Adhesive Tape Incorporated.

.9 Adhesive:

.1 Conforming to CGSB 71-GP-25M, and as recommended by manufacturer and compatible with contacted surfaces.

.10 Access Panels:

.1 Standard Access Panels: Supply 610mm x 610mm (24" x 24") self framing metal access panels with integral locks as approved by Consultant, where required for access to concealed controls and equipment, by Le Hage Metal Ltd., or Acudor Products Limited, or approved equal.

3 Execution

3.1 EXAMINATION

.1 Examine gypsum wallboard panels for damage and existence of mould. Install only undamaged panels.

.2 Examine gypsum wallboard in accordance with GA-231 for water damage.

.3 Examine areas and substrates, with installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

.4 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

.2 Coordinate installation of gypsum board suspension systems with installation of acoustical ceiling tiles (ACT) suspension systems. Where gypsum board suspension systems abut ACT systems, ensure that ceiling tiles grid fit into gypsum grid without affecting overall design and appearance.

.3 Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION - GENERAL

.1 Conform to ASTM C840, except as otherwise specified herein. Cooperate with mechanical, electrical and other trades to accommodate fixtures, fittings and other items in wallboard areas.

.2 Review extent of temporary heat provided. Carry out the work of this Section only when temperature is maintained and controlled in the range of 13 deg. C to 21 deg. C for at least twenty-four (24) hours before installing gypsum board and shall be maintained until joint compound and adhesives are dried or cured.

.3 Bring gypsum board into contact, but do not force into place.

3.4 GYPSUM WALLBOARD - SINGLE LAYER APPLICATION

.1 Metal Studs:

.1 Apply gypsum wallboard with screws. Erect wallboard with long dimension at right angles to supports. For fire rated partitions, erect board vertically or horizontally according to the ULC listing. Locate end joints over supporting members.

.2 Locate vertical joints at least 305mm (12") from the jamb/head/sill lines of openings.

.3 For parallel application space screws at 200mm (8") O.C. at board edges at 305mm (12") O.C. on board fields.

.2 Fasteners:

.1 Perimeter screws shall be not less than 10mm (3/8") from edges and ends and shall be opposite the screws on adjacent boards.

.2 Screws shall be driven with a power screw gun and set with countersunk head slightly below the surface of the board.

.3 Joints: Finish all joints.

3.5 GYPSUM WALLBOARD - DOUBLE LAYER APPLICATION

.1 General:

.1 Lay out work to minimize end joints on the face layer and to offset parallel joints between face and base layers by at least 254mm (10"). Apply the face layer at right angles to the base layer.

.2 Base Layer:

.1 The base layer shall be same as face layer or wallboard backing board applied at right angles to framing members. Secure base layers with screws spaced 305mm (12") O.C. to each member. Perimeter screws shall be opposite the screws on adjacent boards.

.2 The surface of the erected base layer shall be straight, plumb or level, and without protrusions before the face layer is applied.

.3 Face Layer:

.1 Apply face layer at right angles to base layer with adhesive. Apply adhesive with a notched spreader to leave 10mm x 13mm (3/8" x 1/2") ribbons, 38mm (1-1/2") apart over entire back side of face layer. Erect wallboard immediately after spreading adhesive.

.2 Supplement adhesive with screw fasteners. Provide temporary support for wallboard until adhesive bond has fully developed.

.3 As an alternative to adhesive specified, joint compound mixed with water in accordance with manufacturer's directions may be used. Allow joint compound and water mixture to stand thirty (30) minutes before using.

.4 Joints:

.1 Finish joints in face layers only, unless otherwise required to achieve fire resistant ratings indicated, as hereinafter specified.

3.6 EXTERIOR SHEATHING BOARD

.1 Install exterior sheathing board to exterior walls in accordance with manufacturer's written instructions. Seal all cut edges, ends, utility holes and fastener heads, as recommended by manufacturer.

.2 Tape and fill all joints and fastener heads using materials recommended by exterior sheathing board manufacturer.

3.7 FIRE RESISTANT ASSEMBLIES

.1 Fire resistance rating of gypsum board assemblies and framing shall be as called for on drawings or schedules, and as required to conform with applicable codes and requirements of authorities having jurisdiction.

.2 Appropriate ULC designs as listed in current ULC list of equipment and materials, Volume II, Building Construction, shall be placed when applicable. Extend partitions full height through ceiling space unless otherwise noted on drawings.

.3 Vertical bulkheads in ceiling spaces over fire rated glazed partitions, doors and the like shall have same fire rating as the door or partition over which they occur. All such bulkheads shall be of drywall construction unless otherwise noted.

.4 Use fire rated gypsum board as specified.

.5 Where lighting fixtures, diffusers, and the like are recessed into fire rated ceilings or bulkheads, provide enclosure to maintain required fire rating. Form removable panel to give access to fixture outlet box.

.6 Where fire hose cabinets or other fixtures or equipment are recessed in fire rated walls or partitions, provide drywall enclosure or backing to maintain required fire rating, unless otherwise detailed.

3.8 CONTROL JOINTS

.1 Install control joints using metal control joint strip as specified where:

.1 A partition, furring or column fireproofing abuts a structural element, dissimilar wall or partition assembly, or other vertical penetration, or ceiling.

.2 A ceiling or soffit abuts a structural element, dissimilar wall or partition assembly or other vertical penetrations.

.3 Wings of "L", "U" and "T"-shaped ceiling/soffit areas are joined;

.4 Construction changes within the plane of the partition or ceiling or soffit.

.5 Partition, restrained ceiling or furring run exceeds 9144mm (30').

.6 Unrestrained ceiling dimensions exceed 15240mm (50') in either direction.

.7 Expansion or control joints occur in the base exterior wall.

.8 Wallboard is installed over masonry control joints.

.9 And elsewhere as indicated on the drawings.

.2 Install in accordance with manufacturer's instructions. Where application is on furring members and double furring members at control joints, place one furring member on each side of the control joint.

3.9 BULKHEADS

.1 Fur out bulkheads in areas indicated and as required to conceal mechanical, electrical or other services in rooms where drywall finishes are scheduled, and elsewhere if called for on drawings.

.2 Ensure hangers are installed as to prevent splaying.

3.10 PRESSED STEEL (HOLLOW METAL) FRAMES

.1 Install pressed steel (hollow metal) frames where they occur in gypsum wallboard partitions.

.2 Anchor frames securely to studs using a minimum of three (3) anchors per jamb for jambs up to 2134mm (7') high and minimum of four (4) anchors per jamb for jambs over 2134mm (7') high.

3.11 ACCESS DOORS

.1 Access doors supplied by this Section and Mechanical and Electrical shall be built-in by this Section where required in gypsum board installations, in accordance with manufacturer's recommendations, to match and blend with surrounding surfaces.

.2 Refer to drawings for locations.

3.12 THERMAL BREAK

.1 Install self-sticking resilient sponge tape at edges of wallboard in contact with metal windows and exterior door frames to provide a thermal break.

.2 Adhere tape to casing bead and compress during installation.

3.13 FINISHING

.1 Before proceeding with installation of finishing materials ensure the following:

.1 Wallboard is fastened and held close to framing and furring.

.2 Fastening heads in wallboard are slightingly below surface in dimple formed by driving tool.

.2 Levels of Gypsum Wallboard Finish:

.1 Level 0: Temporary construction only.

.2 Level 1: Plenum areas and above ceilings. Where a fire-resistance rating is required finishing should be in accordance with reports of fire tests of assemblies that have met the requirements of the fire rating imposed.

.3 Level 2: Areas of water resistant gypsum backing board under tile, exposed areas where appearance is not critical.

.4 Level 3: Service corridors and areas to receive heavy or medium textured coatings or heavy-duty wall coverings.

.5 Level 4: Areas to receive light textured coatings or lightweight wall coverings.

.6 Level 5: Areas to receive gloss, semi-gloss or flat sheen paints and critical lighting conditions. Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat over entire surface for corridors, long hallways, walls and ceilings longer than 7500 mm or walls higher than 3600 mm , and for all curved or angled wall surfaces.

.3 Finish gypsum wallboard in strict accordance with ASTM C840, GA-214 and GA-216 and as follows:

.1 Fill and tape joints and internal corners and fill screw depressions in board face and smooth out along corner beads and metal strip with joint compound.

.2 Mix joint compound (powder) in accordance with manufacturer's written instructions.

.3 Prefill "V" grooves of rounded edges with special setting type joint compound using a 127mm to 150mm (5" to 6") joint finishing knife. Finish flush with tapered surface ready for tape reinforcing application. Allow prefill material to dry thoroughly before application of embedding compound and tape.

.4 Apply joint compound in thin uniform layer. Embed reinforcing tape accurately centred on joint and securely pressed in, leaving sufficient compound under tape to provide proper bond. Immediately apply skim coat over tape application. Allow to dry thoroughly before application of next coat.

.5 Apply fill coat finishing the tapered depression flush with board surfaces. Allow to dry thoroughly before application of finish coat.

.6 Apply finish coat extending slightly beyond the filler coat and feathered out onto the board surface. Do not apply finish coat to gypsum board scheduled to be sprayed with acoustic surfacing finish.

.7 Sand between coats and following the finishing coat, where necessary, and leave surface smooth and ready for painting.

.8 Finish screw depressions with filler material and finish coat as specified above.

.9 Joint and depression finish shall in no case protrude beyond the plane of the board surface.

.10 Furnish corner beads and metal trim flush with board surface using filler and finishing coats feathered out approximately 50mm (2") and 100mm (4") respectively onto the board surface.

.11 Provide metal casing beads at exposed edges, at junctions of gypsum/cement board with dissimilar material, at control joints and at junction with columns. Casing beads are required at perimeter of gypsum/cement wallboard ceilings and soffits. Fasten with screws at 305mm (12") O.C. along entire length.

.12 Finish gypsum board to receive a Level 4 finish, unless indicated on the Drawings as a Level 5 finish.

3.14 REPAIRS

.1 After taping and finishing has completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.

.2 Patch holes or openings 13mm (1/2") or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.

.3 Repair holes or openings over 13mm (1/2"), or equivalent size, with 16mm (5/8") thick gypsum wallboard secured in such a manner as to provide solid substrate equivalent to undamaged surface.

.4 Tape and refinish scratched, abraded or damaged finished surfaces including cracks and joints in non-decorated surface to provide smoke tight construction, fire protection equivalent to the fire rated construction and STC equivalent to the sound rated construction.

3.15 PROTECTION

.1 Protect installed products from damage during remainder of construction period.

.2 Remove and replace panels that are damaged.

END OF SECTION

1 General

1.1 SUMMARY

.1 The work in this section includes supply and installation for the following:

.1 Ceramic Wall Tile.

.2 Porcelain Floor Tile.

.3 Ant-Fracturing Membrane.

.4 Edge trims, Transition Strips and Accessories.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards

.1 American National Standards Institute/Ceramic Tile Institute (ANSI/CTI):

.1 ANSI/CTI A108.1, Specification for the Installation of Ceramic Tile: Collection of 20 ANSI/CTI A108, A118 and A136 Series of Standards on Tile Installation

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

.1 ASTM C241/C241M, Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic

.2 ASTM C615/C615M, Standard Specification for Granite Dimension Stone

.3 ASTM C627, Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester

.4 ASTM C920, Standard Specification for Elastomeric Joint Sealants

.5 ASTM C1028, Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

.6 ASTM C1178/C1178M, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-75.1-M, Tile, Ceramic

.4 Terrazzo, Tile and Marble Association of Canada (TTMAC):

.1 2019-2021 Specification Guide 09 30 00, Tile Installation Manual

.2 Hard Surface Maintenance Guide

1.3 EXAMINATION

.1 Examine all areas and conditions affecting work of this Section and report any discrepancies or defects which would affect finished results.

1.4 SUBMITTALS

.1 Submit submittals in accordance with Division 01.

.2 Samples:

.1 Submit sample panel of each type and colour tile, 610mm x 610mm (24" x 24").

.2 Adhere to a rigid board with setting compound, grout and a dummy control joint showing sealant as specified. Identify samples by project number, date, name of sub-contractor and tile type.

.3 Tile and grout used in the building shall correspond to appearance of approved samples in all respects. Do not install tile until samples are approved.

.4 Upon Consultant's request submit samples of base, trim and fittings.

.3 Material Lists:

.1 Prior to ordering any materials submit list of products to be used. Products proposed must be recommended by their manufacturer for purpose intended. Upon Consultant's request submit evidence of manufacturer's endorsement.

.2 Take care to ensure compatibility of all materials. Consult the manufacturers in case of doubt.

.3 The supplementary materials shall come from the same production batch as installed materials.

.4 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on Site for reference by workers.

.5 Maintenance Instructions:

.1 Upon completion of the Work, furnish Consultant with copies of maintenance instructions, containing complete detailed and specific instructions for maintaining, preserving and keeping clean the surfaces of this Work and in particular, giving adequate warning of maintenance practices of materials detrimental to the work of this Section for inclusion in the Operation and Maintenance Manual.

.6 Maintenance Materials:

.1 Supply five percent (5%) extra of each colour of tile and of each tile type for future repairs by the Owner.

.2 Place maintenance materials where directed by the Owner and store in their original containers.

1.5 QUALITY ASSURANCE

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

.2 Work of this Section shall be executed by workers especially trained and experienced in this type of work. Have a full time, qualified representative at the Site to direct the work of this Section at all times.

.3 Ensure proper use of proprietary materials in strict accordance with the material manufacturer's directions. It shall be the responsibility of the material manufacturer or supplier to furnish these directions to the Contractor and to check periodically at the site to ensure that they are being carried out.

1.6 PRE-INSTALLATION CONFERENCE

.1 Contractor shall hold pre-installation conference two (2) weeks prior to commencing work of this Section. Conference shall be attended by the Contractor, Owner, Consultant, concrete finishing subcontractor, tile installers and tile manufacturer's representative, setting bed and grout manufacturer's representative to discuss the following, but not limited to the following;

.1 Substrate conditions, non-structural cracks, structural cracks and preparation requirements;

.2 Floor and wall surface irregularities and levelness tolerances, including all remedial requirements;

.3 Installation of anti-fracturing membranes and setting bed materials;

.4 Installation of tiles and grouting;

.5 Edge details and treatments;

.6 Installation of tile and grout sealers.

.2 Contractor shall ensure that manufacturer's representatives issues written installation instructions at the pre-installation conference, to all parties attending the pre-installation conference and the Consultant, for all tile types, setting beds, grouts and sealers required for the work of this Section.

.3 Contractor shall within seventy-two (72) hours of the pre-installation conference, prepare minutes of the conference, and issue minutes to all parties attending the pre-installation conference and the Consultant. Contractor shall clearly indicated required actions and by which party.

1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Co-ordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Restrict traffic by other trades during installation.

.5 Provide adequate protection of completed tiled surfaces to prevent damage by other trades until final completion of this project. Minimum protection shall consist of 4 mil polyethylene sheets lapped 100mm (4") and taped.

.6 Heavily travelled areas shall have additional 13mm (1/2") thick fibreboard sheet protection with taped joints over polyethylene sheet protection as specified above.

.7 Protect exposed edges of floor tile with same thickness as tile x 100mm (4") wide tapered strip of plywood adhered to floor until adjoining floor finish is to be installed.

1.8 SITE CONDITIONS

.1 Ambient Conditions: Apply tile after completion of work by other Sections is complete; to surfaces sufficiently dry, clean, firm, level, plumb and free from oil or wax or any other material deleterious to tile adhesion and as follows:

.1 Temperature: Maintain tile materials and substrate temperature between TTMAC recommended minimum and maximum temperature range; unless indicated otherwise by manufacturer, for forty-eight (48) hours before and during installation until materials are fully set and cured; provide additional heat during winter months or at any other time when there is a risk that surface temperatures may drop below minimum recommended temperatures.

.2 Ventilation: Maintain adequate ventilation where Work of this Section generates toxic gases or where there is a risk of raising relative humidity to levels that could damage building finishes and assemblies.

1.9 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions, but for a period of five (5) years, and agree to promptly make good defects which become evident during the warranty period without cost to the Owner.

.2 Defects shall include but not be limited to the following:

.1 Cracking and crazing;

.2 Discolouration and staining;

.3 Pitting, splitting, and;

.4 Deformation of tiles and grout.

2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Dynamic Coefficient of Friction (DCOF): Tile installed on walkway surfaces having following values as determined by testing identical products per ANSI A137.1:

.1 Level Interior Wet Spaces: A minimum wet DCOF AcuTest Value of 0.42 or higher.

.2 Level Interior Dry Spaces: A minimum wet DCOF AcuTest Value below 0.42

.2 Floor Level Tolerances: Provide materials to attain floor levelness tolerances required by this Section.

.1 Calculate quantity of materials based on the difference between the specified tolerance and the initial tolerance specified in Section 03 35 00.

.2 Measurements: As indicated in Section 03 35 00.

2.2 MATERIALS

.1 Porcelain Floor and Wall Tiles (PORT-1):

.1 Types, Sizes, Colours and Manufacturers: As indicated in Finish Legend on the Drawings.

.2 Ceramic Wall Tiles (CER-1 & CER-2):

.1 Types, Sizes, Colours and Manufacturers: As indicated in Finish Legend on the Drawings.

.3 Control Joint Caulking:

.1 As supplied by the Grout Manufacturer.

.2 Colour: To match adjacent grout, as approved by the Consultant.

.4 Trims:

.1 Straight Edge Strips:

.1 Extruded, brushed nickel finish aluminum edge strips, 3mm (1/8”) wide at top edge; Height as required to suit tile installation; with integral perforated anchoring leg for setting the strip into the setting material.

.2 Basis of Design Materials: Schlüter JOLLY by Schlüter.

.2 Corner Edge Strips:

.1 Extruded, brushed nickel finish aluminum corner edge strips; with integral perforated anchoring leg for setting the strip into the setting material.

.2 Basis of Design Materials: Schlüter ECK-K by Schlüter.

.3 Transition Edge Strips:

.1 Extruded, brushed nickel finish, aluminum edge strips; Height as required to suit tile installation, with integral perforated anchoring leg for setting the strip into the setting material and sloped transition.

.2 Basis of Design Materials: Schlüter Reno-U by Schlüter.

2.3 MORTAR SETTING MATERIALS

.1 Manufacturers: Mortar and grout materials listed in this Section shall be of a uniform quality for each mortar, and grout component from a single manufacturer and each aggregate from one source or producer as follows:

.1 Flextile Ltd.

.2 MAPEI Inc.

.3 Custom Building Products Ltd.

.4 Laticrete International Inc.

.2 Surface Preparation Materials:

.1 Levelling Bed/Mortar Additive: Performance standard meeting requirements of ANSI A108.1, Type 2; Acceptable material:

.1 Mortar Bed with #43 Additive by Flextile Ltd.

.2 Mapecem Premix PL50 by MAPEI Inc.

.3 Level Quik Underlayment by by Custom Building Products.

.4 Laticrete 3701 Fortified Mortar Bed by Laticrete International Inc.

.3 Interior Thin Set Wall System: Dry set mortar meeting or exceeding the requirements of ANSI A108.1 formulated for thin set applications of ceramic biscuit tile, factory sanded mortar consisting of portland cement, sand and additives requiring only potable water to be added for installation:

.1 Acceptable mortar materials:

.1 #51 Floor and Wall Mix by Flextile Ltd.

.2 Kerabond by MAPEI Inc.

.3 Premium Blend Thinset by by Custom Building Products.

.4 Laticrete 317 Mortar by Laticrete International Inc.

.4 Interior Thin Set Floor System: Dry set mortar meeting or exceeding the requirements of ASTM C627 for Heavy installation using latex modified, portland cement mortar meeting requirements of ANSI A108.1:

.1 Acceptable mortar materials:

.1 #53 Floor Mix by Flextile Ltd.

.2 Kerabond by MAPEI Inc.

.3 Master Blend Thinset by by Custom Building Products.

.4 Laticrete 253 Thinset by Laticrete International Inc.

.5 Large Format Tile Mortar: Medium bed, dry set polymer modified mortar system designed specifically for use with large format tile materials over 305mm x 305mm (12" x 12"), requiring only the addition of water, rated for extra heavy service installation:

.1 Acceptable mortar materials:

.1 #50 PM Medium Bed Thin Set Mortar by Flextile Ltd.

.2 Ultracontact by MAPEI Inc.

.3 Complete Contact by Custom Building Products.

.4 Laticrete Sure Set by Laticrete International Inc.

2.4 GROUT MATERIALS

.1 Grout Colours: As indicated in Finish Legend on the Drawings.

.2 Portland Cement Grout for Wall and Floor Joints ≤3mm (1/8") Interior Only: factory blended polymer modified mixture meeting requirements of ANSI A108.1:

.1 Acceptable Materials:

.1 500 Series Unsanded Grout by Flextile Ltd.

.2 Ker 800 Unsanded Grout by MAPEI Inc.

.3 Polyblend Unsanded Grout by Custom Building Products.

.4 Peracolor Grout Laticrete International Inc.

.3 Latex-Portland Cement Grout for Floors with Joints ≥3mm (1/8") Interior or Exterior: factory blended stain resistant latex modifiers, portland cement and graded silica sand and dry-set grout and meeting requirements of A108.1:

.1 Acceptable Materials:

.1 600/100 Series Sanded Grout by Flextile Ltd.

.2 Keracolour S Sanded Grout by MAPEI Inc.

.3 Polyblend Sanded Grout by Custom Building Products.

.4 Peracolor Grout Laticrete International Inc.

2.5 ANTI-FRACTURING WATERPROOF MEMBRANES

.1 Load bearing, premanufactured lightweight fabric reinforced anti-fracturing waterproofing membrane, consisting of a polyethylene membrane with a grid structure of square cavities, each cut back in a dovetail configuration, and an anchoring fleece laminated to the underside.

.2 Thickness: 3.5mm (1/8").

.3 Basis of Design Materials: Schlüter Ditra by Schlüter.

2.6 ACCESSORY MATERIALS

.1 Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers and as follows:

.1 Job Site Cleaner: Phosphoric acid/nitric acid based cleaning solution mixed in accordance with cleaner manufacturer's recommendations and as recommended by tile manufacturer. Separately

.2 Maintenance Cleaner: Non-toxic, electrolytic, biodegradable, non-ammonia containing, pH controlled cleaning solution mixed in accordance with manufacturer's recommendations.

3 Execution

3.1 EXAMINATION

.1 Maintain minimum temperature of 13 deg C at tile installation area for twenty-four (24) hours prior to curing and for twenty-four (24) hours after installation. Do not apply work to frozen surfaces.

.2 Examine carefully surfaces to which tile is to be installed and report any defects to the Consultant.

.3 Anti-Fracturing Membranes:

.1 Prepare all surfaces of non-structural and structural cracks in strict accordance with the anti-fracturing membrane manufacturer's written instructions.

.2 Prime and fill all surfaces of non-structural and structural cracks in strict accordance with the anti-fracturing membrane manufacturer's written instructions.

.4 Commencement of installation shall signify complete acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Surface Preparation:

.1 Make backing surfaces level and true to a tolerance in plane of 3mm in 2439mm (±1/8” in 8’) for walls and 3mm in 3048mm (±1/8” in 10’) for floors using levelling bed mortar.

.2 Surfaces shall be structurally sound, well fastened, clean and free from dust, oil, grease, paint, tar, wax, curing agents, primers, sealers, form release agents or any deleterious substances that may act as bond barriers.

.3 Backing surfaces shall be dry and fully cured. Dampness must not exceed five percent (5%) by volume.

.2 Examine concrete substrate, repair as required to produce level, clean surface for new tile installation. Repair Work shall include levelling, filling, grinding or cutting, in accordance with Section 03 35 00.

.3 Work of other trades that are required before new tile installation (i.e. electrical conduit installed below ceramic tile) shall be installed, complete and approved before tile installation.

3.3 INSTALLATION – ANTI-FRACTURING MEMBRANES

.1 Install waterproofing membrane in accordance with manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.

3.4 INSTALLATION - GENERAL

.1 Unless otherwise specified, execute tile work according to the latest issue of Specification Guide 09 30 00, Tile Installation Manual - published by Terrazzo, Tile and Marble Association of Canada, as the minimum standard except as varied by this Specification.

.2 Thoroughly clean surfaces to which tile is to be applied.

.3 Back butter all floor tile.

.4 Neatly cut tile around fitments, fixtures, access panels, and the like. Splitting of tile is expressly prohibited except where no alternative is possible. Form intersections, corners and returns accurately.

.5 Finish surfaces flat and level or, sloped and graded as required.

.6 Joint Widths: Install tile with the following joint widths, unless indicated on drawings:

.1 Wall Tile: 1.6mm (1/16”).

.2 Floor Tile: 6mm (1/4”), unless otherwise indicated on the Drawings.

.3 Make joints consistent width and alignment within tile area.

.4 Maintain 2/3 of grout joint depth free of setting material.

.7 Joints in base shall match floor patterns. Joints shall be watertight without voids, cracks or excess grout.

.8 Lay out tile so that fields or patterns are centred on wall areas or architectural features and so that no tile less than 1/2 size occurs.

.9 Arrange and set recessed accessories in tile work so that they are evenly spaced, centred with joints and set true with correct projection. Rigidly install accessories.

.10 Provide manufacturer's standard trim pieces at changes of direction and at terminations. Unless otherwise indicated provide the following corner and edge conditions:

.1 Internal horizontal corners: Coved.

.2 External vertical and horizontal corners: Bullnosed.

.3 Internal vertical corners and unexposed edges: Square.

.11 Install tiles in patterns and locations as indicated on drawings.

.12 Install wall tile full wall height unless shown otherwise.

.13 Coordinate work of this Section with work of other Sections for items requiring to be recessed into work of this Section.

.14 Sound tiles after setting and remove and replace tiles not fully bedded.

.15 Re-point joints after cleaning to eliminate imperfections. Avoid scratching tile surfaces.

.16 Finished tile work shall be clean and free of tiles which are pitted, chipped, cracked or scratched. All damaged tile shall be removed and replaced.

.17 Where indicated on Drawings or as required, install continuous single piece metal edge trims centred under doors in closed position and other locations where tile meets other floor finishes.

3.5 MORTAR APPLICATION METHOD

.1 Thin-Set Application Method:

.1 Install wall tile to gypsum wallboard and moisture resistant wallboard in dry areas using latex modified thin-set setting bed and latex modified wall grout in strict accordance with tile manufacturers written installation instructions as per the pre-installation conference.

.2 Apply floor tile and prepare floor slabs in strict accordance with tile manufacturers written installation instructions as per the pre-installation conference.

3.6 GROUTING

.1 Grout tiles in accordance with ANSI A108.10 and as specified herein.

.2 When grouting a fresh laid floor, make certain that traffic and grouting will not cause movement of floor in setting bed. Protect floor by using kneeling boards or gypsum board to defend floor against traffic while grouting.

.3 Mix grouts and install in strict accordance with the manufacturer's instructions.

.4 Excess grout shall be removed from the surface of tiles using the edge of a rubber float held at a 45 deg angle, moving it diagonally to the joints. Fill all gaps and air holes.

.5 Do not allow grout to harden on face of tile. Refer to manufacturer's instructions for thorough removal.

.6 Floors which required damp curing shall be cured for the required length of time using heavy kraft paper, not polyethylene sheets. Consult manufacturer for instructions.

3.7 CONTROL JOINTS AND SEALING

.1 Control joints of a flexible caulking material shall be placed every 4877mm to 6096mm (16’ to 20') apart, directly over existing control joints and/or where indicated on drawings or as required in accordance with TTMAC Detail No. 301MJ-2019-2021, Details E, F and G, whichever is applicable. Control joints shall be placed around the floor perimeter at walls, around columns, and where tile abuts other hard materials or vertical surfaces. Saw cutting of tile after installation is prohibited. Tile shall be cut if required and installed along each side of control joints.

.2 Expansion joints must always be placed directly over all slab expansion joints in accordance with TTMAC Detail No. 301MJ-2019-2021, Details A and B, whichever is applicable.

.3 Locate expansion, control, contraction, and isolation joints, as indicated below, unless specifically indicated otherwise on the Drawings:

.1 Interior: 4877mm (16’) maximum: 6mm (1/4") joint width.

.4 Joints around fixtures, pipes or other fittings shall be sealed with a sealant. Refer to Section 07 92 00 for type of sealants to be used.

.1 Colour of sealant shall match grout as selected later by Consultant.

3.8 CLEANING AND PROTECTION

.1 Clean tiled areas after grouting has cured, using compatible solutions and methods as recommended by the manufacturer.

.2 Remove grout residue from tile as soon as possible.

.3 Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation.

.4 Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning.

.5 Flush surface with clean water before and after cleaning.

.6 Leave finished installation clean and free of cracked, chipped, broken, unbonded, or other tile deficiencies.

3.9 INSTALLATION SCHEDULE

.1 Install tiles according to TTMAC’s “Specification Guide 09 30 00 Tile Installation Manual 2019-2021”.

.2 Expansion and Control Joints: Movement Joints for Tile Installations: TTMAC Detail 301MJ-2019-2021.

.3 Wall Tile:

.1 Tile Installed Over Masonry or Concrete Walls – Thin-Set Method: TTMAC Detail 303W-2019-2021 Interior/Exterior.

.2 Tile Installed on Coated Glass Mat Backer Board, Detail B - Interior Wet/Dry Areas: TTMAC Detail 305W-2019-2021.

.4 Floor Tile:

.1 Tile Bonded to Concrete Slab – Thin-Set Method, TTMAC Detail 311F-2019-2021; Detail A Interior/Exterior.

.2 Large Format Tile on Interior Floors: TTMAC Detail 329LFT-2019-2021

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply and installation of ceilings consisting of the following, complete with exposed suspension system and trim:

.1 Acoustical tiles for interior ceilings.

.2 Fully concealed, direct-hung, suspension systems.

1.2 REFERENCE STANDARDS

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

.1 ASTM C635/C635M-22, Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings

.2 ASTM E1264-23 Standard Classification for Acoustical Ceiling Products

.2 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate layout and installation of acoustic tile ceiling and suspension system with other construction that penetrates ceilings or is supported by them including; but not limited to, light fixtures, HVAC equipment, fire suppression system, and partition assemblies, and as follows:

.1 Schedule and coordinate installation of ceiling to occur after completion of overhead mechanical and electrical work.

.2 Schedule and coordinate ceiling installation with mechanical and electrical trades building in components into ceiling finish panels.

.2 Pre-Installation Conference: Conduct conference at Project site in accordance with requirements of Division 01 to discuss coordination issues with Contractor, Subcontractor and Consultant present.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

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

.1 Product Data: Submit product data for each type of product specified.

.2 Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling mounted items indicating the following:

.1 Ceiling suspension system members.

.2 Method of attaching suspension system hangers to building structure.

.3 Ceiling mounted items including light fixtures; air outlets and inlets; speakers; sprinklers; and special mouldings at walls, column penetrations, and other junctures of acoustic ceilings with adjoining construction.

.3 Samples for Initial Selection: Manufacturer's colour charts consisting of sections of acoustic panels, suspension systems, and trim showing the full range of colours, textures, and patterns available for each type of ceiling assembly indicated.

.4 Samples for Verification: Full size units of each type of ceiling assembly indicated; in sets for each colour, texture, and pattern specified, showing the full range of variations expected in these characteristics:

.1 150mm (6") square samples of each acoustic panel type, pattern, and colour

.2 Set of 305mm (12") long samples of exposed suspension system members, including trim, for each colour and system type required.

.5 Maintenance and Materials:

.1 Provide five percent (5%) of each type of acoustic ceiling panels and two percent (2%) of each suspension system and trim for future repairs. Identify cartons and place where directed by the Owner.

.2 Maintenance materials shall be of same production run as installed materials.

1.5 INFORMATIONAL SUBMITTALS

.1 Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

.1 Ceiling suspension-system members.

.2 Structural members to which suspension systems will be attached.

.3 Method of attaching hangers to building structure.

.4 Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.

.5 Size and location of initial access modules for acoustical tile.

.6 Items penetrating finished ceiling and ceiling-mounted items including the following:

.1 Lighting fixtures.

.2 Diffusers.

.3 Grilles.

.4 Speakers.

.5 Sprinklers.

.6 Access panels.

.7 Perimeter moldings.

.7 Show operation of hinged and sliding components adjacent to acoustical tiles.

.8 Minimum Drawing Scale: ¼” = 1’ (1:48).

1.6 QUALITY ASSURANCE

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

.2 Single-Source Responsibility: Provide acoustic ceilings and grid components by a single manufacturer to ensure compatibility.

.3 Letter of Certification:

.1 Contractor together with manufacturer, shall submit a written confirmation, signed by manufacturer's registered professional Engineer, stating that the suspended ceiling system will provide adequate support for electrical fixtures.

1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

1.8 SITE CONDITIONS

.1 Ambient Conditions: Install acoustic unit ceilings only when building is enclosed, has sufficient heat, when overhead mechanical and electrical work is complete, and dust and moisture producing activities are complete; maintain uniform temperatures and relative humidity within range recommended by material manufacturer from the time of installation until Substantial Performance for the project; make adjustments to temperature and humidity gradually within tolerances indicated by manufacturer.

1.9 WARRANTY

.1 Acoustical Panel: Submit manufacturers standard ten (10) year written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:

.1 Panels: Sagging and warping.

.2 Grid System: Rusting and manufacturer’s defects.

2 Products

2.1 MANUFACTURERS

.1 Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section, manufacturers offering products that may be incorporated into the Work include the following:

.1 Armstrong World Industries, Inc.

.2 Chicago Metallic

.3 CertainTeed

.4 CGC Interiors, a USG Company

2.2 DESIGN CRITERIA

.1 Superimposed Loads: Determine superimposed loads applied to suspension systems by components of the building and verify that adequate hangers are installed to support additional loads in conjunction with normal loads of the ceiling system, and as follows:

.1 Maximum Deflection: Limit deflection to L/360 in accordance with ASTM C635 deflection test.

2.3 MATERIALS

.1 Acoustic Panels (ACT-1): Provide manufacturer's wet-formed mineral wool panels of configuration indicated in accordance with ASTM E1264 classifications as designated by the nominal values for types, patterns, acoustic ratings, and light reflectance class listed in this Section; with flame spread rating of 25 or less and smoke developed rating of 50 or less when tested in accordance with CAN/ULC S102 and as follows:

.1 Physical Properties: Type: III; Form: 2; Pattern: C D, Fire Class: A.

.2 Dimensions: 610mm x 1220mm x 16mm (24" x 48" x 5/8").

.3 Edge Profile: 15/16 Square Lay-In Edge.

.4 Colour: White.

.5 Acoustic and Visual Performance (Minimum Nominal):

.1 Noise Reduction Coefficient (NRC): 0.55

.2 Ceiling Articulation Class (CAC): 35

.3 Light Reflectance: 0.80

.6 Basis of Design Materials: As indicated in the Finish Schedule on the Drawings.

.2 Metal Suspension System (CA1): Manufacturer's standard direct hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C635 requirements and as supplied by same materials supplier as acoustic panels for intermediate duty, exposed tee bar and as follows:

.1 Tee Bar Grid Face Width: 24mm (15/16").

.2 Module: Sized as appropriate to acoustic panel size.

.3 Hangers, Braces and Ties: Nominal 14 ga. diameter steel wire, galvanized.

.4 Exposed Finish: Manufacturer's standard satin, white finish.

.5 Corrosion Resistance: Hot-dip galvanized or stainless steel components.

.6 Metal Suspension System (for ACT-1):

.1 Tee Bar Grid Face Width: 24mm (15/16").

.2 Basis of Design Material: 15/16" Prelude XL by Armstrong World Industries, Inc.

.3 Tie Wire: Manufacturers standard 1.2mm (3/64") galvanized soft annealed steel wire.

.4 Accessories:

.1 Miscellaneous 'U' clips, splicers, screws, anchors, nails, wire, hold-down clips, and the like, for complete installation.

3 Execution

3.1 INSPECTION

.1 Examine the work upon which the work of this Section depends and report any defects to the Consultant. Do not commence installation until such time as all wet trades have been completed. Commencement of work implies acceptance of surface and conditions.

.2 Ensure that a uniform minimum temperature of 15 deg. C and humidity of 20 - 40% before, during and after installation is maintained.

3.2 INSTALLATION

.1 Cooperate with mechanical, electrical, drywall and other trades to accommodate fixtures, and the like. Examine mechanical and electrical drawings to establish hanger layout and ensure that ceiling hanger layout and furring are designed to span ducts, and the like, where required. Supply all hangers, including inserts for hangers and supplementary framing members as required for complete installation.

.2 Prior to installation of acoustic panels notify the Consultant for inspection and approval of suspension system.

.3 All installations shall be by skilled mechanics and in strict accordance with system manufacturer's printed directions to produce first-class, flush finished surface in true plane, free from drooping, warped, soil or damaged board or grid.

.4 Accurately space and level all runners and securely wire to main runner channels or hangers as applicable. Join cross tees to main runners by interlocking ends through preformed slots in web of main steel tees. Where joints occur in main tees, they shall be butted together flush and secured with interlocking tack. Tee-to-tee intersections and tee-to-edge mould connections shall be fitted tight, flush and parallel to ceiling plane without twists or gaps. Provide continuous runners each side of light fixtures and frame around all openings.

.5 Provide all additional supports, hangers and steel trapeze channel framing required to support fixtures located under mechanical ducts.

.6 Space hangers to support grid on 1220mm (48”) centres each way securely fastened to structure. Hangers shall not, under any circumstances, be secure to pipes, ducts or any electrical or mechanical items.

.7 Frame around recessed fixtures, grilles and openings with an allowance for movement.

.8 Grid systems shall be accurately spaced, square, true in line at correct elevations and level with water or laser beam to a tolerance of 3mm in 3048mm (1/8" in 10'). Grid shall be symmetrically laid so that border panels are not less than half size. Lay out panels square with walls. Obtain Consultant's approval of layout before proceeding.

.9 The suspension system shall support the ceiling assembly with a maximum deflection of 1/360 of the span.

.10 Install ceiling suspension system in accordance with ASTM C636 installation procedures.

.11 Anchors, where required, shall be self-drilling type, installed by means of an electrically powered drill specifically designed for this purpose. The anchor manufacturer shall evaluate the specific job conditions and advise in writing regarding anchor sizes necessary. The safe working load shall not exceed 25% of the manufacturer's stated average test loads for the anchor.

.12 Receive instruction from the anchor manufacturer regarding correct usage and comply with these requirements.

.13 "Ramset" or similar powder actuated fastening devices WILL NOT BE PERMITTED.

.14 Attach hangers to inserts and anchors where structural concrete occurs.

.15 Hangers shall be looped through the eye bolts of inserts and anchors and around steel joists, securely wire tie the loop of the hanger to the hanger in each case with two strands of tie wire for permanent securement.

.16 Do not attach hangers to or through steel deck. Attach hangers to steel joist. Where joist spacing is not suitable and where ducts and other equipment interfere, provide cross channels between joists and securely wire tie in position for support of hangers.

.17 Hangers shall be plumb and not pressed against ducts, pipes or conduits. Splayed hangers are not acceptable. Arrange hangers to cause as little interference as possible to ducts and piping.

.18 Form hangers tightly and sharply around main runner channels to prevent movement or rotation of the channel within the loop. Securely saddle tie channel to hanger and return loop leg of hanger to the hanger with two strands of tie wire in each case.

.19 Kinks or bends shall not be made in hangers as a means of levelling main runner channels.

.20 Assemble ceiling system in accordance with drawings. Install ceilings centered on room axis unless noted otherwise. Lay patterned ceiling panels in one direction with pattern parallel to the shortest room dimension.

.21 Cooperate with the mechanical contractor and cut ceiling panels as required to accommodate air handling diffuser throughout the work.

.22 Place panels on flanges of tees. Finish panels to all vertical surfaces with edge mouldings.

.23 Provide hold-down clips at acoustical system to hold units tight to grid system within 6096mm (20') of an exterior door and an operable window.

.24 Provide special cut furring members and access openings of required size to all locations where access to ceiling space is required.

.25 Install acoustic ceiling panel types as indicated on drawings and schedules.

3.3 CLEANING

.1 Thoroughly clean all acoustic ceiling surfaces upon completion of the installation.

.2 Promptly as the work proceeds and on completion, remove all surplus materials and debris resulting from the work of this Section.

END OF SECTION

1 General

1.1 SUMMARY

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

.1 Liquid-applied penetrating vapour control system for existing concrete slab-on-grade substrates to receive adhesive applied floor coverings where on-site moisture vapour transmission exceeds the limitations of the floor covering manufacturer's published recommendations.

.2 Hydraulic Cement-based Self-Leveling Underlayment.

.3 Provide a complete vapour control system including all accessory items necessary, even if not specifically noted.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

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

.1 ASTM F2170 - Relative Humidity in Concrete Floor Slabs Using in situ Probes

.2 ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

.3 ASTM C1583 - Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension

.4 ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials

.5 ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes

.6 ASTM D2369 – Standard Test Method for Volatile Content of Coatings

.7 ASTM D4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method

1.3 DEFINITIONS

.1 pH: Used in this Section to mean "alkalinity" as described in ASTM F 710.

1.4 PRE-INSTALLATION CONFERENCE

.1 Contractor shall hold pre-installation conference two (2) weeks prior to commencing work of this Section. Conference shall be attended by the Contractor, Owner, Consultant, concrete finishing subcontractor, epoxy subcontractor, and vapour-control flooring treatment installers and manufacturer's representative to discuss the following, but not limited to the following;

.1 Substrate conditions, non-structural cracks, structural cracks and preparation requirements;

.2 Floor surface irregularities and levelness tolerances, including all remedial requirements;

.3 Field test results of moisture levels of concrete prior to application;

.4 Installation of vapour-control flooring treatment;

.5 Inspections during the work.

.2 Contractor shall ensure that manufacturer's representatives issues written installation instructions at the pre-installation conference, to all parties attending the pre-installation conference and the Consultant, for all vapour-control flooring treatment required for the work of this Section.

.3 Contractor shall within seventy-two (72) hours of the pre-installation conference, prepare minutes of the conference, and issue minutes to all parties attending the pre-installation conference and the Consultant. Contractor shall clearly indicated required actions and by which party.

1.5 SUBMITTALS

.1 Action Submittals:

.1 Product Data: For each type of product indicated, including but not limited to the following:

.1 Data to indicate compliance with specified requirements.

.2 List of system use and performance history, for the same formulation and system design, listing reference sources for a minimum of ten (10) years.

.3 Manufacturer's recommended installation procedures, including the basis for accepting or rejecting actual installation procedures used on the Project.

.2 Informational Submittals:

.1 Manufacturer Certificates: Manufacturer's certificate that certifies acceptance and exposure to continuous topical water exposure after final cure.

.2 Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

.3 Material Test Reports: Independent test results indicating compliance with the performance requirements.

.4 Moisture Testing Reports: Field test results of moisture testing prior to application.

.5 Field Quality-Control Report: Manufacturer's field reports indicating full compliance by the installer of the specified system and that the system was in full compliance with all requirements of this Section.

1.6 QUALITY ASSURANCE

.1 Installer's Qualifications: Engage an experienced Installer, approved and certified in writing by the manufacturer as qualified to install treatment in accordance with manufacturer's warranty requirements.

.2 Manufacturer's Qualifications: Formulates synthetic type treatments for vapour emission and alkalinity control installations of similar size and complexity with the system proposed for use.

1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Follow packaging, shipping and product handling requirements recommended by the manufacturer.

.2 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location. Do not load any area beyond the design limits.

.3 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.4 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact, protected from exposure to harmful weather conditions and at temperature levels as recommended by manufacturer.

.5 Restrict traffic by other trades during installation.

.6 Provide adequate protection of completed Work of this Section, to prevent damage by other trades.

1.8 SITE CONDITIONS

.1 Environmental Limitations: Comply with vapour-control flooring treatment manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting vapour-control flooring treatment application.

.2 Do not install vapour-control flooring treatment until installation areas are enclosed and conditioned.

.1 Do not apply vapour-control flooring treatment to unprotected surfaces, or when water is accumulated on the surface of the concrete.

.2 Do not apply vapour-control flooring treatment when temperature is lower than, 10 deg C (50 deg F) or expected to fall below this temperature within twenty-four (24) hours from time of application.

.3 Allow continuous ventilation and indirect air movement at all times during application and curing process of treatment.

.3 Close spaces to traffic during vapour-control flooring treatment application and for not less than twenty-four (24) hours after application unless manufacturer recommends a longer period.

1.9 WARRANTY

.1 Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace materials that fail in material or workmanship specified in "Performance Requirements" Article within specified warranty period.

.1 In the event moisture vapour emission rates exceed specified requirement during warranty period and cause flooring system damage, manufacturer and installer shall provide complete repair and replacement of damage flooring at no cost to Owner.

.2 Repair shall include new flooring, adhesives, patching compounds, required accessories and labor charges to provide an acceptable, Owner-approved flooring system.

.3 Installer shall warrant that installed system is compatible with specified flooring, and specified floor coverings require no additional cementitious materials, special adhesives or reapplications of system components at additional charge to Owner. Finish flooring installation shall remain standard for all specified flooring.

.2 Warranty Period: Ten (10) years from date of Substantial Completion.

2 Products

2.1 MATERIALS

.1 General: Non-corrosive, non-toxic, non-flammable, non-combustible and not labeled as a marine pollutant in liquid or mixed form.

.2 Source Limitations: Obtain components and accessories of concrete moisture-vapour control system through one source from a single manufacturer.

2.2 MOISTURE VAPOUR BARRIER

.1 Fast-Track, One-Component Moisture Vapor Barrier for Concrete:

.1 Basis of Design Materials: ARDEX VB 100 by ARDEX Americas.

.2 Performance and Physical Properties: (When cured at 21° C+/-3°C (70° F+/-3°F) and 50% +/-5% relative humidity):

.1 Application: Manual.

.2 Permeability (ASTM E96): <0.1 perms.

.3 14 pH solution (ASTM D1308): No effect.

.4 VOC: 0 g/L.

.5 Walkable: Approximately 60 minutes.

.6 Install Underlayment: Minimum 1 hour after second coat, maximum 24 hour.

.7 Container: Ready-to-use, resealable.

2.3 HYDRAULIC CEMENT UNDERLAYMENT

.1 Hydraulic Cement-based Self-Leveling Underlayment:

.1 Basis of Design Materials: ARDEX V 1200 by ARDEX Americas.

.2 Primer: No primer required.

.3 Performance and Physical Properties: Meet or exceed the following values for material cured at 21° C+/-3°C (70° F+/-3°F) and 50% +/-5% relative humidity:

.1 Application: Barrel Mix or Pump.

.2 Flow Time: 10 minutes.

.3 Final Set: Approx. 90 minutes.

.4 Compressive Strength: 4500 psi (315 kg/cm2) at 28 days, ASTM C109M.

.5 Flexural Strength: 1000 psi (70 kg/cm2) at 28 days, ASTM C348.

.6 VOC: 0

.4 Water shall be clean, potable, and sufficiently cool (not warmer than 70°F).

2.4 CRACK AND JOINT REPAIR ACCESSOIRS

.1 Low Viscosity Rigid Polyurethane Crack and Joint Repair:

.1 Basis of Design Materials: ARDEX ARDIFIX by ARDEX Americas.

.2 Semi-Rigid Joint Sealant:

.1 Basis of Design Materials: ARDEX ARDISEAL Rapid Plus Semi-Rigid Joint Sealant by ARDEX Americas.

3 Execution

3.1 EXAMINATION

.1 Prior to preparation of the Work under this Section, examine installed Work executed under other Sections which affect execution of work under this Section.

.2 Moisture Testing Procedures: Perform the following tests to determine if vapour-control flooring treatment is required.

.1 Testing Conditions: Do not conduct moisture testing until final building environmental conditions have been achieved. Maintain temperature between 18.3 to 29.4 deg C (65 to 85 deg F) and relative humidity between 40 to 60 percent for not less than seventy-two (72) hours prior to and throughout duration of testing.

.2 Perform concrete testing to determine conditions at a minimum of three tests for the 1000 sq. ft. and one (1) additional test for each 1000 sq. ft. thereafter for each of the following methods:

.1 Water Vapour Transmission: Not to exceed 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in twenty-four (24) hours per ASTM F1869.

.2 Internal Relative Humidity: Not to exceed 75 percent RH per ASTM F2170.

.3 Digital Alkalinity-pH: Not to exceed 9.0 pH per ASTM F2170.

.4 Provide test results with map of test locations and recommendations to the Consultant prior to installation of finish flooring.

.3 Upon receipt of written approval from Consultant to proceed with Work specified in this Section, examine substrates, areas, and conditions, with installer present, for compliance with requirements and conditions affecting performance of the Work.

.1 Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements.

.2 Inspect for previously applied treatments that may inhibit penetration or performance of vapour control flooring treatment.

.3 Verify that required repairs are complete, cured, and dry before applying treatment.

.4 Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Coordinate work under this Section with Work specified under other Sections to ensure proper and adequate interface of Work.

.2 Protect adjacent surfaces from drips, spray, damage to walls and base, air pollution of surrounding environment, and other damage from work under this Section.

.3 Surface Preparation:

.1 Investigate and inform the treatment manufacturer if concrete additives such as chlorides, plasticizers, or other soluble compounds that can contaminate surfaces have been used in concrete mix.

.2 Before application of flooring treatment, clean substrate of substances that could impair penetration or performance of product according to flooring treatment manufacturer's written instructions.

.3 Shot-blast floors, using #420 shot, to remove defective materials and foreign matter such as dust, adhesives, leveling compounds, paint marks, dirt, floor hardeners, paint overspray, bond breakers, oil, grease, curing agents, form release agents, efflorescence, laitance, moisture testing adhesives and steel shot.

.4 Repair cracks, expansion joint, control joints, and open surface honeycombs and fill in accordance with manufacturer's recommendations.

.5 Provide an uncontaminated, absorptive, sound surface. Do not acid etch.

.6 Vacuum surfaces clean prior to application. Do not use clean sweeping agents, dust absorbers or chemical agents to clean concrete.

3.3 APPLICATION

.1 Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of flooring treatment and to instruct installer on the product and application method to be used.

.2 Apply in accordance with manufacturer's instructions and recommendations, unless specifically noted otherwise.

.1 Comply with regulatory requirements.

.2 Close areas to traffic during application and for time period after application recommended in writing by manufacturer.

.3 Apply treatment with manufacturer's representative present.

.4 Cure treatment according to manufacturer's written instructions. Prevent contamination during application and curing processes.

.5 Do not install floor coverings over treatment until after time period recommended in writing by vapour-control flooring treatment manufacturer.

3.4 APPLICATION – CRACK AND JOINT TREATMENT

.1 Pre-fill dormant control joints and dormant cracks greater than a hairline 0.8mm (1/32'') with low viscosity rigid polyurethane crack and joint repair.

.2 Once the dormant cracks and dormant control joints have been filled properly, broadcast sand to refusal, and allow these areas to cure thoroughly.

.3 Remove all excess sand prior to proceeding with applying the moisture vapour barrier.

.4 All moving joints and moving cracks must be treated by installing a fully flexible sealing compound designed specifically for use in moving joints, as recommended by the moisture vapour control manufacturer.

3.5 APPLICATION – MOISTURE VAPOR BARRIER

.1 Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

.2 Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.

.3 Mixing: Comply with manufacturer's printed instructions and the following:

.1 Stir the moisture vapor barrier with a wooden paint stirrer or similar prior to use to ensure that all components that have settled are in full suspension.

.4 Application: Comply with manufacturer's printed instructions and the following:

.1 Immediately apply the freshly stirred moisture vapor barrier to the prepared concrete.

.2 Saturate a 10mm (3/8”) nap roller and apply uniformly in a singular direction, and back roll. Once the first coat has dried, repeat this process in a perpendicular direction.

.3 Once an area has been coated completely, allow this to dry to a tack-free film approximately 45 minutes at 21°C (70°F) for the first coat and approximately 60 minutes at 21°C (70°F) for the second coat.

.4 Following the application of the moisture vapor barrier, install the hydraulic cement underlayment.

3.6 APPLICATION – HYDRAULIC CEMENT UNDERLAYMENT

.1 Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

.2 Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.

.3 Mixing: Comply with manufacturer's printed instructions.

.4 For pump installations, mix hydraulic cement underlayment using automatic mixing pumps as recommended by the manufacturer.

.5 When mixing sanded materials, use a vacuum complete with a HEPA dust extraction vacuum system. Additionally, each bag should be handled with care and emptied slowly to avoid creating a plume of dust.

.6 Application: Comply with manufacturer's printed instructions.

.7 Curing:

.1 The hydraulic cement underlayment requires no special curing and is walkable within 2-3 hours after installation.

.2 The dry time required prior to installing finish flooring will vary with the thickness of the hydraulic cement underlayment and the type of flooring being installed.

3.7 FIELD QUALITY CONTROL

.1 Testing and Inspection: Engage a qualified testing and inspection agency to perform the following:

.1 Schedule inspections and notify the Consultant, and other regulatory agencies, if any, of the time at least forty-eight (48) hours prior to the inspection.

.2 Validation Testing:

.1 After application of the treatment, test interior concrete floor surfaces scheduled to receive the vapour-control flooring treatment to establish system performance.

.2 Testing agency to provide validation calcium chloride testing of treated floor areas designated in accordance with ASTM F869 once the specified system has been installed.

.1 At a minimum, test interior slab-on-grade surfaces prior to finish flooring installation and after the spaces to receive finish flooring are brought to an environmental condition matching the designated conditions of use.

.2 Provide test kits at the rate of three kits per 1000 sq. ft. and one additional test kit for each additional 1000 sq. ft. or portion thereof; and for validation testing, provide one test kit placed beside every sixth test kit.

.3 Digital Alkalinity pH Testing: Testing agency shall conduct pH test at each calcium chloride test.

.4 Vapour emission test readings shall satisfy the manufacturer's published requirements of the finish flooring to be installed. Common acceptable criteria require that vapour emissions not exceed 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in twenty-four (24) hours, although various manufacturers' actual requirements may vary.

.5 Once test results are known, copies shall be given to Consultant, Contractor, and Owner.

.2 If the validation test vapour emission and pH readings exceed the requirements of the finish flooring manufacturer, provide remedial materials and labor, at no additional cost to the Owner, to bring vapour emissions and pH within acceptable limits.

3.8 CLEANING AND PROTECTION

.1 Immediately clean vapour-control flooring treatment from adjoining surfaces and surfaces soiled or damaged by flooring treatment application as work progresses. Correct damage to work of other trades caused by flooring treatment application, as approved by Consultant.

.2 Comply with manufacturer's written cleaning instructions.

.3 Provide finish, clean and ready for the application of finish flooring.

.4 Protect each coat during specified cure periods from traffic, topical water, and contaminants.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Labour, Products, equipment and services necessary to install wood flooring to match existing wood flooring, in accordance with the Contract Documents.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards

.1 Canadian General Standards Board (CGSB):

.1 CGSB 37-GP-9Ma, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.

.2 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.2 Canadian Lumber Association (CLA):

.1 CLA Grading Rules for Canadian Hardwood Strip Flooring.

.3 Canadian Standards Association (CSA):

.1 CSA A123.3, Asphalt or Tar Saturated Roofing Felt.

.2 CAN/CSA-O80 Series, Wood Preservation.

.3 CSA O151-M, Canadian Softwood Plywood.

1.3 SUBMITTALS

.1 Provide required information in accordance with Division 01.

.2 Product data:

.1 Submit duplicate copies of manufacturer's Product data indicating:

.1 Performance criteria, compliance with appropriate reference standards, characteristics, and limitations.

.2 Product transportation, storage, handling and installation requirements.

.3 Shop drawings: Submit shop drawings indicating Placement of pattern with respect to area of work. Show cuts at edges, entrances, alcoves, change of levels, and other obstructions.

.4 Samples: Submit two samples of oak hardwood flooring specified.

.5 Closeout submittals: Submit maintenance data and floor finish and care requirements for incorporation into Operations and Maintenance Manuals in accordance with Division 01.

1.4 QUALITY ASSURANCE

.1 Installer’s qualifications: Perform Work of this Section by a company that has a minimum of five years proven acceptable experience on installations of similar complexity, size, and nature.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Follow packaging, shipping and product handling requirements recommended by the manufacturer.

.2 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location. Do not load any area beyond the design limits.

.3 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.4 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact, protected from exposure to harmful weather conditions and at temperature levels as recommended by manufacturer.

.5 Restrict traffic by other trades during installation.

.6 Provide adequate protection of completed Work of this Section, to prevent damage by other trades.

1.6 SITE CONDITIONS

.1 Do not install Work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:

.1 Ambient air and surface temperature: 18 deg C to 21 deg C.

.2 Precipitation: None.

.3 Relative Humidity: Not to exceed 45%.

.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 72 hours before, during, and 48 hours after installation.

.3 Maintain minimum temperature of 10 deg C and specified relative humidity within area of installation until final acceptance of building.

1.7 MAINTENANCE

.1 Submit extra 10% of gross floor area covered, for each pattern and type specified. Include sufficient amount of adhesive and finishing materials and installation and application instructions. Submit Products from same production run as installed products. Store maintenance Products as directed by Consultant.

2 Products

2.1 HARDWOOD FLOORING

.1 Oak Strip Flooring (WD-1):

.1 To match existing hardwood flooring random sizes, and colour, tongue and groove edges and matched ends, as approved by the Consultant prior to ordering.

.2 Meeting the CLA Grading Rules for Canadian Hardwood Strip Flooring.

.3 Grade stamp each bundle of flooring.

2.2 ACCESSORIES

.1 Adhesive and Mastic: As recommended by hardwood flooring manufacturer.

.2 Membrane: Polyethylene film to CAN/CGSB-51.34, Type 2, 0.15 mm thick.

.3 Nails: purpose designed barbed nails for power nailing.

.4 Base: As indicated in Section 09 65 13.

3 Execution

3.1 EXAMINATION

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 PREPARATION

.1 Cover concrete slab on grade with polyethylene membrane, lap joints 100 mm and seal with mastic.

.2 Place sleepers on dampproof membrane. Shim and level sleepers, maximum surface tolerance 1:800. Install sleepers parallel to short dimension of room and space at 250 mm oc. Stagger sleeper butt joints 300 mm minimum.

.3 Maintain minimum 50 mm expansion space at walls and obstructions.

.4 Install sheathing at right angles to sleepers, stagger and offset joints and fasten at minimum 300 mm o.c., stagger and offset joints. Maintain minimum 6 mm expansion space at joints between plywood panels.

.5 Maintain minimum 6 mm expansion space at joints between sheathing panels.

3.3 ADHESIVE APPLICATION

.1 Apply adhesive over subfloor in accordance with manufacturer's instructions.

.2 Apply no more adhesive than can be covered with flooring before working time expires.

.3 Allow no streaks or lumps in adhesive during application.

.4 Remove adhesive that has set or that has formed surface film before flooring is embedded. Apply fresh coat of adhesive.

3.4 INSTALLATION

.1 Install flooring so fields and patterns are developed from centre axis of area covered.

.2 Locate centre axis so that no flooring unit is less than one-half size.

.3 Apply flooring units with uniform pressure but avoid working adhesive into joints.

.4 Install base continuously at floor perimeter. Secure to wall surface with screws and plugs. Ensure base does not contact floor surface and is not secured to it.

.5 As installation progresses, roll flooring with 45 kg minimum roller to ensure full adhesion. Remove excess adhesive from flooring units.

.6 Install thresholds at openings. Attach threshold to adjacent rigid floor surface. Threshold to act as ramp between floor surfaces over expansion space.

.7 Maintain 50 mm expansion space at perimeter of floor surface. Install spring steel spacers attaching retaining clips to wall at 600 mm oc.

.8 Power sand floor surface smooth and true. Vacuum clean and remove dust.

.9 Apply two coats of floor finish. Permit to dry thoroughly before permitting foot traffic.

3.5 PROTECTION

.1 Protect new floors from time of final set of adhesive until final inspection.

.2 Prohibit traffic on floor for 48 hours after installation. Protect Work of this Section from damage and debris until final inspection.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes, but is not limited to, the following:

.1 Resilient sheet materials:

.1 Homogeneous sheet vinyl flooring

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards

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

.1 ASTM F1066, Standard Specification for Vinyl Composition Floor Tile

.2 ASTM F1344, Standard Specification for Rubber Floor Tile

.3 ASTM F1516, Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended)

.4 ASTM F1859, Standard Specification for Rubber Sheet Floor Covering Without Backing

.5 ASTM F1869, Standard Test Method for Measuring Moisture Vapour Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

.6 ASTM F1913, Standard Specification for Vinyl Sheet Floor Covering Without Backing

.7 ASTM F2034, Standard Specification for Sheet Linoleum Floor Covering

.8 ASTM F2169, Standard Specification for Resilient Stair Treads

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-51.34-M, Vapour Barrier, Polyethylene Sheet for Use in Building Construction

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Close spaces to traffic during flooring installation and until time period after installation recommended in writing by manufacturer; install flooring and accessories after other finishing operations, including painting and ceiling construction have been completed.

.2 Pre-Installation Conference: Conduct conference at Project site in accordance with requirements of Division 01, to verify project requirements, substrate conditions, patterns and layouts, coordination with other Sections affected by work of this Section, manufacturer’s installation instructions and manufacturer’s warranty requirements.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals:

.1 Product Data: Submit one copy of product data for each type of product specified.

.2 Shop Drawings: Submit shop drawings indicating:

.1 Location of seams and edges.

.2 Location of columns, doorways, enclosing partitions, built-in furniture, cabinets, and cut-out locations.

.3 Samples for Selection: Submit manufacturer's colour charts and samples for initial selection consisting of full range of colours and patterns available for each type of product indicated.

.4 Samples for Verification:

.1 Resilient Flooring: Submit samples of each different specified product for verification of colour and pattern in manufacturer's standard size, but not less than 150mm x 150mm (6” x 6”) in size for tile or sheet material.

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

.1 Site Quality Control Test Results: Submit results or moisture emission testing of concrete subfloors prior to installation of flooring. Results shall include comparison of manufacturer’s recommended moisture content to actual moisture vapour emission rate.

.4 Maintenance Data and Operating Instructions:

.1 Operation and Maintenance Data: Submit manufacturer’s written instructions for maintenance and cleaning procedures, include list of manufacturers recommended cleaning and maintenance products, and name of original installer and contact information in accordance with Division 01.

.5 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for incorporation into the Operation and Maintenance Manual. Keep one copy of WHMIS safety data sheets on site for reference by workers.

.6 Maintenance Materials:

.1 Provide five percent (5%) of each colour and type of resilient flooring specified, boxed and labelled.

.2 Store maintenance materials on the premises as directed by the Owner.

1.5 QUALITY ASSURANCE

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

.2 Resilient Flooring Installer: Use an installer who is competent in heat welding and have a minimum of five (5) years documented experience in the installation of resilient flooring and seams in accordance with manufacturer’s training or certification program:

1.6 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with Construction Schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Restrict traffic by other trades during installation.

.5 Provide adequate protection of completed tiled surfaces to prevent damage by other trades until final completion of this project. Minimum protection shall consist of kraftpaper.

1.7 ENVIRONMENTAL CONDITIONS

.1 Temperature of room, floor surface and materials shall not be less than 21 deg C for forty-eight (48) hours before, during and for forty-eight (48) hours after installation. Concrete floors shall be aged for a minimum of twenty-eight (28) days and shall be dry before application of the resilient flooring.

.2 Moisture content of floor shall not exceed a maximum of 3 lbs. of water per 1,000 sq. ft. of concrete slab area over a twenty-four (24) hour period as measured by one (1) of the following methods, as approved by Consultant:

.1 Rubber Manufacturer's Association (RMA) moisture test using anhydrous calcium chloride.

.2 Does not exceed 3% as measured by Calcium Carbide Hygrometer procedure.

.3 Does not exceed 5% as measured by normal Protimeter.

.3 Avoid exposure to high humidity, cold drafts and abrupt temperature changes.

1.8 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions but for an extended period of five (5) years and agree to repair or replace faulty materials or work which become evident during warranty period without cost to the Owner.

.2 Defects shall include, but not limited to, bond failure, and extensive colour fading.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design Manufacturers: Manufacturers named in this Section were approved to provide work specified in this Section. Additional manufacturers offering similar products may be incorporated into the work of this Section provided they meet the performance requirements indicated and provided requests for substitution are provided a minimum of five (5) days in advance of Bid Closing.

.2 Approved manufacturers:

.1 Terket/Johnsonite

.2 Armstrong Flooring

.3 Interface Flor

.4 Altro Floor

.5 Fuzion Flooring

2.2 SHEET FLOORING MATERIALS

.1 Unbacked Sheet Vinyl Flooring (VSF-1): Conforming to ASTM F1913 and the following:

.1 Classification: Commercial.

.2 Size: 25m x 2m x 2mm thick.

.3 Colour, Model and Manufacturer: As indicated in the Finish schedule on the Drawings.

2.3 RESILIENT ACCESSORIES

.1 Levelling, Patching and Moisture Vapour Control Compounds: As indicated in Section 09 61 43.

.2 Fillers and Primers:

.1 Types and brands approved, acceptable to flooring material and resilient base manufacturers for the applicable conditions.

.2 Use non-shrinking latex compound.

.3 Resilient Floor Tile Adhesive:

.1 Standard Tile: Waterproof, clear setting type and brands as recommended by the tile manufacturer.

3 Execution

3.1 EXAMINATION

.1 Testing and Inspections: Test moisture emission rate of concrete subfloor prior to installing flooring, using the calcium chloride test method in accordance with ASTM F1869.

.2 Examine substrates, areas, and conditions affecting work are in accordance with manufacturer's requirements, and as follows:

.1 Verify that floor surfaces are smooth and flat to plus or minus 3mm over 3m (1/8” over 10’); notify Consultant in writing where floor tolerances are not within acceptable values.

.2 Verify that concrete slabs exhibit normal alkalinity of between 5 and 9 and that they are free of carbonization or dusting deleterious to flooring installation or adhesive bond.

.3 Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits that could interfere with flooring installation.

3.2 PREPARATION

.1 Comply with resilient flooring manufacturer's written installation instructions for preparing substrates indicated to receive flooring.

.2 Fill cracks, holes, and depressions in substrates using trowellable levelling and patching compounds in accordance with manufacturers written instructions, and as indicated in Section 09 61 43.

.3 Remove coatings from concrete substrates, including curing compounds and other substances that are incompatible with flooring adhesives, and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer; do not use solvents.

.4 Broom and vacuum clean substrates immediately before installing resilient flooring.

3.3 INSTALLATION

.1 Comply with resilient flooring manufacturer's written installation instructions.

.2 Unroll flooring and allow stabilizing before cutting and fitting in accordance with manufacturer’s installation instructions.

.3 Apply primer in strict accordance with manufacturer's printed instructions. Permit primer to dry.

.4 Apply adhesive uniformly with an approved notchtooth spreader at the recommended rate. (Mechanical spreader not approved). Do not spread more adhesive than can be covered before initial set takes place. Use waterproof adhesive throughout. Follow manufacturer's instructions.

.5 Layout sheet flooring as follows:

.1 Maintain uniformity of resilient flooring direction.

.2 Do not bridge building expansion joints with sheet flooring.

.3 Arrange for a minimum number of seams, where seams are necessary place them in inconspicuous and low traffic areas, and not less than 150mm (6") away from parallel joints in flooring substrates.

.4 Match edges of flooring for colour shading and pattern at seams in accordance with manufacturer's written recommendations.

.5 Obtain Consultant’s acceptance in writing before installing materials having cross seams; make adjustments to seaming plan as directed by Consultant to minimize or eliminate cross seams.

.6 Install flooring flush with adjoining floor covering surfaces.

.7 Scribe sheet flooring to walls, columns, cabinets, floor outlets and other appurtenances.

.8 Roll sheet flooring in both directions in accordance with manufacturer’s instructions.

.6 Accurately scribe flooring around walls, and other floor conditions.

.7 Each type of material used shall be from one manufacturer throughout the work and material in each area shall be of same production run.

.8 Remove and replace loose, damaged and defective tiles where required and as directed by Consultant.

3.4 CLEANING AND PROTECTION

.1 Cleaning, sealing and finishing of resilient flooring in accordance with the manufacturer's instructions and recommendations.

.2 Work shall be handed over to the Owner free of blemishes and in perfect condition.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes, but is not limited to, the following:

.1 Resilient accessories:

.1 Resilient Wall Bases

.2 Resilient Accessories for Transition Strips, area dividers

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards

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

.1 ASTM F1861, Standard Specification for Resilient Wall Base

.2 ASTM F1869, Standard Test Method for Measuring Moisture Vapour Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

.3 ASTM F2169, Standard Specification for Resilient Stair Treads

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Close spaces to traffic during installation and until time period after installation recommended in writing by manufacturer; install accessories after other finishing operations, including painting and ceiling construction have been completed.

.2 Pre-Installation Conference: Conduct conference at Project site in accordance with requirements of Division 01, to verify project requirements, substrate conditions, patterns and layouts, coordination with other Sections affected by work of this Section, manufacturer’s installation instructions and manufacturer’s warranty requirements.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals:

.1 Product Data: Submit one copy of product data for each type of product specified.

.2 Shop Drawings: Submit shop drawings indicating:

.1 Location of seams and edges.

.2 Location of columns, doorways, enclosing partitions, built-in furniture, cabinets, and cut-out locations.

.3 Type and style of resilient transition strip used between adjacent flooring types.

.3 Samples for Selection: Submit manufacturer's colour charts and samples for initial selection consisting of full range of colours and patterns available for each type of product indicated.

.4 Samples for Verification:

.1 Submit samples of each different specified product for verification of colour and pattern in manufacturer's standard size, but not less than 150mm (6”) long for resilient accessories.

.3 Maintenance Data and Operating Instructions:

.1 Operation and Maintenance Data: Submit manufacturer’s written instructions for maintenance and cleaning procedures, include list of manufacturers recommended cleaning and maintenance products, and name of original installer and contact information in accordance with Division 01.

.4 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for incorporation into the Operation and Maintenance Manual. Keep one copy of WHMIS safety data sheets on site for reference by workers.

.5 Maintenance Materials:

.1 Provide 9144mm (30') lineal feet coil stock of each colour of resilient base specified, boxed and labelled.

.2 Store maintenance materials on the premises as directed by the Owner.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with Construction Schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Restrict traffic by other trades during installation.

1.7 ENVIRONMENTAL CONDITIONS

.1 Temperature of room, floor surface and materials shall not be less than 21 deg C for forty-eight (48) hours before, during and for forty-eight (48) hours after installation. Concrete floors shall be aged for a minimum of twenty-eight (28) days and shall be dry before application of the resilient accessories.

.2 Avoid exposure to high humidity, cold drafts and abrupt temperature changes.

1.8 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions but for an extended period of five (5) years and agree to repair or replace faulty materials or work which become evident during warranty period without cost to the Owner.

.2 Defects shall include, but not limited to, bond failure, and extensive colour fading.

2 Products

2.1 RESILIENT ACCESSORIES

.1 Resilient Wall Base (BASE-1): Smooth, buffed exposed face and ribbed or grooved bonding surface supplied in maximum practical length, with pre-moulded end stops and external corners to match base, conforming to ASTM F1861 and as follows:

.1 Type: TV – Thermoplastic Vinyl

.2 Group: 1 – Homogeneous/Solid

.3 Style: Coved with toe.

.4 Height: 100mm (4”)

.5 Thickness: 3mm (1/8”)

.6 Length: Manufacturers standard maximum length.

.7 Colour: To match TA4, Gateway.

.8 Basis of Design Material: Traditional Vinyl Wall Base by Tarkett.

.2 Resilient Transition and Edge Strips (TS):

.1 Extruded vinyl shapes meeting or exceeding ADA Recommendations for change of level transitions for transition between floors finishes having different levels.

.2 Transition Strip (TS1): Ceramic Tile to Resilient Flooring Transition.

.1 Basis of Design Material: Transition Strip Model CTA-XX-K by Johnsonite.

.2 Colour: As selected by the Consultant from the Manufacturer’s standard product line.

.3 Transition Strip (TS2): Resilient Flooring to Concrete Slab Transition.

.1 Basis of Design Material: Transition Strip Model SSR-XX-B by Johnsonite.

.2 Colour: As selected by the Consultant from the Manufacturer’s standard product line.

.4 Transition Strip (TS3): Carpet Tile to Concrete Slab Transition.

.1 Basis of Design Material: Transition Strip Model CTA-XX-J by Johnsonite.

.2 Colour: As selected by the Consultant from the Manufacturer’s standard product line.

.3 Fillers and Primers:

.1 Types and brands approved, acceptable to flooring material and resilient base manufacturers for the applicable conditions. Use non-shrinking latex compound.

3 Execution

3.1 EXAMINATION

.1 Examine substrates, areas, and conditions affecting work are in accordance with manufacturer's requirements, and as follows:

.1 Verify that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that could interfere with base and accessories installation.

3.2 PREPARATION

.1 Comply with manufacturer's written installation instructions for preparing substrates indicated to receive wall base.

.2 Broom and vacuum clean substrates immediately before installing materials indicated in this Section.

3.3 INSTALLATION

.1 Comply with manufacturer's written installation instructions.

.2 Layout resilient base as follows:

.1 Fit joints tight and vertical.

.2 Joints along one plane shall be at minimum 6096mm (20') spacing, at inconspicuous locations.

.3 Mitre internal corners, use pre-moulded sections for external corners and exposed ends.

.4 Install base on solid backing. Adhere tightly to wall and floor surfaces.

.5 Scribe and fit to door frames and other obstructions.

.6 Install outside corners prior to installation of straight sections.

.7 Install straight and level to variation of plus or minus 3mm over 3m (1/8" over 10') straight edge.

.8 Do not stretch base during installation.

.9 Shave back of base where necessary to produce snug fit to substrate.

.3 Layout resilient accessories as follows:

.1 Install edge strips at unprotected and exposed edges where flooring terminates.

.4 Each type of material used shall be from one manufacturer throughout the work and material in each area shall be of same production run.

.5 Remove and replace loose, damaged and defective materials where required and as directed by Consultant.

3.4 CLEANING AND PROTECTION

.1 Cleaning and finishing of resilient base shall be performed in accordance with the manufacturer's instructions and recommendations.

.2 Work shall be handed over to the Owner free of blemishes.

END OF SECTION

1 General

1.1 SUMMARY

.1 Provide labour, materials, tools and other equipment, services and supervision required to complete interior painting work.

.2 Surface preparation for this section will be limited to priming and back-priming, and specific pre-treatments noted in this section or as specified in the Master Painters Institute (MPI) Painting Specification Manual.

1.2 RELATED REQUIREMENTS

.1 Other sections of the specification requiring painting refer to this section. Coordinate requirements of referencing sections.

1.3 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

.1 Environmental Choice Paints and Surface Coatings, Low VOC Product Listings Program (ECP):

.1 Paints and Surface Coatings, Low VOC Product Listings

.2 The Master Painters Institute (MPI):

.1 New Surfaces: Architectural Painting Specification Manual.

.3 The Society for Protective Coatings (SSPC):

.1 Coating Materials Guidelines

.2 Surface Preparation Guidelines

.3 Application, Inspection and Quality Control Guidelines

1.4 DEFINITIONS

.1 Gloss Levels: Standard coating terms defined by MPI Manual apply to products of this Section as follows:

.1 G1: Matte of Flat: Lustreless or matte finish with a gloss range below 10 when measured at 85° to meter and 0 to 5 when measured at 60°.

.2 G2: Velvet: Matte to low sheen finish with a gloss range of 10 to 35 when measured at 85° to meter and 0 to 10 when measured at 60°.

.3 G3: Eggshell: Low sheen finish with a gloss range of 10 to 35 when measured at 85° to meter and 10 to 25 when measured at 60°.

.4 G4: Satin: Low to medium sheen with a gloss range of minimum 35 when measured at 85° to meter and 20 to 35 when measured at 60°.

.5 G5: Semi-Gloss: Medium sheen finish with a gloss range of 35 to 70 when measured at 60° to meter.

.6 G6: Gloss: High sheen finish with a gloss range of 70 to 85 when measured at 60° to meter.

.7 G7: High Gloss: Reflective sheen having a gloss range in excess of 85 when measured at 60° to meter.

.2 Gloss Values: Generally, provide paints and coatings having the following sheens when installed on the following substrates:

.1 Walls: Eggshell (G3).

.2 Trim and Doors: Satin (G4).

.3 Ceilings: Flat (G1).

1.5 SUBMITTALS

.1 Provide required information in accordance with Division 01.

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

.1 Product Data: Submit list of all painting materials used for the Work to the Consultant for review prior to ordering materials for each paint system indicated, including block fillers and primers.

.1 Material List: An inclusive list of required coating materials indicating each material and cross reference specific coating, finish system, and application; identify each material by manufacturer's catalogue number and general classification.

.2 Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

.2 Samples: Provide stepped samples, defining each separate coat, including block fillers and primers using representative colours required for the project; label each sample for location and application, and as follows:

.1 Drawdown Samples: Provide three (3) drawdown sample charts (cards) for each type, texture and colour of finish specified for verification purposes before ordering paint materials.

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

.1 Certification: Submit certification reports for paint products indicating that they meet or exceed low VOC and coloured base requirements listed in this Section.

1.6 PROJECT CLOSEOUT SUBMISSIONS

.1 Operation and Maintenance Data: Submit copies of paint manufacturer’s written maintenance information for inclusion in the operations manual in accordance with Division 01, including specific warning of any maintenance practice or materials that may damage or disfigure the finished Work.

.2 Maintenance Materials: Deliver maintenance materials to Owner in quantities indicated and in accordance with Division 01, that match products installed; packaged with protective covering for storage, and identified with labels describing contents and building location and as follows:

.1 Paints and Coatings: Minimum of 4-4L containers of field colours and 4-1 L containers of each accent colour, and all remnants.

1.7 QUALITY ASSURANCE

.1 Conform to the standards contained in the MPI Manual.

.2 Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in service performance, and as follows:

.1 Have a minimum of five (5) years proven satisfactory experience and shall show proof before commencement of work that he will maintain a qualified crew of painters throughout the duration of the work.

.2 When requested provide a list of the last three comparable jobs including, name and location, specifying authority, start and completion dates and cost amount of the painting work.

.3 Apprentices may be employed provided they work under the direct supervision of a qualified journeyman in accordance with trade regulations.

.3 Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats and as follows:

.1 Use only paint manufacturers and products as listed under the Approved Products section of the MPI Manual Architectural Painting Specification Manual.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Conform to MPI Manual and manufacturers requirements.

.2 Perform no painting or decorating work when the ambient air and substrate temperatures, relative humidity and dew point and substrate moisture content is below or above requirements for both interior and exterior work.

.3 Apply paint only to dry, clean, properly cured and adequately prepared surfaces in areas where dust is no longer generated by construction activities such that airborne particles will not affect the quality of finished surfaces.

.4 Ensure adequate continuous ventilation and sufficient heating and lighting is in place.

.5 Paint, stain and wood preservative finishes and related materials (thinners, solvents, caulking, empty paint cans, cleaning rags, etc.) shall be regarded as hazardous products. Recycle and dispose of same subject to regulations of applicable authorities having jurisdiction.

.6 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground retain cleaning water and filter out and properly dispose of sediments.

.7 Set aside and protect surplus and uncontaminated finish materials not required by the Owner and deliver or arrange collection for verifiable re-use or re-manufacturing.

1.9 WARRANTY

.1 Provide upon completion of the work, a Warranty Certificate, in the name of the Owner, stating that the work of this section was performed in accordance with these specifications and the MPI manual (latest edition), and is warranted against defects in material or installation, for a period of two (2) years from Date of Substantial Performance.

2 Products

2.1 MANUFACTURERS

.1 Subject to compliance with requirements, manufacturers that have attained the prerequisites for ecologically sustainable labelling mark on their products and may be incorporated into the Work include; but are not limited to, the following:

.1 Dulux Paints

.2 Benjamin Moore and Co. Limited

.3 Sherwin-Williams LLC

.4 ICI Paints (Canada) Inc.

2.2 MATERIALS

.1 Primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, and other painting materials shall be in accordance with the MPI Manual “Approved Product” listing and shall be from a single manufacturer for each system used.

.2 Materials such as linseed oil, shellac, and other accessory materials shall be the highest quality product of an approved manufacturer listed in the MPI Manual and shall be compatible with other coating materials.

.3 All materials and paints shall be lead and mercury free and shall have low VOC content where possible.

.4 Paint Schedule:

.1 (PT-1) General Wall Colour: Manufacturer as indicated in the Finish Schedule on the Drawings.

.2 (PT-2) General Ceiling Paint: Manufacturer as indicated in the Finish Schedule on the Drawings.

.3 (PT-3): Doors and Trim: Manufacturer as indicated in the Finish Schedule on the Drawings.

.4 (STAIN-1): To match existing wood floors throughout the building, as approved by the Consultant.

.5 (STAIN-2): Doors – To match existing wood doors throughout the building, as approved by the Consultant.

3 Execution

3.1 PREPARATION OF SURFACES:

.1 Prepare surfaces in accordance with MPI Manual requirements. Refer to the Manual for specific surface preparation requirements for each substrate material.

3.2 APPLICATION

.1 Paint when substrates and environmental conditions (heating, ventilation, lighting and completion of other work) are acceptable for applications of products specified in this Section.

.2 Paint and stain surfaces scheduled to receive paint or stain finish to Premium MPI Manual finish requirements with application methods in accordance with best trade practices for type and application of materials used.

.3 Continue paint finishes through behind wall mounted items.

.4 Painting coats specified are intended to cover surfaces satisfactorily when applied at proper consistency and in accordance with manufacturer's recommendations.

.5 Apply a minimum of four coats of paint where deep or bright colours are used to achieve satisfactory results.

3.3 MECHANICAL AND ELECTRICAL EQUIPMENT

.1 Paint "unfinished" conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and texture to match adjacent surfaces, in the following areas:

.1 In exposed-to-view exterior and interior areas.

.2 In interior high humidity interior areas.

.3 In boiler room, mechanical and electrical rooms.

.2 Leave conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks in unfinished areas.

.3 Paint inside of ductwork where visible behind louvers, grilles and diffusers beyond sight line with primer and one coat of matt black (non-reflecting) paint.

.4 Paint the inside of light valances gloss white.

.5 Refer to Mechanical and Electrical specifications for painting, banding, stencilling of other surfaces/equipment, and generally as follows:

.1 Paint gas piping gas standard yellow where visible in service spaces.

.2 Paint both sides and all edges of plywood backboards for equipment before installation.

.3 Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.4 Do not paint over nameplates.

3.4 SITE QUALITY CONTROL

.1 Painted surfaces will be considered to lack uniformity and soundness if any of the following defects are apparent at time of field review when viewed from a distance of 4' from the painted surface:

.1 Runs, sags, hiding or shadowing by inefficient application methods

.2 Evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles

.2 Painted surfaces will be considered as deficient if any of the following defects are apparent at time of field review, regardless of viewing distance.

.1 Damage due to touching before paint is sufficiently dry or any other contributory cause.

.2 Damage due to application on moist surfaces or caused by inadequate protection from the weather.

.3 Damage or contamination of paint due to windblown contaminants (dust, sand blast materials, salt spray, etcetera)

.3 Painted surfaces found as unacceptable shall be replaced or repaired at no cost to the Owner or Consultant:

.1 Small affected areas may be touched up

.2 Large affected areas or areas without sufficient dry film thickness of paint shall be repainted.

.3 Runs, sags or damaged paint shall be removed by scraper or by sanding before application of new paint coats.

3.5 PROTECTION

.1 Protect newly painted exterior surfaces from rain and snow, condensation, contamination, dust, salt spray and freezing temperatures until paint coatings are completely dry.

.2 Curing periods shall exceed the manufacturers recommended minimum time requirements.

.3 Erect barriers or screens and post signs to warn of or limit or direct traffic away or around work area as required.

3.6 CLEANUP

.1 Remove all paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

.2 Keep work area free from an unnecessary accumulation of tools, equipment, surplus materials and debris.

.3 Remove combustible rubbish materials and empty paint cans each day and safely dispose of it in accordance with requirements of authorities having jurisdiction.

.4 Clean equipment and dispose of wash water or solvents, and other cleaning and protective materials (rags, drop cloths, masking papers, etcetera), paints, thinners, paint removers and strippers in accordance with the safety requirements of authorities having jurisdiction.

END OF SECTION

1 General

1.1 SUMMARY

.1 Provision of all labour, materials, equipment and incidental services necessary to provide markerboards and accessories.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

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

.1 ASTM A653/653M; Specification for Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM B221; Specification for Aluminum-Alloy Extruded Bars, Rods Wire, Profiles and Tubes.

.3 ASTM D1037; Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.

.2 Underwriters Laboratories Canada (ULC):

.1 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics

.3 Porcelain Enamel Institute (PEI):

.1 PEI 501, Appearance Properties of Porcelain Enamel.

.2 PEI 502, Mechanical and Physical Properties of Porcelain Enamel

1.3 SUBMITTALS

.1 Provide required information in accordance with Division 01.

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

.1 Shop Drawings: Submit shop drawings for each type of markerboard required including, but not limited to, the following:

.1 Include dimensioned elevations.

.2 Show location of joints between individual panels where unit dimensions exceed maximum panel length.

.3 Include sections of typical trim members.

.4 Show anchors, grounds, reinforcement, accessories, layout, and installation details.

.2 Product Data: Submit product data for each type of markerboard indicated.

.3 Samples for Initial Selection: Provide Manufacturer's colour charts showing the full range of colours and textures for initial selection of materials for the following:

.1 Marker Boards: Actual sections of porcelain enamel finish for each type of markerboard required.

.4 Samples for Verification: Provide samples for verification for the following products, showing colour and texture or finish selected; include sample sets showing the full range of variations expected where finishes involve normal colour and texture variations; prepare Samples from the same material to be used for the Work:

.1 Markerboards: Sample panels not less than 305mm x 305mm, mounted on the substrate indicated for the final Work. Include a panel for each type, colour and texture required.

.2 Aluminum Trim and Accessories: Samples of each finish type and colour, on 150mm long sections of extrusions and not less than 100mm squares of sheet or plate. Include Sample sets showing the full range of colour variations expected.

1.4 PROJECT CLOSEOUT SUBMISSIONS

.1 Provide operations and maintenance information in accordance with Division 01.

.2 Submit data for cleaning of finishes.

1.5 QUALITY ASSURANCE

.1 Qualifications: Provide proof of qualifications when requested by the Consultant:

.1 Source Limitations: Obtain markerboards through one source from a single manufacturer.

.2 Manufacturers or fabricators providing Products under this Section shall have sufficient plant, equipment and competent personnel to provide the Products, in accordance with the Contract Documents. Firm(s) shall have past experience in the manufacture or fabrication of the Products specified herein and shall have successfully completed Projects of similar scope and type.

.3 Engage an experienced installer who is an authorized representative of markerboard manufacturer for both installation and maintenance of the type of products required for this Project.

1.6 SITE CONDITIONS

.1 Verify field measurements before preparation of shop drawings and before fabrication to ensure proper fitting and as follows:

.1 Coordinate fabrication schedule with construction progress to avoid delaying the Work:

.2 Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

.2 Establish dimensions and proceed with fabricating markerboards without field measurements where field measurements cannot be made without delaying the work, coordinate wall construction to ensure actual dimensions correspond to established dimensions.

1.7 WARRANTY

.1 Provide manufacturers written guarantee, signed and issued in the name of Owner, to replace the following items for defective material and workmanship for the time stated from date of Substantial Performance:

.1 Framing, Panels and hardware: Failure of performance requirements specified in Contract Documents; one (1) year.

2 Products

2.1 MANUFACTURERS

.1 Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

.1 Architectural School Products Ltd.

.2 CPE Design Solutions Inc.

.3 Global School Products Inc.

.4 Martack Specialties Ltd.

2.2 MATERIALS

.1 Galvanized Steel Sheet: Commercial grade to ASTM A653/A653M with Z275 zinc coating.

.2 Porcelain Enamel Steel: Meeting PEI 501 and PEI 502 standards.

.3 Fibreboard: to ASTM D1037, Class A fire rating to CAN/ULC S102.

.4 Laminating Adhesive: To manufacturer's standard.

.5 Extruded Aluminum: Aluminum Association alloy 6063-T5. Minimum 1.5mm thickness.

.6 Joint Reinforcement: Concealed mechanical jointing system to provide straight, rigid, continuously supported, tight butt, flush joints at surface.

.7 Anchor Clips, Brackets and Fasteners: Concealed type as recommended by manufacturer for fixed mounting.

2.3 MARKERBOARDS

.1 Porcelain Markerboards (WB-1):

.1 Face Sheet: Magnetic, minimum 0.62 mm enamelling grade steel specifically processed for temperatures used in coating porcelain on steel to manufacturers standard process, and as follows:

.1 Coat exposed face and edges with a 3-coat process consisting of primer, ground coat, and colour cover coat.

.2 Coat concealed face with a 2-coat process consisting of primer and ground coat.

.2 Cover Coats: Provide manufacturer's standard, light coloured, special writing surface with gloss finish intended for use with erasable dry markers.

.3 Core: 11 mm thick, fiberboard core material complying with requirements of ASTM D1037.

.4 Backing Sheet: 0.5 mm thick, galvanized steel sheet backing.

.5 Laminating Adhesive: Manufacturer's standard, moisture resistant, thermoplastic type adhesive, low VOC.

.6 Basis of Design Materials: Vit-Rite by Architectural School Products Ltd.

2.4 ACCESSORIES

.1 Perimeter Trim and Framing:

.1 Material: Extruded aluminum: Aluminum Association alloy AA6063-T5.

.2 Basis of Design Materials:

.1 Perimeter Trim: ASP Series, Model #205 by Architectural School Products Ltd.

.2 Maprail with Cork Insert: ASP Series, Model #206 by Architectural School Products Ltd.

.3 Bottom Rails/Marker Trays:

.1 Counter-Mounted (on top of shelving and other millwork): Flat bottom rail/marker tray.

.2 Finish: Anodized, Class II to AA-M12C22A31, #17 Clear.

.3 Markers & Marker Brush: Provide one set dry-wipe markers and one marker brush for each markerboard.

2.5 FABRICATION

.1 Shop fabricated markerboards in one piece for lengths 3600 mm or less, for longer sections colour match adjacent pieces.

.2 Laminate markerboard and backing sheet to the core in accordance with the markerboard manufacturer's recommendations.

.3 Apply perimeter trim in continuous horizontal and vertical lengths, cut and mitred at corners, complete with the following accessories:

.1 Provide continuous chalk trays below all marker boards.

.2 Provide continuous maprails above all marker boards, complete with cork insert.

.3 Use adhesive to secure centre portions of panels.

3 Execution

3.1 EXAMINATION

.1 Inspect Work and conditions affecting the Work of this Section. Proceed only after deficiencies, if any, have been corrected.

.2 Ensure that all anchors and setting or installing components provided by this Section for installation are properly located and installed.

3.2 PREPARATION

.1 Obtain all dimensions from the job site.

.2 Provide dimensions and components, anchors and assemblies to be installed (where required) in proper time for installation.

3.3 INSTALLATION

.1 Erect Work in strict accordance with manufacturer's written instructions.

.2 Conceal all anchors and fitments. Exposed heads of fasteners not permitted. All joints in exposed work to be flush hairline butt joints.

.3 Refer to details on drawings for sizes and locations, confirmed on site before installation.

.4 Mount on site maprails and tackable strips, and accessories as indicated.

3.4 CLEANING

.1 At completion and continuously as Work proceeds, remove all surplus materials, debris and scrap.

.2 At completion of Work, remove all protective surface covering film and wrappings.

.3 Clean all frames and hard surfaces using mild soap or other cleaning agent approved by manufacturer.

END OF SECTION

1 General

1.1 SUMMARY

.1 Provision of all labour, materials, equipment and incidental services necessary to provide tackboards and accessories.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

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

.1 ASTM A653/653M; Specification for Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM B221; Specification for Aluminum-Alloy Extruded Bars, Rods Wire, Profiles and Tubes.

.3 ASTM D1037; Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.

.2 Underwriters Laboratories Canada (ULC):

.1 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics

1.3 SUBMITTALS

.1 Provide required information in accordance with Division 01.

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

.1 Shop Drawings: Submit shop drawings for each type of tackboard required including, but not limited to, the following:

.1 Include dimensioned elevations.

.2 Show location of joints between individual panels where unit dimensions exceed maximum panel length.

.3 Include sections of typical trim members.

.4 Show anchors, grounds, reinforcement, accessories, layout, and installation details.

.2 Product Data: Submit product data for each type of tackboard indicated.

.3 Samples for Initial Selection: Provide Manufacturer's colour charts showing the full range of colours and textures for initial selection of materials for the following:

.1 Tackboards: Actual sections of tackable finish for each type of tackboard required.

.4 Samples for Verification: Provide samples for verification for the following products, showing colour and texture or finish selected; include sample sets showing the full range of variations expected where finishes involve normal

colour and texture variations; prepare Samples from the same material to be used for the Work:

.1 Tackboards: Sample panels not less than 305mm x 305mm, mounted on the substrate indicated for the final Work. Include a panel for each type, colour and texture required.

.2 Aluminum Trim and Accessories: Samples of each finish type and colour, on 150mm long sections of extrusions and not less than 100mm squares of sheet or plate. Include Sample sets showing the full range of colour variations expected.

1.4 PROJECT CLOSEOUT SUBMISSIONS

.1 Provide operations and maintenance information in accordance with Division 01.

.2 Submit data for cleaning of finishes.

1.5 QUALITY ASSURANCE

.1 Qualifications: Provide proof of qualifications when requested by the Consultant:

.1 Source Limitations: Obtain tackboards through one source from a single manufacturer.

.2 Manufacturers or fabricators providing Products under this Section shall have sufficient plant, equipment and competent personnel to provide the Products, in accordance with the Contract Documents. Firm(s) shall have past experience in the manufacture or fabrication of the Products specified herein and shall have successfully completed Projects of similar scope and type.

.3 Engage an experienced installer who is an authorized representative of tackboard manufacturer for both installation and maintenance of the type of products required for this Project.

1.6 SITE CONDITIONS

.1 Verify field measurements before preparation of shop drawings and before fabrication to ensure proper fitting and as follows:

.1 Coordinate fabrication schedule with construction progress to avoid delaying the Work.

.2 Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

.2 Establish dimensions and proceed with fabricating tackboards without field measurements where field measurements cannot be made without delaying the work, coordinate wall construction to ensure actual dimensions correspond to established dimensions.

1.7 WARRANTY

.1 Provide manufacturers written guarantee, signed and issued in the name of Owner, to replace the following items for defective material and workmanship for the time stated from date of Substantial Performance:

.1 Framing and Panels: Failure of performance requirements specified in Contract Documents; two (2) years.

2 Products

2.1 MANUFACTURERS

.1 Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

.1 Architectural School Products Ltd.

.2 CPE Design Solutions Inc.

.3 Global School Products Inc.

.4 Martack Specialties Ltd.

2.2 MATERIALS

.1 Core: Particleboard to ASTM-D1037, Grade R, 6mm thick.

.2 Face Sheet: Fine grain, natural cork, to meet ASP Natural Cork, by Architectural School Products Ltd.

.3 Laminating Adhesive: To manufacturer's standard.

.4 Extruded Aluminum: Aluminum Association alloy 6063-T5. Minimum 1.5mm thickness.

.5 Joint Reinforcement: Concealed mechanical jointing system to provide straight, rigid, continuously supported, tight butt, flush joints at surface.

.6 Anchor Clips, Brackets and Fasteners: Concealed type as recommended by manufacturer for fixed mounting.

2.3 MARKERBOARDS

.1 Tackboards (TB-1):

.1 Natural cork tackboards; sizes as indicated on architectural drawings.

.2 Basis of Design Materials: Natural Cork Tackboards by Architectural School Products Ltd.

2.4 ACCESSORIES

.1 Perimeter Trim and Framing:

.1 Material: Extruded aluminum: Aluminum Association alloy AA6063-T5.

.2 Field-Applied Trim: Manufacturer's standard, screw-on trim.

.3 Corner: Radius.

.4 Basis of Design Materials:

.1 Perimeter Trim: ASP Series, Model #205 by Architectural School Products Ltd.

.2 Finish: Anodized, Class II to AA-M12C22A31, #17 Clear.

2.5 FABRICATION

.1 Shop fabricated tackboards in one piece for lengths 3600 mm or less, for longer sections colour match adjacent pieces.

.2 Laminate tackboard and backing sheet to the core in accordance with the tackboard manufacturer's recommendations.

.3 Apply perimeter trim in continuous horizontal and vertical lengths, cut and mitred at corners, complete with the following accessories:

.1 Use adhesive to secure centre portions of panels.

3 Execution

3.1 EXAMINATION

.1 Inspect Work and conditions affecting the Work of this Section. Proceed only after deficiencies, if any, have been corrected.

.2 Ensure that all anchors and setting or installing components provided by this Section for installation are properly located and installed.

3.2 PREPARATION

.1 Obtain all dimensions from the job site.

.2 Provide dimensions and components, anchors and assemblies to be installed (where required) in proper time for installation.

3.3 INSTALLATION

.1 Erect Work in strict accordance with manufacturer's written instructions.

.2 Conceal all anchors and fitments. Exposed heads of fasteners not permitted. All joints in exposed work to be flush hairline butt joints.

.3 Refer to details on drawings for sizes and locations, confirmed on site before installation.

3.4 CLEANING

.1 At completion and continuously as Work proceeds, remove all surplus materials, debris and scrap.

.2 At completion of Work, remove all protective surface covering film and wrappings.

.3 Clean all frames and hard surfaces using mild soap or other cleaning agent approved by manufacturer.

END OF SECTION

1 General

1.1 SUMMARY

.1 Furnish labour, materials and other services to complete the fabrication and installation of the following:

.1 Washroom accessories and framed mirrors and

.2 Attachment hardware.

.2 Include all materials and fitments required for the operation of any unit furnished, in the manner, direction and performance shown on the shop drawings and specified herein.

1.2 REFERENCE STANDARDS

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

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

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

.4 Applicable Standards:

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

.1 ASTM A153/A153M, Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware

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

.3 ASTM A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

.4 ASTM A1008/A1008M, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

1.3 SUBMITTALS

.1 Shop Drawings: Show and describe in detail, materials, finishes, dimensions, details of connections and fastenings, elevations, plans, sections, metal gauges, hardware and any other pertinent information.

.2 Coordinate the work of this Section with the placement of internal wall reinforcement.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store materials in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Unsatisfactory materials shall be removed from the site.

.5 Adequately protect the structure and work of other Sections during delivery, storage, handling and execution of the work of the Section.

.6 Provide tools, plant and other equipment required for the proper execution of the work of this Section.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design Products: Products named in this Section were used as the basis-of-design for the project; additional manufacturers offering similar products may be incorporated into the work of this Section provided they meet the performance requirements established by the named products and provided they submit requests for substitution.

.2 Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:

.1 ASI Watrous - Global Partitions

.2 Bobrick

.3 Frost

2.2 MATERIALS

.1 Provide one of the products indicated for each designation in the Washroom and Custodial Accessory Schedule below, subject to compliance with specified requirements.

.2 Stainless Steel: In accordance with ASTM A666, Type 304, with No. 4 finish (satin); minimum nominal thickness as established by product type.

.3 Sheet Steel: Steel: In accordance with ASTM A1008/A1008M, cold rolled, commercial quality; minimum nominal thickness as established by product type; surface preparation and metal pretreatment as required for applied finish.

.4 Galvanized Steel Sheet: In accordance with ASTM A653/A653M, minimum Z180 coating designation.

.5 Galvanized Steel Mounting Devices: In accordance with ASTM A153/A153M, hot dip galvanized after fabrication.

.6 Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.3 FABRICATION

.1 Washroom and Custodial Accessories:

.1 Surface Mounted:

.1 Fabricate units with tight seams and joints, and exposed edges rolled.

.2 Hang doors and access panels with continuous stainless steel hinge.

.3 Provide concealed anchorage where possible.

.2 Recessed Mounted:

.1 Fabricate units of all welded construction, without mitred corners.

.2 Hang doors and access panels with full length, stainless steel hinge.

.3 Provide anchorage that is fully concealed when unit is closed.

.2 Workmanship shall be best grade of modern shop practice known to recognized manufacturers specializing in this work. Joints and intersecting members shall be accurately fitted, made in true planes with adequate fastening. Wherever possible fastenings shall be concealed.

.3 Isolate where necessary to prevent electrolysis between dissimilar metal to metal or metal to masonry or concrete contact.

.4 Fabricate and erect work square, plumb, straight, true and accurately fitted. Provide adequate reinforcing and anchorage.

.5 Drilling shall be reamed and exposed edges left clean and smooth.

.6 Include anchors and fastenings necessary to anchor work of this Section.

.7 Coordinate with Section 06 10 00: Rough Carpentry, for wood blocking for attachment of washroom accessories.

.8 Keys: Provide universal keys for internal access to accessories for servicing and re-supplying. Provide minimum of six (6) keys to Owner's representative.

3 Execution

3.1 EXAMINATION

.1 Inspect surfaces over which the work of this Section is dependent for any irregularities detrimental to the application and performance of the work. Notify Consultant in writing of all conditions which are at variance with those in the Contract Documents and/or detrimental to the proper and timely installation of the work of this Section. The decision regarding corrective measures shall be obtained from the Consultant prior to proceeding with the affected work.

.2 Commencement of work of this Section implies acceptance of surfaces and conditions.

3.2 INSTALLATION

.1 Make thorough examination of drawings and details, determine the intent, extent, materials, conditions of interfacing with other work and be fully cognizant of requirements.

.2 Work of this Section shall include complete installation of items specified herein. Installation shall be in strict accordance with manufacturer's printed instructions.

.3 Securely fasten accessories, level and plumb in the locations shown on the drawings and specified herein. All fastenings shall be concealed.

.4 Co-ordinate the work of this Section with the work of other Sections to provide the necessary recesses, edge conditions wood blocking for the accessories as required.

.5 Do all drilling of steel, masonry and concrete necessary for the anchorage of the work.

.6 Installed grab bars shall be capable of supporting a downward pull of 500 lbs. per lineal foot.

3.3 ADJUSTING

.1 Check mechanisms, hinges, locks and latches, adjust and lubricate to ensure that accessories are in perfect working order.

3.4 CLEANING

.1 Upon completion of the work of this Section or when directed by Consultant, remove all protective coatings, and coverings. Clean and polish exposed surfaces.

3.5 WASHROOM AND CUSTODIAL ACCESSORY SCHEDULE

No.	Description / Model
CH	Break Away Coat Hooks: Satin finished stainless steel, spring-loaded coak hook with concealed mounting, provide 1 for each washroom, located as directed by Consultant: Frost 1150-SS Bobrick B-983
GB1	Grab Bar: Horizontal 1.214mm (0.048") thickness; 610mm (24") long x 38mm (1-1/2") Ø, straight, stainless steel, slip resistant grip, concealed mounting, cap secured with vandal resistant set screws: ASI 3801-24P Bobrick B-6806.99x24 Frost 1001np 24
GB2	Grab Bar: Side "L"-shape grab bar, 760mm (30") long x 760mm (30") high 38mm (1-1/2") dia., stainless steel, slip resistant grip, concealed mounting, cap secured with vandal resistant set screws: ASI Type 04 Frost 1003np 30”x30”
MR1	Mirror (Tilt): Framed, 762mm (30") high x 460mm (18") wide, fixed tilt installation for disabled persons, mounted 1000mm (40") to bottom of frame: ASI 0535-1830 Bobrick B-293x1830 Frost 941-1830ft
MR2	Mirror (Flat): Framed, 910mm (36") high x 610mm (24") wide, fixed installation, mounted 1000mm (40") to bottom of frame: ASI 0600-2436 Bobrick B-290x2436 Frost 941-2436
UWS	Shelf: Surface mounted shelf, 405mm (16”) long x 125mm (5”) wide, 18 gauge, type 304 stainless steel, satin finish. 19mm (3/4”) return front edge, hemmed: ASI 0692-516 Bobrick B-295 x 16 Frost 950-4

3.6 WASHROOM ACCESSORY SCHEDULE – SUPPLIED BY THE OWNER

PTD	Paper Towel Dispenser: Supplied by School Board and installed by Contractor.
TTD	Toilet Tissue Dispenser: Supplied by School Board and installed by Contractor.
SD	Soap Dispenser: Supplied by School Board and installed by Contractor.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply and installation of quartz agglomerate countertops on top of millwork, ready to accept under mount sinks indicated on Mechanical Drawings.

1.2 SUBMITTALS

.1 Provide product information in accordance with Division 01.

.2 Action Submittals: Provide the following samples before starting any work:

.1 Product Data: Indicate product description, fabrication information, and compliance with specified performance requirements.

.2 Shop Drawings: Submit shop drawings indicating dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.

.3 Samples for Initial Selection: Submit minimum 305mm x 305mm (12" x 12") samples. Indicate full colour and pattern variation.

.4 Samples for Verification:

.1 One full-size quartz agglomerate countertop, with front edge and backsplash, 200mm x 250mm (8” x 10”), of construction and in configuration specified.

1.3 CLOSEOUT SUBMITTALS

.1 Maintenance Data: Include recommended cleaning materials and procedures, and list of materials detrimental to surfaces.

1.4 QUALITY ASSURANCE

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

.1 Fabricator: Use a fabricator having a minimum of three (3) years experience in fabrication and installation of quartz agglomerate countertops and have training and certification from the manufacturer for work of similar scope and complexity as that required for the project.

.2 Installer: Install using personnel experienced in installation of quartz agglomerate countertops of similar design and complexity as that required for this Project.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: Deliver components to project when areas are ready for installation.

.1 Transport countertops with care, securely anchored to pallet, to prevent damage to materials or finishes.

.2 Transport countertops to the site after completion of adjacent construction that could damage materials of this Section.

.2 Storage and Handling Requirements:

.1 Store countertops indoors in an area adjacent to installation.

.2 Block off floor.

.3 Tilt slightly and secure to prevent fall over.

.4 Protect and wrap to prevent abuse, damage or soiling.

1.6 SITE CONDITIONS

.1 Site Measurements: Verify dimensions by site measurements before fabrication and indicate measurements on shop drawings where countertops are indicated to fit between or around other construction; coordinate fabrication schedule with construction progress to avoid delaying the Work.

.2 Established Dimensions: Establish dimensions and proceed with fabricating countertops without site measurements where site measurements cannot be made without delaying the Work; coordinate construction to ensure that actual site dimensions correspond to established dimensions; allow for trimming and fitting.

1.7 WARRANTY

.1 Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace simulated stone countertops that fail in materials or workmanship within specified warranty period.

.1 Warranty shall also include installation and finishing that may be required due to repair or replacement of defective simulated stone countertops.

.2 Warranty Period: Ten (10) years from date of Substantial Completion.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design products are named in this Section; additional manufacturers offering similar simulated stone countertops may be incorporated into the work provided they meet the performance requirements established by the named products.

.2 Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section and as established by the Basis-of-Design Materials, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:

.1 Wilsonart

2.2 QUARTZ AGGLOMERATE COUNTERTOPS

.1 Configuration: Provide countertops with the following front and backsplash style:

.1 Front and Back Edge Profile: Square Polish Edge Profile; Thickness as indicated on the Drawings.

.2 Countertops: 50mm (2”) thick, quartz agglomerate with front edge built up with same material.

.3 Backsplashes: 25mm (1”) thick, quartz agglomerate.

.4 Fabrication: Fabricate tops in one piece with shop-applied edges and backsplashes unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

.1 Backsplashes: Fabricate with loose backsplashes for field assembly.

.5 Fabricate countertops without joints.

.6 Fabricate countertops in sections if one piece is not possible for joining in field, with joints at locations indicated and as follows:

.1 Bonded Joints: 1/32 inch (0.8 mm) or less in width.

2.3 COUNTERTOP MATERIALS

.1 Quartz Agglomerate (QTZ-1): Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with the "Physical Characteristics of Materials" Article of ANSI SS1.

.2 Colour and Manufacturer: As indicated in the Finish Schedule on the Drawings.

2.4 COUNTERTOP SUPPORT MATERIALS

.1 Wood Core and Support Framing:

.1 Fabricate countertop core from shop sanded exterior grade veneer core plywood, as indicated in Section 06 20 00.

.2 Fabricate countertop wood support framing to support weight of simulated stone materials and to account for cut outs and openings required for installation.

.2 Shims: Fabricator's standard shim materials to fully support simulated stone countertops on wood core to provide flat and level installation that does not transfer stresses that could cause cracking in simulated stone countertops.

.3 Fasteners: As recommended by manufacturer and as follows:

.1 Draw Bolt Fasteners: Mitre butt joint fastener, adjustable and requiring no special tools for installation, galvanized.

.2 Non-Exposed Fasteners: Fabricators choice consistent with quality level specified; exposed fasteners will not be permitted.

2.5 ACCESSORIES

.1 Joint Adhesive: Manufacturers recommended adhesive designed to create chemically bonded, inconspicuous, nonporous joints.

.2 Sealant: Mildew resistant, silicone sealant, as specified in Section 07 92 00. Colour: As selected by the Consultant from the manufacturer's standard product line.

.3 Cleaner: Type recommended by manufacturer.

2.6 FABRICATION

.1 Fabricate units to maximum size capable of being safely transported and handled to place of final installation in accordance with shop drawing and manufacturers written instructions using a fabricator certified by the manufacturer.

.2 Fabricate and machine shapes to profiles indicated on Drawings; obtain all dimensions affecting fabrication and installation from job site before starting fabrication.

.3 Cut, drill and shape fabrications as required to receive plumbing fittings and services, and built-in accessories, provide edge treatments, back splashes, and other details as indicated on Drawings.

.4 Finish edges and surfaces true, level and even with inconspicuous joints between having no voids formed using manufactures standard joint adhesive and reinforcing strips.

.5 Make cut outs with 3mm (1/8") radius corners to prevent stress cracking.

.6 Fabrication assemblies with tolerances as follows:

.1 Variation in component size: $\pm$ 3mm (1/8").

.2 Location of openings: $\pm$ 3mm (1/8") from indicated location.

.7 Match numbered components assembled on site; number items to show proper location on site; number on back using material that will not show or telegraph through finished assemblies.

.8 Provide anchorage to receive Work of other Sections scheduled and detailed to be installed.

3 Execution

3.1 EXAMINATION

.1 Examine substrates, areas, and conditions where installations of countertops occur, with Installer present, for compliance with manufacturers requirements. Verify that substrates and conditions are satisfactory for installation and comply with requirements specified.

.1 Carefully inspect the backup structure and millwork to verify that it is ready to accept the work of this Section.

.2 Verify all anchors, seats, connections attached to miscellaneous metal supports properly and securely fastened in correct locations.

.3 Verify access to point of installation for each unit.

3.2 INSTALLATION

.1 Support countertops evenly to prevent stress fractures.

.2 Apply a thin bead of adhesive to top edges of base cabinet and set counter on top, square to face of cabinet work; cut out openings to match fixtures required and remove from countertops after final set of adhesive.

.3 Secure and tighten connections with equal torque to prevent stress fractures after simulated stone countertops are properly aligned, vertically and horizontally with each other and with other related building components.

.4 Seal joints between countertops and adjacent materials, and between abutting countertops with silicone sealant

.5 Adhere under mount sinks to countertops using manufacturer's recommended adhesive and mounting hardware.

.6 Install backsplashes and end splashes as indicated on Drawings; adhere to countertops using manufacturer's standard colour matched silicone sealant.

.7 Coordinate plumbing connections and electrical requirements with affected Sections of work.

3.3 CLEANING AND PROTECTION

.1 Keep components and hands clean during installation; remove adhesives, sealants and other stains as work progresses; keep components clean until Substantial Performance for the Project.

.2 Demonstration: Inform Owner of cleaning techniques and required cleansing materials.

.3 Repair or replace damaged work that cannot be repaired to match installed work at no additional cost to the Owner.

.4 Protect surfaces and corners liable to damage with wood blocking, sacking, or other means, to prevent damage and chipping of installed countertops until Substantial Performance of the Project.

END OF SECTION

1 General

1.1 SUMMARY

.1 Provide all labour, materials, equipment and services to supply and install the dual telescopic hydraulic elevator required and/or indicated on the drawings and as specified herein.

.1 Where works, devices or part of the equipment in the contract documents occur in the singular number, they shall be taken as plural where applicable in accordance with the quantities required to satisfy the requirements of the contract.

.2 Before commencing work the elevator contractor shall prepare all necessary drawings to show general arrangement of the elevator equipment. These drawings must be approved before installation of the elevator.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1 A properly framed and enclosed legal hoistway, including venting as required by the governing code or authority.

.2 Suitable machine room with legal access and ventilation, with concrete floor. Temperature in machine room to be maintained between 12 deg C and 32 deg C (55 deg F and 90 deg F). Ventilation to suit elevator heat release requirements.

.3 Adequate rail bracket supports, bracket spacing as required by governing code. Separator beams where required.

.4 Dry pit reinforced to sustain normal vertical forces from rails and impact loads from buffer and cylinder. Pit floor to be level and free of debris.

.5 Adequate support for sill angle across full width of hoistway at each landing. Vertical surfaces of entrance sill supports to be plumb, one above the other, and square with the hoistway. Finish floor and grout, if required, between door frames to sill line.

.6 Hoist beam to be provided.

.7 Hoistway walls are to be designed and constructed in accordance with the required fire rating including where penetrated by elevator fixture boxes and to include adequate fastening to hoistway entrance assemblies.

.8 Entrance walls and finished floors are not to be constructed until after door frames and sills are in place. If front walls are poured concrete bearing walls, rough openings are to be provided to accept entrance frames and filled in after frames are set. Consult elevator contractor for rough opening size. When drywall construction is used, the General Contractor shall supply the drywall framing so that the wall fire resistance rating is maintained.

.9 Any cutting, including cut-outs to accommodate hall signal fixtures, patching, and painting of walls, floors, or partitions together with finish painting of entrance doors and frames.

.10 A fused disconnect switch or circuit breaker for elevator per the Canadian Electrical Code with feeder or branch wiring to controller. Size to suit elevator requirements, and fused disconnect for auto safe.

.11 A 120 volt, A.C., 20 amp, single phase power supply with fused SPST disconnect switch for elevator, with feeder wiring to each controller for car lights and fans, including main line switch.

.12 Clear access above ceiling, for oil line and wiring duct from machine room, if machine room is remote from elevator hoistway.

.13 Suitable light and convenience outlets in machine room with light switches located within 18" of lock jamb side of machine room door. Machine room receptacles shall be GFI type.

.14 Convenience outlet and light fixture in pit with switch located adjacent to the access door. Pit receptacles shall be GFI type.

.15 Others to provide telephone line into elevator machine room for hook-up by this Section to hands-free telephone unit provided by this Section and mounted in car operating panel.

.16 Guarding and protecting the hoistway during construction. The protection of the hoistway shall include solid panels surrounding each hoistway opening at each floor, a minimum of 4'-0" high. Hoistway guards to be erected, maintained and removed by others.

.17 All electric power for light, tools, hoists, during erection as well as electric current for starting, testing and adjusting the elevator.

.18 Cutout through machine room wall, 8” x 16”, for oil line and wiring duct. Coordinate with elevator contractor at the building site.

.19 All conduit and wire runs remote from either the machine room or the hoistways.

.20 Steel pit ladder.

.21 Cementitious waterproofing in pits.

.22 Heat, smoke or products of combustion sensing devices connected to elevator machine room terminals when such devices are required. Make contacts on the sensors should be sided for 120 volt D.C.

.23 Finish flooring of elevator car enclosure.

.24 Where drywall construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.

.25 Door frames are to be anchored to walls and properly grouted in place to maintain legal fire rating (masonry construction).

.26 The interface of the elevator wall with hoistway entrance assembly shall be in strict compliance with the elevator contractor's requirements.

.27 Filling and grouting around entrances by General Contractor, as required.

.28 When fixtures are mounted in drywall, wall thickness may increase. The General Contractor must coordinate requirements with the elevator contractor.

1.3 PERMITS AND INSPECTIONS

.1 Obtain and pay for necessary municipal or provincial inspections and permits and make such tests as are called for by the regulations of such and any other authorities.

.2 Owner shall pay for all associated licensing fees for the elevators as required.

1.4 CODES AND STANDARDS

.1 This work shall be done in accordance with the requirements of the Canadian Electrical Code latest edition, CAN/CSA-B44, Safety Code For Elevators, latest edition, and any local codes which may govern the requirements of the installation as now in force or understood.

1.5 SUBMITTALS

.1 Shop Drawings:

.1 Submit shop drawings showing the layout of the elevator machine rooms, pits and hoistways including all significant dimensions, the locations and magnitude of all loads imposed on the structure, electrical requirements, all finishes and the finished appearance of the elevator car, hall buttons, lanterns, car position indicators and the hoistway doors and frames and all construction details.

.2 Submit descriptive brochures or detail drawings of landing buttons, main lobby panel, hall fixtures, car position indicators, car operator panels and cab interior design to the Consultant for approval.

.3 Submit shop drawings in ample time so as not to delay preparation of walls, pits, and installation of inserts and anchors required.

.4 Submit shop drawings for approval by municipal or provincial authorities having jurisdiction.

.2 Samples:

.1 Submit samples of finishes as requested by Consultant.

.3 Maintenance Data:

.1 Upon completion of work of this Section, provide the Owner with 2 copies of wiring diagrams for elevator and maintenance and operating manuals, for incorporation into the Operation and Maintenance Manual, and Renewal Parts Catalogues.

1.6 WARRANTY

.1 Warrant that the materials and workmanship of the apparatus installed under these specifications are first-class in every respect. Make good any defects, not due to improper use or care, which may develop within two (2) years from date of Substantial Completion of the Work.

1.7 MAINTENANCE - FIRST YEAR

.1 Provide full maintenance and call-back service on the entire elevator equipment described herein for a period of one year from the date of Substantial Completion of the Work. This maintenance shall include systematic examination, adjustment and lubrication of elevator equipment. Repair or replace electrical and mechanical parts of the equipment whenever this is required. (USE ONLY GENUINE STANDARD PARTS SUPPLIED BY THE MANUFACTURER OF THE EQUIPMENT) concerned. Renewals or repairs necessitated by reason of negligence of misuse of the equipment shall not be the responsibility of the elevator sub-contractor.

.2 All work under this maintenance provision shall be performed by competent personnel under the supervision and in the direct employ of the elevator sub-contractor.

.3 All work, including emergency call back service, shall be done during the regular working hours and days. Provide emergency call back service 7 days a week, 24 hours daily. Call-backs during normal working hours shall be included as part of the maintenance service, except for calls resulting from vandalism, abuse or other reasons beyond the normal control of the maintenance provider. Call-backs outside of normal hours involving the release of trapped passengers shall be included as part of the maintenance service, without additional premiums to the Owner. For other after hours call-backs the Owner will be responsible to pay the overtime portion of the mechanics labour rate (shift bonus premium) and the maintenance provider will absorb the regular rate.

.4 Employ competent personnel to handle this service, maintain locally an adequate stock of parts for replacement or emergency purposes and have qualified men available at such places to insure the fulfilment of this service without unreasonable loss of time in reaching the job site.

.5 This maintenance service shall be performed solely by the elevator subcontractor and shall not be assigned or transferred to any agent or subcontractor.

1.8 MAINTENANCE CONTRACT - ESCALATED

.1 State in the form of tender an addition to contract price to furnish complete maintenance for each year of the next two (2) years, following completion of the one year maintenance period, based on today's material and labour cost indices and the requirement that the elevator contractor will enter into a maintenance contract with the Owner for a minimum period of two (2) years, at the end of the guarantee period, on a continuing basis, with the understanding that increases or decreases in labour and material prices shall be indexed based on Statistic Canada cost of living index and that the contract amount shall be varied according to the index.

.2 Submit with the tender a written maintenance service proposal explaining and detailing the services to be provided under the maintenance agreement the Owner may be required to enter into.

.3 The maintenance contract shall include the following clauses in addition to the regular maintenance clauses:

.1 In addition, the elevator contractor may cancel the contract at any time within 90 days written notice to the Owner if, and only if, unsafe conditions persist (as judged by an inspector from the Ministry of Consumer and Commercial Relations, Elevating Devices Branch) after adequate notice has been given to the Owner to correct the problem and sufficient time has been allowed for the problem to be solved and if the submitted invoices are not paid with a 60-day period after submission.

.2 In addition, the Owner may cancel the contract at any time with 90 days written notice to the elevator contractor, if, and only if, a professionally qualified 3rd party, satisfactory to both parties, judges the maintenance performed on any unit as unsatisfactory and adequate written notice is given to the elevator contractor to correct the problem, and if the elevator contractor fails to satisfy the minimum service coverage required by the contract as judged by a qualified 3rd party satisfactory to both parties.

.3 Safety devices and governors shall be periodically examined.

.4 The elevator sub-contractor shall be responsible for the changes of cables, as found necessary; based on inspection standards of CEMA.

.5 Relays, resistors, solid state cards, condensers, transformer, contacts, leads, dashpots on controllers, and selectors shall be kept in good operating condition.

.6 Machine room equipment shall be kept clean and well painted. The pit, hoistway, tops and bottoms of cabs shall be kept in a clean condition.

.7 Should it become necessary to work on elevators with hall doors open, proper safety barricades shall be erected to protect people from all hazards.

.8 If for any reason (such as a strike), it is mutually agreed to reduce the level of maintenance, the monthly amount of the contract shall be reduced to reflect the reduction in maintenance service.

.9 Should the Owner request that the elevator contractor perform any work on the equipment of this contract, but not included in the terms of this contract, then such work shall be based on the rates included in the contract for time and material as modified by the defined price index contained in the contract.

.10 All work on the elevators shall be registered in the owner's log book and shall include the time of arrival, nature of work or problem, and the action taken.

.11 A scheduled preventative maintenance program shall be set up and followed by the maintenance contractor. The program shall be designed to minimize elevator shut-downs.

2 Products

2.1 APPROVED SYSTEMS AND MANUFACTURERS

.1 Basis of Design Materials: Hydraulic – Dual Telescopic Elevator by Delta Elevator Co Ltd.

2.2 DESCRIPTION OF SYSTEM

.1 Furnish and install one hydraulic, dual telescopic passenger elevator as indicated on drawings and as specified herein:

.1 Common Features:

.1	Class of Loading:	A
.2	Drive Configuration:	Dual Telescopic
.3	Drive Type:	Hydraulic
.4	Elevator Type:	Passenger
.5	Front Entrances:	1
.6	Rear Entrances:	3
.7	Total Entrances:	4
.8	Group Operation:	Simplex
.9	Rated Capacity:	1365 kg
.10	Up Speed:	0.63 m/s

.2 Cab Features

.1	Cab Height:	2438 mm
.2	Cab Height:	Clear Inside 2286 mm
.3	Car Lighting:	LED Pot Lights for Stainless
.4	Inside Depth:	1406 mm
.5	Inside Width:	2032 mm
.6	Bumper Rail:	None
.7	Button Type:	US91
.8	Cab Flooring:	By Others - Section 09 30 00 Tiling.
.9	Cab Pads:	Yes
.10	Car Front Door Finish:	Stainless Steel
.11	Ceiling Finish:	Stainless Steel Panel
.12	Front and Rear Finish:	Stainless Steel
.13	Handrail Style:	Flat 2-1/2" x 1/4"
.14	Reveals:	Stainless Steel
.15	Wall Finish:	Raised Plastic Laminate Panel
.16	Button Colour:	Blue

.3 Control System Features:

.1	Battery Lowering:	Yes
.2	Emergency Power	
.3	Operation:	No
.4	Onboard Diagnostics:	Yes

.4 Entrances Features:

.1	Entrance Height:	2134 mm
.2	Entrance Width:	1067 mm
.3	Front Wall Thickness:	200 mm
.4	Door Type:	Single Speed Side Opening

.5 Fixtures Features:

.1	Bilingual Markings:	No
.2	Camera Provision:	No
.3	Car Position Indicator:	1
.4	Car Station Quantity:	1
.5	Hall Position Indicator:	1

.6 Hoistway Features (Based on Non-Seismic Requirements):

.1	Hoistway Construction:	Concrete Block
.2	Hoistway Depth:	2142 mm
.3	Hoistway Width:	2640 mm
.4	Overhead:	4400 mm
.5	Pit Depth:	1829 mm
.6	Travel:	7385 mm
.7	Total number of Floors:	4

.7 Machine Room Features:

.1	Motor Voltage:	208 VAC
.2	Building Supply Voltage:	208 VAC
.3	Machine Room:	Remote

2.3 INDEPENDENT SERVICE

.1 Provide independent service by means of key operated switch in car operating panel to allow removal of the car from service and to operate independently in response to car calls only and as follows;

.1 Open doors automatically upon arrival.

.2 Render door protective devices inoperative.

.3 Render hall signals inoperative.

2.4 GENERAL

.1 In all cases where a device or part of equipment is referred to in singular number, it is intended that such reference shall apply to as many devices or parts as are required to complete the installation.

2.5 CYLINDER AND PLUNGER (JACK UNIT)

.1 A holeless dual jack system that utilizes two (2) mechanically synchronized jacks shall be provided. The jacks are located at each side of the car and connected to the elevator structure.

.2 Cylinder shall be constructed of steel pipe of sufficient thickness suitable for a working pressure of 2758 KPa. Cylinders of multiple section construction shall be thoroughly and substantially connected by means of external couplings.

.3 Bottom of the cylinder shall have a safety bulkhead and a dished seamless head, concave to pressure. Safety bulkhead shall contain a small orifice to limit the flow of hydraulic fluid in case of failure of the dished head. Top of the cylinder shall be equipped with a cylinder head with drip ring to collect any oil seepage as well as an internal guide ring and self-adjusting packing.

.4 Plunger shall be constructed of selected steel tubing of proper diameter machined true and smooth with a fine polished finish. Plunger shall be provided with a stop electrically welded to the bottom to prevent the plunger from leaving the cylinder. Plunger will be secured to the car frame by means of a suitable platen connection.

.5 Plunger and cylinder shall be installed plumb and must operate freely with minimum friction.

2.6 LEVELLING DEVICE

.1 Elevators shall be provided with an automatic levelling device which will bring the car to a stop within 1/4" of the landing level regardless of load or direction of travel. Landing level will be maintained within the levelling zone irrespective of the hoistway doors being open or closed.

2.7 CAR STALL PROTECTIVE CIRCUIT

.1 A protective circuit shall be provided which will stop the motor and the pump and return the car to its lowest landing in the event the car does not reach its designated landing within a predetermined time interval. This circuit will permit a normal exit from the car but prevent further operation of the elevator until the trouble has been corrected.

2.8 CYLINDER PROTECTION

.1 Inside of the cylinder shall be treated with rust preventative prior to shipment.

2.9 PUMPING UNIT

.1 Pumping unit shall be of integral design and shall include an electric motor connected to a pump, a hydraulic control system, storage tank, necessary piping connections, and a controller, all compactly designed as a self-contained unit.

2.10 PUMP

.1 Pump shall be a positive displacement screw type to give smooth operation and shall be especially designed and manufactured for elevator service.

2.11 MOTOR

.1 Motor shall be of the alternating current, polyphase, submersible cage induction type and shall be of a design especially adapted to electro-hydraulic requirements.

2.12 HYDRAULIC CONTROL SYSTEM

.1 Hydraulic control system shall be of compact design suitable for operation under the required pressures and it shall be mounted in the storage tank. Control valve will be manifold type with up, down and check valve sections. A control section including solenoid valves will direct the main valved and control up and down starting, transition from full speed to levelling speed, up and down stops, pressure relief and manual lowering.

.2 Down speed and up and down levelling shall be controlled at the main valve sections. All of these functions shall be fully adjustable for maximum smoothness and to meet contract conditions. All control systems shall be pre-adjusted at the factory.

.3 Manual lowering feature shall permit lowering the elevator at slow speed in the event of power failure or for adjusting purposes.

2.13 STORAGE TANK

.1 Storage tank or oil reservoir shall be constructed of welded steel sheets, and shall be provided with a cover, a protected vent opening, an oil level gauge, a filtering screen mounted over the suction inlet and a drain connection. An initial supply of oil sufficient for proper operation of the elevator shall be provided. Tank shall have a capacity equal to the volume of oil required to lift elevator to top terminal plus a reserve of not less than 10 gallons.

2.14 MUFFLER

.1 A blow-out proof muffler, designed to minimize the transmission of fluid pulsations, shall be furnished and installed in the pipeline between the pumping unit and the cylinder head.

2.15 PIPING

.1 Piping shall be furnished and installed between the pumping unit and the cylinder head complete with necessary fittings. A gate valve shall be provided in the line to facilitate maintaining and adjusting the elevators.

2.16 CONTROLLER

.1 Microprocessor controllers shall be provided including necessary starting switches of adequate size together with all relays and switches required to accomplish the operation specified.

2.17 REDUCED VOLTAGE STARTING

.1 To reduce starting currents, "Solid State" starting shall be provided for the pump motor.

2.18 WIRING

.1 All wiring and electrical interconnections shall comply with the governing codes. Insulated wiring shall have flame retardant and moisture proof outer covering, and shall be run in conduit, tubing or electrical wireways. Travelling cables shall be flexible and suitably suspended to relieve strain on individual conductors.

2.19 HOISTWAY OPERATING DEVICES

.1 Normal terminal stopping devices shall be provided. When an emergency terminal stopping device is also required, it shall be furnished and the controller switches and circuitry arranged accordingly.

2.20 PIT SWITCH

.1 An emergency stop switch shall be located in the elevator pit.

2.21 PLATFORM

.1 Car platform shall be of all steel construction. It shall be equipped with an aluminum threshold.

2.22 CAR FRAME

.1 A suitable car frame fabricated from formed or structural steel members shall be provided with adequate bracing to support the platform and car enclosure. Car frame shall be isolated from the platen plate by means of rubber isolation mounts. Buffer striking plate on the underside of the car frame plank members must fully compress the spring buffers mounted in the pit before the plunger reaches its down limit of travel.

.2 Rubber tired roller, or slipper, guides shall be mounted on top and bottom of the car frame to engage the guide rails.

2.23 GUIDES

.1 Steel elevator guide rails shall be furnished to guide the car, erected plumb and securely fastened to the building structure.

2.24 DOOR OPERATION

.1 Doors on the car and at that hoistway entrances shall be power operated by means of a quality operator mounted on top of the car. The motor shall have positive control over door movement for smooth operation.

.2 Door operation shall be automatic at each landing with door opening being initiated as the car arrives at the landing and closing taking place after expiration of a time interval. A car door electric contact shall prevent starting the elevator away from the landing unless the car door is in its closed position.

.3 Door closing at elevator shall be arranged to start within a time consistent with handicapped requirements, from notification that a car is answering a hall call. Door shall be arranged to remain open for a time period sufficient to meet handicapped requirements.

.4 Time interval for which the elevator doors remain open when a car stops at a landing shall be independently adjustable for response to car calls and response to hall calls.

.5 An approved positive interlock shall be provided for each hoistway entrance which shall prevent operation of the hydraulic unit unless all doors for that elevator are closed and shall maintain the doors in their closed position while the elevator is away from the landing. Emergency access to the hoistway as required by governing codes shall be provided.

.6 Doors shall be vandalproof to prevent unauthorized access to elevator shaft.

2.25 CAR DOOR SAFETY DEVICE

.1 Provide multi-beam infrared detector for car door protection. Adjust detector unit to automatically time out after 20 seconds as required by Code.

2.26 DOOR HANGERS AND TRACKS

.1 Furnish and install for each car door sheave type two point suspension hangers and tracks complete.

.2 Sheaves shall be steel with flanged groove and include resilient sound absorbing tires of approved material.

.3 Sheaves shall include ball bearings sealed to retain grease lubrication and shall be mounted on steel housing arranged for attaching to the doors.

.4 Hangers shall be provided with ball bearing adjustable rollers to take the up-thrust of the doors.

.5 Tracks shall be cold drawn steel with surfaces shaped to conform to the tread of the hanger sheaves and rollers.

2.27 ELEVATOR ENTRANCE

.1 Sliding Type:

.1 Furnish at all floors, as indicated complete elevator entrances of quality as shown on the plans and specified herein. Assume complete and undivided responsibility for the entire installation including doors, frames, structural supporting angles, headers, hanger covers, fascias or toe guards, hangers and sills.

.2 Flush Type Door:

.1 Door of the flush type with sound-deadening material. Doors shall be constructed of not less than 1/16" thick high quality patent level stainless steel sheets rigidly reinforced by cold rolled shapes full height of door. Top and bottom of the doors shall be provided with cold rolled shapes full width of door and securely welded in place. Doors to be 1-1/4" in thickness and equipped with approved guides to operate in accurately grooved sills.

.2 Door finish shall be stainless steel in brushed finish. Refinish exposed edges after fabrication.

.3 Reinforcement of Door:

.1 Door shall be suitably reinforced to receive standard equipment, mortised where required and drilled and tapped to receive hangers, operators and interlocks.

.2 Door shall be suitably reinforced to receive operating mechanism and to withstand all strains of power operation.

.4 Unit Frame with Integral Trim:

.1 Frames shall be welded or bolted for a one piece assembly and shall be constructed from not less than 1/16" thick stainless steel to detail shown combining rough buck, jamb, casing and glazed transom, all in one piece construction. Frames shall be securely bolted to the sill, or sill extension, at the bottom and secured to the header at the top.

.2 Frame finish shall be stainless steel in brushed finish. Refinish exposed edges after fabrication.

.5 Structural Supporting Angles:

.1 Vertical structural members shall consist of two 3" x 3" x 1/4" steel strut angles.

.6 Headers:

.1 Headers or hanger housings shall be formed of 1/8" thick stainless steel sheet suitably reinforced to provide proper support for hangers and shall be bolted to support angles.

.2 Header finish shall be stainless steel in brushed finish. Refinish exposed edges after fabrication.

.7 Sills:

.1 Sills shall be extruded aluminum with approved anti-slip wearing surface. Grooves for the door guides shall have minimum clearance for the guides.

.8 Sill Supports:

.1 Sills shall be set with properly located sill support angles and shall be fastened to a vertical surface immediately below the finished floor level and flush with the hoistway face of the corridor wall suitable for secure fastening.

.9 Fascias or Toe Guards:

.1 Fascias shall be made of not less than 1/16" thick stainless steel sheet substantially reinforced where necessary and securely fastened in place. They shall extend 12" up from header and be full width of opening plus width of frame flanges.

.2 On lower terminal floors, toe guards of the same construction shall be furnished securely fastened to the sill and wall construction.

.3 Fascias or toe guards finish shall be galvanized steel.

2.28 INSPECTION OPERATION STATION

.1 A key switch shall be provided in the car to permit operation of the elevator from on top of the car, for inspection purposes, with car and hall buttons inoperative.

.2 An operating fixture shall be provided on top of the car containing continuous pressure "UP" and "DOWN" buttons for operating the elevator, an emergency stop button and a toggle switch which makes the top of the car inspection devices operative, and a telephone jack.

2.29 LANDING IDENTIFICATION

.1 Provide 2" high numerals in #4 brushed stainless steel finish on outside frame to identify floor level.

2.30 EMERGENCY CAR LIGHTING

.1 An emergency power unit employing a 12 volt sealed rechargeable battery and totally static circuits shall be provided that will adequately illuminate the elevator car and provide current to the alarm bell in the event of a power failure.

2.31 CAR OPERATING STATION

.1 Provide car operating panel of design selected by the Consultant from manufacturer's standard designs. Finish to be #4 brushed stainless steel finish. Panel shall contain buttons and required switches, all suitably identified complete with braille designations.

.2 Operating button heights and mounting arrangement to comply with B44 requirements.

2.32 HANDS-FREE TELEPHONE

.1 A hands-free communication device shall be mounted behind perforated grille in the car operating panel, and unit shall be controlled using ALARM or HELP button. Necessary wires shall be included in the travelling cable. Communications equipment and connections to the building service system shall be furnished and installed by this Section.

2.33 CAR POSITION INDICATOR

.1 A digital car position indicator with stainless steel faceplate shall be installed in car operating panel.

.2 When stopping at a landing, the position of the car in the hoistway shall be shown by the illumination of the indication corresponding to the landing at which the car is stopped or passing.

.3 Provide lens for LED readout with 2" high characters.

2.34 HALL BUTTONS

.1 At each landing of elevator provide a push button station with #4 brushed stainless steel finish. When a call is registered by momentary pressure on a landing button, that button shall become illuminated and remain illuminated until the call is answered.

2.35 AUTO SAFE

.1 Equip the car with an auto safe which, in event of power failure, will return the car to the lower floor and open the doors. Coordinate with Electrical Drawings.

2.36 FINISHES

.1 Stainless Steel:

.1 All stainless steel exposed in the finished work shall have stainless steel with brushed finish. Refinish exposed edges after fabrication.

.2 Grain direction of stainless steel shall be vertical, unless indicated otherwise.

.3 Protect finish with strippable protective film.

.2 Clear Anodizing (Class II):

.1 All aluminum surfaces exposed in the finished work shall have integral clear anodic coating, minimum 0.4 mils thickness, and conforms to Aluminum Finish Designation AA-M12C22A31, Architectural Class II.

.2 Pre-treat aluminum with caustic etch treatment prior to applying integral clear anodic coating.

.3 Protect finish with strippable protective film.

.3 Air Drying Baking Enamel:

.1 All surfaces inside cab enclosure top forming the reflector shall have highly reflective, air drying, baking type, alkyd gloss enamel conforming to CAN/CGSB-1.88, Type 1.

.2 Colour: "White".

.3 Pre-treat aluminum/steel surfaces after fabrication and apply primer and finish coats in strict accordance with manufacturer's written instructions.

.4 Protect finish with strippable protective film.

.4 Steel (Concealed):

.1 Hot-dip galvanized, or zinc rich paint.

.5 Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact. Use bituminous paint, butyl tape or other approved divorcing material.

3 Execution

3.1 EXAMINATION

.1 Examine the work by other trades and ensure that the hatchway is accurately plumbed and dimensioned within required tolerances and that all necessary inserts have been accurately installed and rigidly anchored.

.2 Report any defects. Do not start elevator work until satisfactory arrangements have been made for their correction.

3.2 INSTALLATION

.1 Follow the manufacturer's recommendations.

.2 Work shall be performed by manufacturer's forces, and only by mechanics skilled in installation of elevators.

.3 Install elevator machinery, car, guides, control and entrances by mechanics skilled in elevator work to provide a quiet, smoothly operating installation free from site sway vibration.

.4 Install guide rails continuously with no gaps at joints. Provide support brackets at required spacing.

.5 Set entrances in perfect alignment with car openings and true with plumb hatch lines.

.6 Erect sills, headers and frames prior to erection of rough walls. Install doors, fascias and toe guards after walls are finished.

.7 Except where submersible pump is provided, mount pump unit minimum 3'-4" above finish floor, also raise level of tank if required by higher pump location.

.8 Perform and meet test requirements of CAN/CSA-B44.

.9 Furnish test and approval certificates issued by the authorities having jurisdiction.

.10 Prior to final acceptance, remove protection from exposed surfaces, clean and polish surfaces, with due regard to type of material.

.11 Touch-up and restore to new condition, damaged or defaced factory finished surfaces.

.12 Upon completion run elevator in the presence of the Consultant. Demonstrate that all adjustments have been properly made and that each elevator meets the specified operation requirements.

.13 Provide electrical troughing and hydraulic oil line sections running between remote elevator machine room and elevator hoistway. Route these connections through the Upper Level floor slab, and affix to the underside of the Upper Level floor slab. Set oil line and duct elevations to height and right of way requirements as defined by Construction Manager. Provide all required fasteners and mountings to support oil line and duct sections. Oil line supports shall have isolation between pipe clamp and oil line.

3.3 EQUIPMENT PERFORMANCE AND ADJUSTMENT SETTINGS

.1 Arrange equipment to operate at maximum speed variation between -5% and +10%, to compensate for changing car loads and direction of travel.

.2 Adjust and set up car door operator to achieve full open cycle in 3.0 to 3.5 seconds. Full open cycle shall be measured from the time the door initially starts to open until it reaches its fully open position.

.3 Adjust and set up car door operator to achieve full close cycle in 3.5 to 4.0 seconds. Full close cycle shall be measured for the time the door initially starts to close until it reaches its fully closed position.

.4 Set up car and hall landing dwell timers to achieve a dwell interval of 3.0 to 4.0 seconds. Dwell time settings shall be capable of being individually reset and adjusted between 0 and 20 seconds.

.5 Set up nudging timer to initiate nudging operation should the door detector be activated for a period equal to the dwell interval plus 20 seconds. Under nudging operation, car doors shall close at a reduced speed. Closing times shall be approximately 1.75 times the time as noted above for normal closing operation under paragraph 3.3.3.

.6 Door re-cycle timer shall operate after 8 to 10 seconds.

.7 Lowest landing return feature shall initially be set for 15 to 20 minutes. During periods of inactivity, car shall also be programmed to return to its bottom landing after sitting idle for specified length of time.

.8 Lighting levels inside the elevator cab shall be not less than 20 foot candles (under normal power), measured inside the cab at the platform level.

.9 Car levelling accuracy shall be maintained at ∀1/4" under all car loading conditions (up to full rated load) and direction of travel.

.10 Valve unit shall be set up and adjusted to achieve imperceptible car acceleration and deceleration rates, with no sudden jerks during speed transitions.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply, fabrication and installation of the following:

.1 Surface mount, tactile warning surface tiles in an inline truncated dome pattern on all stair landings at locations and to dimensions indicated on Drawings.

.2 Scarifying of existing concrete surface to allow for flush mounting of tactile warning surface tile with existing concrete stair.

1.2 SUBMITTALS

.1 Product Data: Submit manufacturer's literature describing products, installation procedures and maintenance instructions.

.2 Shop Drawings: Submit manufacturer's standard Shop Drawings showing all pertinent characteristics of the surface mounted tactile warning tile, including profile, fastener locations and installation methods.

.3 Samples for Verification Purposes: Submit two (2) samples of tactile warning surface tile, a minimum of 200mm x 200mm (8" x 8"), labeled and containing the following information: Name of Project, Submitted by, Date of Submittal, Manufacturer's Name, and Catalog Number.

.4 Maintenance Instructions: Submit copies of manufacturer's specified maintenance practices for each type of tactile warning surface tile and accessories.

1.3 QUALITY ASSURANCE

.1 Provide tactile warning surface tiles as produced by a single manufacturer with a minimum of five years experience in manufacturing surface mounted tactile warning tiles.

.2 Installer's Qualifications: Engage an experienced installer certified in writing by the Tactile Warning Surface manufacturer, who has successfully completed installations similar in material, design, and extent to that indicated for the Contract.

.3 Tactile Warning Surface Tiles: Compliant with ADAAG, PROWAG, ISO 23599 requirements as well as CSA B651-12 Accessible Design for the Built Environment.

2 Products

2.1 MANUFACTURERS

.1 Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section and as established by the Basis-of-Design Materials, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:

.1 ADA Solutions Inc., Model ADA SA TWS Panels, 2.35" dome spacing, or approved equivalent, as accepted by the Consultant.

2.2 PERFORMANCE CRITERIA

.1 Water Absorption: Not to exceed 0.20%, when tested in accordance with ASTM D570.

.2 Slip Resistance: 0.80 minimum combined wet/dry static coefficient of friction when tested in accordance with ASTM C1028.

.3 Compressive Strength: 25,000 psi minimum, when tested in accordance with ASTM D695.

.4 Tensile Strength: 10,000 psi minimum, when tested in accordance with ASTM D638.

.5 Flexural Strength: 25,000 psi minimum, when tested in accordance with ASTM D790.

.6 Abrasion Resistance: 300 minimum, when tested in accordance with ASTM C501.

.7 Flame Spread: 25 maximum, when tested in accordance with ASTM E84.

.8 Salt and Spray Performance of Tactile Warning Surface: No deterioration or other defects after 200 hours of exposure, when tested in accordance with ASTM-B117.

2.3 MATERIALS

.1 Tile Composition: Tactile warning surface tiles shall be manufactured using an exterior grade, homogeneous glass and carbon reinforced polyester based Sheet Molding Compound (SMC) composite material.

.1 Truncated domes contain fibreglass reinforcement.

.2 Colour: Homogeneous throughout Tile:

.1 Federal Yellow (Y).

.2 Domes:

.1 Square grid pattern of raised truncated domes of 5mm (0.2”) nominal height, base diameter of 22.8mm (0.9”) and top diameter of 11.5mm (0.45”).

.2 Dome spacing: Center-to- center (horizontally and vertically) spacing of 60mm (2.35”).

.3 Field Area: Consisting of a non-slip textured surface with a minimum static coefficient of friction of 0.80, wet and dry. At a minimum, the thickness of the body of tactile warning surface tile measures 4.8mm (0.1875”) nominal.

.3 Tile Dimensions:

.1 Rectangular Tile; 305mm (12”) deep x 1524mm (60") long. Provide different tile lengths to reduce the amount of cut tiles. Center tiles evenly over stair edge, as approved by the consultant. Minimum tile length: 229mm (9").

.4 Fasteners: The tactile warning surface tile shall have minimum twelve to twenty-four countersunk fastening holes, depending on the length of the tile. Color matched, stainless steel 304, flat head drive anchor: 6mm (1/4") diameter x 38mm (1 1/2”) long.

.5 Adhesive and Sealants: As recommended by tactile warning surface tile manufacturer.

3 Execution

3.1 PREPARATION

.1 Substrate Condition:

.1 Ensure substrate has been scarified at a depth to allow tactile warning surface tile to install flush with adjacent existing concrete stair level.

.2 Ensure substrate is in suitable condition, and in compliance with material manufacturer's recommendations, to receive work of this Section.

3.2 INSTALLATION

.1 Tactile warning surface tile shall be installed per manufacturer’s instructions.

.2 When multiple tactile warning surface tile regardless of size are used, the truncated domes shall be aligned between the tactile warning surface tiles and throughout the entire tactile warning surface installation.

.3 Minimize cutting of tactile warning surface tiles on site.

.4 Remove tile inclined edge prior to tile installation.

.5 Apply adhesive on the backside of tactile warning surface tile following the perimeter and internal cross pattern established by the SA Tile manufacturer.

.6 Set Tactile warning surface tiles true and square to the stair edge as detailed in the Drawings, allowing 3mm (1/8") separation between successive SA Tiles for expansion and contraction.

.7 Drill holes true and straight to a depth of 63.5mm x 6mm (2 1/2" x 1/4") using the recommended bit. As necessary, additional countersunk holes may be added to tactile warning surface tile.

.8 Mechanically fasten tactile warning surface tile to the concrete substrate using composite sleeve anchors. Ensure that the fastener has been set to full depth, straight and true.

.9 Following the installation of tactile warning surface tiles, apply sealant to the perimeter edge. Follow the tactile warning surface manufacturer's recommendations when applying the sealant in a cove type profile to blend and seal the SA Tile edge to the adjoining surfaces.

.10 Do not allow foot traffic on installed tactile warning surface tile until the perimeter edge sealant has cured sufficiently to avoid tracking.

END OF SECTION

Division 20 Common Requirements for Mechanical

Division 21 Fire Suppression

Fire-Suppression Sprinkler Systems

Division 22 Plumbing

Plumbing Insulation

Facility Water Distribution

Facility Sanitary Sewerage

Facility Storm Drainage

Plumbing Fixtures

Division 23 Heating, Ventilating, and Air Conditioning (HVAC)

Division 25 Integrated Automation

END OF SECTION

Part 1 General

1.1 GENERAL

.1 The following Mechanical Identified Prices Form must be submitted to the architect and consultant at the time of tender closing. Mechanical contractors must complete all information requested or tenders may be considered null and void. Should any uncertainty arise as to the proper manner of submitting tenders, the requisite information will be given at the office of the Consultant. Contractor shall sign and date this page and initial and date each page thereafter.

1.2 CONTRACTOR

I/We certify that I/We have the authority to bind the company.

COMPANY NAME	AUTHORIZED SIGNATURE
ADDRESS	PRINTED SIGNATURE
CITY	TITLE
TELEPHONE NUMBER	DATE
FAX	

1.3 RELATED SECTIONS

.1 This section must be read in association with the following: Division 1, Mechanical and Electrical Divisions.

1.4 ITEMIZED PRICES (EXCLUDING HST)

.1 Itemized prices are for work which is included in the bid price listed on the bid form. Each price may be retained, or deleted from the bid price in the amount indicated, at the discretion of the Owner, and may be used to determine the low bidder.

.1 For the supply and installation of the fire suppression dry system the attic spaces including all dry system components downstream of the main system header and including all supporting equipment.

_____*Dollars ($_____)*

(Dollar amount in writing)

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Products

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

.1 This section covers items common to all sections of Mechanical Division.

.2 Conform to Division 1 General Conditions.

.3 Furnish labour, materials, and equipment necessary for completion of work as described in contract documents.

.4 Unless specifically indicated, all materials and equipment provided under this contract shall be new and shall be manufactured in the project year.

1.2 INTENT

.1 Mention herein or indication on Drawings of articles, materials, operations or methods requires: supply of each item mentioned or indicated, of quality, or subject to qualifications noted; installation according to conditions stated: and, performance of each operation prescribed with furnishing of necessary labour, equipment, and incidentals for mechanical work.

.2 Where used, words “Section” and “Division” shall also include other Subcontractors engaged on site to perform work to make building and site complete in all respects.

.3 Where used, word “supply” shall mean furnishing to site in location required or directed complete with accessory parts.

.4 Where used, word “install” shall mean secured in place and connected up for operation as noted or directed.

.5 Where used, word “provide” shall mean supply and install as each is described above.

1.3 REGULATIONS, PERMITS, AND FEES

.1 All materials and quality of work shall meet all current and latest Provincial, Municipal and Fire Marshall requirements, regulations, codes, and by-laws in force in the area of the project.

.2 Each contractor shall give all necessary notices, obtain all necessary permits, and pay all fees in order that the work shown or specified may be carried out. Each contractor shall furnish any certificates necessary as evidence that the work installed conforms with the laws and regulations of all authorities having jurisdiction.

.3 In the event that changes, or alterations are required on completed work by authorized inspectors, these changes shall be made at the contractor’s expense.

.4 Special equipment which does not have a standard CSA label shall be inspected by the local electrical authority having jurisdiction and the Approval Certificate shall be submitted to the Consultant as soon as possible. All costs and fees for inspections shall be borne by this contractor.

.5 Submit a copy of all final certificates in the maintenance manuals.

1.4 DRAWINGS

.1 Mechanical Drawings do not show structural and related details. Take information involving accurate measurement of building from building drawings, or at building. Make, without additional charge, any necessary changes, or additions to runs of piping, conduits, and ducts to accommodate structural conditions. Location of pipes, ducts, conduits and other equipment may be altered by Consultant without extra charge provided change is made before installation and does not necessitate major additional material.

.2 As work progresses and before installing piping, ductwork, heating units, registers, diffusers, fixtures and any other fittings and equipment which may interfere with interior treatment and use of building, provide detail drawings, or obtain directions for exact location of such equipment and fittments.

.3 Mechanical Drawings indicate general location and route of pipes, ducts and conduits which are to be installed. Where required work is not shown or only shown diagrammatically, install same at maximum height in space to conserve head room (minimum 2200 mm (88") clear) and interfere as little as possible with free use of space through which they can pass. Follow building lines, conceal piping, conduits and ducts in furred spaces, ceilings and walls unless specifically shown otherwise. Install work close to structure so furring will be small as practical.

.4 Install piping and ductwork to clear structural members and any fireproofing. Locate mechanical work to permit installation of specified insulation. Do not remove or damage structural fireproofing. Leave space to permit fireproofing and insulation to be inspected and repaired.

.5 Before commencing work, check and verify all sizes, locations, grade and invert elevations, levels, and dimensions to ensure proper and correct installation. Verify existing/municipal services.

.6 Locate all mechanical and electrical equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.

.7 In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install piping and other work so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose.

.8 Relocate equipment and/or material installed but not co-ordinated with work of other Sections and/or installed incorrectly as directed, without extra charge.

.9 Where drawings are done in metric and product not available in metric, the corresponding imperial trade size shall be utilized.

1.5 INTERFERENCE AND COORDINATION DRAWINGS

.1 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the constructed spaces provided.

.2 Prepare drawings to indicate co-ordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are coordinated.

.3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.

.4 Upon consultant's request submit copies of interference drawings to consultant.

.5 Due to the nature of the building and the complexity of the building systems provide the following:

.1 Interference drawings, showing coordination of architectural, structural, mechanical, and electrical systems for the consultant's review prior to fabrication.

.2 Detailed layout drawings, clearly showing fasteners and hangers.

.6 Provide CAD drawings (minimum file version AutoCAD 2013) in addition to hard copies.

1.6 QUALITY ASSURANCE

.1 Perform work in accordance with applicable provisions of local Plumbing Code, Gas Ordinances, and adoptions thereof for all mechanical systems. Provide materials and labor necessary to comply with rules, regulations, and ordinances.

.2 In case of differences between building codes, provincial laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Consultant in writing of such differences.

1.7 ALTERNATES AND SUBSTITUTIONS

.1 Throughout Mechanical Divisions are lists of "Alternate and equal Equipment" manufacturers acceptable to Consultant if their product meets characteristics of specified described equipment.

.2 Each bidder may elect to use "Alternate or equal Equipment" manufacturers from lists of Alternates where listed. Include for any additional costs including all costs for revisions to electrical contract to suit Alternate used. Prices are not required in Tender for Alternates listed except where specifically noted as "Separate Price" in which case contractor will complete the Supplementary Tender Form.

.3 It is responsibility of this Division to ensure "Alternate Equipment" fits space allocated and gives performance specified. If an "Alternate Equipment" nor "equal" specified product unit is proposed and does not fit space allotted in Consultant's opinion, supply of specified described equipment will be required without change in Contract amount. Should electrical characteristics for "alternate" or "equal" equipment differ from equipment specified it shall be the responsibility of the equipment manufacturer to pay all costs associated with the revisions to the electrical contract. Only manufacturers listed will be accepted for their product listing. All other manufacturers shall be quoted as substitution stating conditions and credit amount.

.4 If pipe or item, of size or weight indicated, is unobtainable, supply next larger size or heavier weight without additional charge.

1.8 EXAMINATION

.1 Site Reviews

.1 Examine premises to understand conditions, which may affect performance of work of this Division before submitting proposals for this work.

.2 No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

.2 Drawings:

.1 Mechanical Drawings show general arrangement of piping, ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.

.2 Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing, Mechanical, and Fire Protection Drawings.

.3 Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories, which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

.3 Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

1.9 SEQUENCING SCHEDULING AND COORDINATION

.1 It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for installation of systems according to the true intent and meaning of Contract Documents. Anything not clear or in conflict will be explained by making application to Consultant. Should conditions arise where certain changes would be advisable, secure Consultant's approval of these changes before proceeding with work.

.2 Coordinate work of various trades in installing interrelated work. Before installation of mechanical items, make proper provision to avoid interferences in a manner approved by Consultant. Each Contractor shall refer to all sections of the specification for their responsibilities with other trades. Changes required in work specified in Mechanical Division caused by neglect to do so shall be made at no cost to Owner.

.3 Arrange pipes, ducts, and equipment to permit ready access to valves, unions, traps, starters, motors, control components, and to clear openings of doors and access panels.

.4 Furnish and install inserts and supports required by Mechanical Division unless otherwise noted. Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions of the Work to Sections involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne by Mechanical Division.

.5 Be responsible for required excavation, backfilling, cutting, and patching incident to work of this Division and make required repairs afterwards to satisfaction of Consultant. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.

.1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

.2 Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

.3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

.6 Adjust locations of pipes, ducts, equipment, fixtures, etc, to accommodate work from interferences anticipated and encountered. Determine exact route and location of each pipe and duct prior to fabrication.

.1 Make offsets, transitions, and changes in direction of pipes, ducts, and electrical raceways as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.

.2 Furnish and install traps, air vents, sanitary vents, pull boxes, etc, as required to effect these offsets, transitions, and changes in direction.

.7 Slots and openings through floors, walls, ceilings, and roofs shall be provided by this contractor but performed by a trade specializing in this type of work. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

.8 This project is phased and scheduled to be completed during consecutive summer breaks (July and August of 2024 and 2025). Work must be completed so that the building occupancy is granted at the end of each summer break. Refer to architectural plans and specifications for additional details of phasing of work. Fire suppression system will also require work in both summers. Additional fees will not be permitted for additional work resulting from a failure to coordinate project phasing with architectural requirements and with general contractor.

1.10 CONTRACT BREAKDOWN

.1 Provide breakdown of contract exclusive of HST to acceptance of consultants prior to first draw submission.

.2 Provide labour and material cost for each item.

.3 Breakdown shall indicate total contract amount.

.4 Contract breakdown shall be as follows as a minimum.

Mobilization and shop drawings (max. $2000.00)
Demolition
Inside buried plumbing and drainage
Above grade rough-in plumbing and drainage
Plumbing Fixtures
Specialty Piping
Sprinkler system and heads
Heating piping
Piping Insulation
Ductwork
Duct Insulation
Grilles & Diffusers
Fire Stopping
Fans & Equipment
Building Automation Systems
Testing Adjusting and Balancing
HVAC system startup
Support for integrated testing for fire alarm system
DX Split Coolin System
Refrigeration Piping
Mechanical contractor closeout requirements (min. of 3% for the first $500,000.00, 1% from $500,000.00 to $5,000.000.00, and 0.5% beyond. Shall not be less than $5,000.00)

.5 Progress claims, when submitted, are to be itemized against each item of the contract breakdown, this shall be done in table form showing contract amount, work complete to date, previous draw, amount this draw and balance.

.6 Mobilization amount may only be drawn when all required shop drawings have been reviewed by the consultant.

1.11 SHOP DRAWINGS AND PRODUCT DATA

.1 Furnish complete catalog data for manufactured items of equipment to be used in the Work to Consultant for review within 14 days after award of Contract.

.2 Upon receipt of reviewed shop drawing, product is to be ordered immediately.

.3 Provide a complete list of shop drawings to be submitted prior to first submission.

.4 Before submitting to the Consultant, review all shop drawings to verify that the products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers, and similar data and that it has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The Contractor's review of each shop drawings shall be indicated by stamp, date and signature of a qualified and responsible person possessing by the appropriate authorization.

.5 If material or equipment is not as specified or submittal is not complete, it will be rejected by Consultant.

.6 Additional shop drawings required by the contractor for maintenance manuals, site copies etc., shall be photocopies of the "reviewed" shop drawings. All costs to provide additional copies of shop drawings shall be borne by the contractor.

.7 Submit all shop drawings for the project as a package. Partial submittals will not be accepted.

.8 Catalog data or shop drawings for equipment, which are noted as being reviewed by Consultant or their Engineer shall not supersede Contract Documents.

.9 Review comments of Consultant shall not relieve this Division from responsibility for deviations from Contract Documents unless Consultant's attention has been called to such deviations in writing at time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.

.10 Check work described by catalog data with Contract Documents for deviations and errors.

.11 Shop drawings and product data shall show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances. e.g., access door swing spaces.

.12 Shop drawings and product data shall be accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify as to current model production.

.5 Certification of compliance to applicable codes.

.13 State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information. List on catalog covers page numbers of submitted items. Underline applicable data.

.14 Shop drawings shall be submitted electronically as per the following directions:

.1 Electronic Submissions:

.1 Electronically submitted shop drawings shall be prepared as follows:

.1 Use latest software to generate PDF files of submission sheets.

.2 Scanned legible PDF sheets are acceptable. Image files are not acceptable.

.3 PDF format shall be of sufficient resolution to clearly show the finest detail.

.4 PDF page size shall be standardized for printing to letter size (8.5"x11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11"x17".

.5 Submissions shall contain multiple files according to section names as they appear in Specification.

.6 File names shall include consultant project number and description of shop drawing section submitted.

.7 Each submission shall contain an index sheet listing the products submitted, indexed in the same order as they appear in the Specification. Include associated PDF file name for each section.

.8 On the shop drawing use an “electronic mark” to indicate what is being provided.

.9 **Each file shall bear an electronic representation of the “company stamp” of the contractor. If not stamped the file submission will not be reviewed.**

.2 Email submissions shall include subject line to clearly identify the consultants project number and the description of the shop drawings submitted.

.3 Electronic attachments via email shall not exceed 10MB. For submissions larger than 10MB, multiple email messages shall be used. Denote related email messages by indicating “1 of 2” and “2 of 2” in email subject line for the case of two messages.

.4 Electronic attachments via web links (URL) shall directly reference PDF files. Provide necessary access credentials within link or as username/password clearly identified within body of email message.

.5 On site provide one copy of the “reviewed” shop drawings in a binder as noted above.

.6 Contractor to print copies of “reviewed” shop drawings and compile into maintenance manuals in accordance with requirements detailed in this section.

1.12 OPERATION AND MAINTENANCE MANUAL

.1 Provide operation and maintenance data for incorporation into manual as in submittals’ requirements.

.2 Operation and maintenance manual to be approved by, and final copies deposited with, Consultant before final inspection.

.1 Submit one (1) copy of Operation and Maintenance Manual to Consultant for approval. Submission of individual data will not be accepted unless so directed by Consultant.

.1 Manual(s) shall be in a three ring binder (minimum 50 mm (2") ring) labelled:

.1 Operation and Maintenance Manual.

.2 Project Name.

.3 Location.

.2 Make changes as required and re-submit as directed by Consultant.

.3 Operation data to include:

.1 Control schematics for each system including environmental controls.

.2 Description of each system and its controls.

.3 Description of operation of each system at various loads together with reset schedules and seasonal variances.

.4 Operation instruction for each system and each component.

.5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.7 Colour coding chart.

.8 Spare parts equipment list.

.9 Manufacturers standard or extended warranty information.

.4 Maintenance data shall include:

.1 Servicing, maintenance, operation, and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.5 Performance data to include:

.1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified elsewhere.

.4 Testing, adjusting and balancing reports as specified in Testing, Adjusting and Balancing Section.

.5 Copy of all substantial performance final certificates.

.6 Miscellaneous data to include:

.1 Letter of contractor’s warranty and guarantee.

.2 Index sheet.

.3 Tabbed format for each section.

.4 Manufacturers approved shop drawings.

.5 Spare parts list and source.

.6 List of Manufacturers and suppliers address for each piece of equipment.

.7 Final Submittals:

.1 Upon acceptance of Operation and Maintenance Manual by the Consultant provide the following:

.1 Provide two (2) copies of final operation maintenance manuals, as well as a PDF file of the entire approved manual on a USB stick. Only one USB stick is to be provided containing both the approved manual and as-built drawings.

1.13 AS-BUILT DRAWINGS

.1 Site records:

.1 Contractor shall provide two (2) sets of reproducible mechanical drawings. Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection at all times.

.2 As-Built drawings:

.1 Prior to start of Testing, Adjusting and Balancing (TAB), finalize production of as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 3 mm (1/8") high as follows: - "AS-BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).

.3 TAB to be performed using as-built drawings.

.1 Submit hard copy to Consultant for approval. When returned, make corrections as directed.

.2 Once approved, submit completed reproducible paper as-built drawings as well as a scanned pdf file copy on USB stick with Operating and Maintenance Manuals.

1.14 WARRANTIES

.1 In addition to guarantee specified in General Conditions, guarantee heating, cooling, and plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.

.2 The contractor shall provide all regular equipment service including any parts (as recommended by the manufacturer) for the warranty period.

.1 HVAC unit

.2 Exhaust fans

.3 All equipment filter changes (4 times per year).

.4 Miscellaneous fans and heaters.

.3 Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record "start-up" date of each piece of equipment on certificate. Include certificates as part of Operation & Maintenance Manual.

.4 Contractor shall rectify any installation deficiencies in the boiler or pressurized other systems identified by a TSSA Inspector for a period of three (3) years from ready for takeover.

.5 Warranty period shall start from date of ready for takeover and shall be 2 years. Warranty shall include parts and labour.

1.15 READY FOR TAKEOVER

.1 Complete the following to the satisfaction of the consultant prior to request for ready for takeover.

- .1 As-Built Drawings.
- .2 Maintenance Manuals
- .3 System Start up
- .4 TAB Reports
- .5 HVAC System Commissioning
- .6 Instructions to Owners
- .7 Final Certificates (required prior to consultant's release of conformance letter).
  - .1 NFPA-13 Contractors Material and Test Certificate (sprinkler)
  - .2 NFPA-13 Fire Protection Bypass Flow Test
  - .3 Sprinkler/Standpipe Design Engineers' Letter
  - .4 Potable Water Test (Refer to domestic water piping section – Part 3)
  - .5 Backflow Test Certificate (for all testable devices)

1.16 OCCUPANCY REQUIREMENTS

.1 The contractor shall provide the following documentation to the consultant prior to receiving occupancy. Failure to provide the proper documentation will result in the occupancy not being granted. List of required documentation:

- .1 Final Certificates (required prior to consultant's release of conformance letter).
  - .1 NFPA-13 Contractors Material and Test Certificate (sprinkler)
  - .2 NFPA-13 Fire Protection Bypass Flow Test
  - .3 Sprinkler/Standpipe Design Engineers' Letter
  - .4 Potable Water Test (Refer to domestic water piping section – Part 3)
  - .5 Backflow Test Certificate (for all testable devices)

1.17 REVISION TO CONTRACT

.1 Provide the following:

- .1 Itemized list of material with associated costs.
- .2 Labour rate and itemized list of labour for each item.
- .3 Copy of manufacturers/supplier's invoice if requested.

1.18 DELIVERY, STORAGE, AND HANDLING

.1 Follow Manufacturer's directions in delivery, storage, and protection, of equipment and materials. Contractor to include all costs associated with delivery storage and handling in tender price.

.2 Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or mechanical injury but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in dry, heated space.

1.19 DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS

.1 If designated substances and/or hazardous materials are suspected or identified cease all work in the immediate area in accordance with OHSA and notify consultant.

.2 Each contractor and on site employee of the contractor shall have "asbestos awareness training".

.3 The Contractor shall ensure that employees who may come into contact with designated substances and/or hazardous materials due to the nature of the work that they perform, have received training that enables them to recognize designated substances and/or hazardous materials and that enables them to react in accordance with the Occupational Health and Safety Act and regulations thereto should contact with designated substances and/or hazardous materials occur during the course of their work.

.4 It is the responsibility of the contractor to review the designated substances and/or hazardous materials book in the building prior to starting any work.

.5 Existing occupied buildings (depending upon their age) may contain designated substances and/or hazardous materials in thermal insulating materials and some manufactured products, such as vinyl asbestos floor tile. Any insulating materials, on pipes, fittings, boilers, tanks, ductwork, etc. may contain designated substances and/or hazardous materials and shall not be disturbed.

.6 A survey of each building documenting the location and condition of designated substances and/or hazardous materials -containing materials is available for your mandatory review prior to commencing any work on premises.

1.20 PHASING OF WORK

.1 This work for this project shall be constructed in phases. Refer to the architectural drawings for phasing information and details. Misinterpretation of the drawings with respect to the extent of the phasing of the work shall not relieve the contractor of the work required to complete the entire contract.

.2 Provide all necessary services or temporary services to suit phasing of construction with respect to all mechanical services and fire protection.

.3 Life safety systems in the building are to remain fully operational in occupied areas for building staff and occupants during renovations.

.4 Provide all necessary tests and certificates at completion of each phase to suit requirements of local authorities and consultants for occupancy of completed areas.

1.21 TSSA INSPECTION

.1 Prior to final completion of the project, this contractor shall make application, arrange, and pay for a TSSA inspection of all piping systems and equipment installations, including, but not limited to medical gasses, refrigeration, fuel piping, compressed air, heating plant, cooling plant, and associated equipment installed under the contract.

.2 Provide a copy of the TSSA report in the maintenance manuals for each system.

1.22 CONFINED SPACES

.1 Certain areas of the building may be defined as a “Confined Space”. Any personnel working in these areas must have confined space training, appropriate equipment and undertake all work in conformance with appropriate codes and standards.

.2 Refer to building documentation for any spaces deemed “Confined Space”.

1.23 ENERGY EFFICIENCY

.1 The mechanical systems of this building must achieve the energy efficiency levels by conforming to ANSI/ASHRAE/IESNA 90.1 “Energy Standard for Buildings Except Low-Rise Residential Buildings” and Chapter 2 of Division 3 of SB-10 prescriptive method from the Ontario Building Code.

.2 All equipment, products, and installations must conform to the Codes and Standards.

END OF SECTION

Part 1 General

1.1 TESTS

.1 Give 48 hours written notice of date for tests.

.2 Insulate or conceal work only after testing and approval by Consultant.

.3 Conduct tests in presence of Consultant.

.4 Bear costs including retesting and making good.

.5 Piping:

.1 General: maintain test pressure without loss for 4 h unless otherwise specified.

.2 Hydraulically test steam and hydronic piping systems at 1-1/2 times system operating pressure or minimum 860 kPa, whichever is greater.

.3 Test natural gas systems to CSA-B149.1-00, TSSA requirements and requirements of authorities having jurisdiction.

.4 Test drainage, waste and vent piping to Ontario Building Code and authorities having jurisdiction.

.5 Test domestic hot, cold and recirculation water piping at 1-1/2 times system operating pressure or minimum 860 kPa (124.8 psi), whichever is greater.

.6 Test fire systems in accordance with authorities having jurisdiction and as specified elsewhere.

.6 Equipment: test as specified in relevant sections.

.7 Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.

1.2 SYSTEM START UP

.1 Provide adjusting testing and start up of all equipment prior to testing and balancing (TAB) specified elsewhere.

.2 Provide consultant with written notice verifying all equipment operation and installation is complete.

.3 Start up shall be in presence of the following: owner or representative, contractor, building automation systems (BAS) contractor, and manufacturer's representative. Each person shall witness and sign off each piece of equipment. Consultant's attendance will be determined by consultant.

.4 Simulate system start up and shut down and verify operation of each piece of equipment.

.5 Arrange with all parties and provide 72 hours notice for start up procedure.

.6 Arrange with building automation systems contractor to sequence all components and ensure system operation.

1.3 COMMISSIONING

.1 Refer to section 20 08 11.

1.4 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTION

.1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.2 Mechanical contractor to schedule and coordinate the demonstration all on the same day, starting at a pre-approved time and continuing consequently until complete.

.3 Where specified elsewhere in Mechanical Division, qualified manufacturers' representatives who are knowledgeable about the project to provide demonstrations and instructions.

.4 Use operation and maintenance manual, record drawings, audio visual aids, etc. as part of instruction materials.

.5 Instruction duration time requirements as specified in appropriate sections.

.6 Where deemed necessary, Consultants may record these demonstrations on video tape for future reference.

1.5 TRIAL USAGE

.1 Consultant or owner may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:

.1 HVAC

.2 Exhaust air

.3 Plumbing and drainage.

1.6 DEFICIENCIES

.1 During the course of construction, the consultants will monitor construction and provide written reports of work progress, discussions, and instruction to correct work.

.2 Instruction to correct work shall be done within the work period before the next review.

.3 The contractor shall not conceal any work until inspected.

.4 The contractor shall expedite 100% complete rough-in work and have inspected prior to concealing services and equipment especially above ceiling.

.5 Upon completion of the project the consultant will do a final review. Upon receiving the final inspection report, the contractor must correct and sign back the inspection report indicating the deficiencies are completed. A re-inspection will only be done once consultant receives this in writing.

1.7 EQUIPMENT INSTALLATIONS

.1 Unions or flanges: provide for ease of maintenance and disassembly.

.2 Space for servicing, disassembly and removal of equipment and components: provide as recommended by manufacturer or as indicated.

.3 Equipment drains: pipe to floor drains.

.4 Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines.

1.8 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to equipment unless specified or indicated otherwise. Coordinate with block coursing (if applicable).

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install mechanical equipment at following heights unless indicated otherwise.

.1	Standard water closets	350 (14") to top of bowl
.2	Barrier-free water closets	400 (16") to top of bowl
.3	Barrier-free water closets	450 (18") to top of seat lid
.4	Wall hung lavatory	787)31") to top of rim
.5	Barrier-free wall hung lavatory	840 (33") max to top of rim 737 (29") min underside of rim front
.6	Hydronic heating elements	200 mm (8") to bottom of cabinet
.7	Backflow preventors	900 – 1200 (3'– 4') to centerline of unit
.8	Thermostats: Barrier Free (operable)	1200 mm (47.25")
	Non Barrier Free	1500 mm (59")

Also follow direction of architectural drawings and where discrepancies occur clarify prior to rough-in.

1.9 ANCHOR BOLTS AND TEMPLATES

.1 Supply anchor bolts and templates for installation by other divisions.

1.10 PROTECTION OF OPENINGS

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.11 ELECTRICAL

.1 Electrical work to conform to Electrical Division including the following:

.1 Supplier and installer responsibility and related mechanical responsibility is indicated in Equipment Schedule on mechanical and/or electrical drawings

.2 Control wiring and conduit is specified in Electrical Division except for conduit, wiring and connections below 50 V which are related to control systems specified in Mechanical Division. Refer to Electrical Division for quality of materials and workmanship.

.3 Electrically operated equipment shall be C.S.A. approved label. Special Inspection Label of Provincial Authority having jurisdiction will be accepted in lieu of C.S.A. approval. Each motor shall have an approved starter. Starter will be supplied and installed by Electrical Division unless otherwise indicated.

1.12 CONTROL WIRING

.1 Furnish and install all components, devices, and control wiring for all plumbing, fire protection, HVAC equipment, HVAC systems, lighting, and other electrical loads to make all equipment operable to satisfaction of owner and consultant and to manufacturer's requirements and recommendations.

.2 All electrical wiring, mechanical wiring and installations shall comply with local and national electrical and mechanical codes.

.3 Supply and install wiring as required for all devices and systems. Install wiring in EMT conduit and otherwise comply with all requirements of the Electrical Division. Approved plenum wire may be used for sensor and network communication wiring where it complies with appropriate building codes and regulatory authorities.

.4 All wiring concealed in walls and chases, and all exposed wiring shall be run in conduit.

.5 Provide recessed conduit and backer boxes where controls are wall mounted. Surface mounted boxes and conduit are acceptable in mechanical or service rooms.

.6 Free-run plenum rated cable shall be run in cable hangers where provided by electrical division or tied neatly to pipe and duct hangers in the ceiling. Avoid wiring that droops. Follow building lines and do not run wiring "as the crow flies".

1.13 MOTORS

.1 Provide high efficiency motors for mechanical equipment as specified.

.2 If delivery of specified motor will delay delivery or installation of any equipment, install motor approved by Consultant for temporary use. Final acceptance of equipment will not occur until specified motor is installed.

.3 Motors under 373 W, (1/2 hp): speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, voltage as indicated.

.4 Motors 373 W, (1/2 hp) and larger: EEMAC Class B, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 40°C (72°F), 3 phase, voltage as indicated.

1.14 BELT DRIVES

.1 Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.

.2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise specified.

.3 For motors under 7.5 kW 10 hp: standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified r/min.

.4 For motors 7.5 kW 10 hp and over: sheave with split tapered bushing and keyway having fixed pitch unless specifically required for item concerned. Provide sheave of correct size to suit balancing.

.5 Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.

.6 Motor slide rail adjustment plates to allow for centre line adjustment.

.7 Provide sheave changes as required for final air balancing.

1.15 GUARDS

.1 Provide guards for unprotected devices.

.2 Guards for belt drives:

.1 Expanded metal screen welded to steel frame.

.2 Minimum 1.2 mm (18 gauge) thick sheet metal tops and bottoms.

.3 40 mm (1 1/2") diameter holes on both shaft centres for insertion of tachometer.

.4 Removable for servicing.

.3 Provide means to permit lubrication and use of test instruments with guards in place.

.4 Install belt guards to allow movement of motors for adjusting belt tension.

.5 Guard for flexible coupling:

.1 "U" shaped, minimum 1.6 mm (16 gauge) thick galvanized mild steel.

.2 Securely fasten in place.

.3 Removable for servicing.

.6 Unprotected fan inlets or outlets:

.1 Wire or expanded metal screen, galvanized, 20 mm (3/4") mesh.

.2 Net free area of guard: not less than 80% of fan openings.

.3 Securely fasten in place.

.4 Removable for servicing.

.7 Duct Openings in Floor

.1 Provide reinforced expanded mesh grating, style 3 (3 lbs/sq.ft.) cover on accessible unprotected duct openings over 300 mm (12") wide and as indicated. This includes all ductwork terminating in air handling units and plenums.

.2 Securely Fasten in place.

.3 Removable for servicing.

1.16 PIPING AND EQUIPMENT SUPPORTS

.1 Equipment supports supplied by equipment manufacturer: specified elsewhere in Mechanical Division.

.2 Piping and equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel meeting requirements of - Structural Steel Section. Submit structural calculations with shop drawings.

.3 Mount base mounted equipment on chamfered edge housekeeping pads, minimum of 100 mm (4") high and 150 mm (6") larger than equipment dimensions all around. Concrete specified elsewhere.

.4 Where housekeeping pads incorporate existing pads provide 10 mm dowels into existing pads. New pad height shall match existing.

1.17 ROOF MOUNTED PIPE SUPPORT

.1 Provide zero penetration pipe support on roof where indicated.

.2 Base shall be made of high density polypropylene with UV protection. Maximum loading shall be 50 lb/sq.ft.

.3 Frames shall be galvanized. All fastenings, rods, nuts, washers, hangers, etc. shall be stainless steel.

.4 Provide shop drawings as specified. Install to manufacturers recommendations.

.5 Acceptable material:
Portable pipe hanger
Bigfoot systems
Miro rooftop supports
Trikon Systems

1.18 SLEEVES

.1 Pipe sleeves: at points where pipes pass through masonry, concrete or fire rated assemblies and as indicated. Grout sleeves in place.

.2 Schedule 40 steel pipe.

.3 Sleeves with annular fin continuously welded at midpoint:

.1 Through foundation walls.

.2 Where sleeve extends above finished floor.

.3 Through fire rated walls and floors.

.4 Sizes: minimum 6 mm (1/4") clearance all around, between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm (1") above other floors.

.6 Fill voids around pipes:

.1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.

.2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors, and partitions, maintain fire rating integrity.

.3 Ensure no contact between copper tube or pipe and ferrous sleeve.

.4 Fill future-use sleeves with lime plaster or other easily removable filler.

.5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+Amdt-Mar-78.

.7 Provide minimum 20 gauge duct sleeves where ducts pass through masonry concrete or fire rated assemblies. Maintain minimum 25 mm clearance all around or to the requirements of the authority having jurisdiction. Seal at wall as indicated.

1.19 FIRE STOPPING

.1 This contractor shall work with all other contractors on the project in providing one common method of fire stopping all penetrations made in fire rated assemblies.

.2 Approved fire stopping and smoke seal material in all fire separations and fire ratings within annular space between pipes, ducts, insulation, and adjacent fire separation and/or fire rating.

.3 Do not use cementious or rigid seals around penetrations for pipe, ductwork, or other mechanical items.

.4 Insulated pipes and ducts: ensure integrity of insulation and vapour barrier at fire separation.

.5 Provide materials and systems capable of maintaining effective barrier against flame, smoke, and gases. Ensure continuity and integrity of fire separation.

.6 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.

.7 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation. Provide “fire wrap” blanket around services penetrating fire walls. Extent of blanket must correspond to ULC recommendations.

.8 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens, and volatile solvents.

.9 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

.10 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes. Exposed surfaces are to be acceptable to consultant prior to application of finish.

.11 Firestopping shall be inspected and approved by local authority prior to concealment or enclosure.

.12 Install material and components in accordance with ULC certification, manufacturer’s instructions and local authority.

.13 Submit product literature and installation material on fire stopping in shop drawing and product data manual. Maintain copies of these on site for viewing by installers and consultant.

.14 Manufacturer of product shall provide certification of installation. Submit letter to the consultant.

.15 Acceptable Manufacturer:
Minnesota Mining and Manufacturing

.16 Acceptable Alternate Manufacturers to approval of local authority:
Fryesleeve Industries Inc.
General Electric Pensil Firestop Systems
International Protective Coatings Corp.
Rectorseal Corporation (Metacaulk)
Proset Systems
3M
AD Systems
Hilti

.17 Ensure firestop manufacturer representative performs on site inspections and certifies installation. Submit inspection reports/certification at time of substantial completion.

1.20 ESCUTCHEONS

.1 On pipes and ductwork passing through walls, partitions, floors and ceilings in exposed finished areas and on water and drain pipes inside millwork and cabinets.

.2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.

.3 Outside diameter to cover opening or sleeve.

.4 Inside diameter to fit around finished pipe.

1.21 PAINTING

.1 Refer to Section Interior Painting and specified elsewhere.

.2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

.3 Apply two coats of paint to exposed piping service in mechanical room, base colour as specified in Mechanical Identification Section.

.4 Prime and touch up marred finished paintwork to match original.

.5 Restore to new condition, or replace equipment at discretion of consultant, finishes which have been damaged too extensively to be merely primed and touched up.

1.22 SPARE PARTS

.1 Furnish spare parts in accordance with general requirements and as follows:

.1 One set of packing for each pump.

.2 One casing joint gasket for each size pump.

.3 One glass for each gauge glass.

.4 Sprinkler heads per NFPA-13 requirements.

.2 Provide list of equipment in maintenance manuals indicating corresponding spare parts required. List of spare parts to be signed off by receiving personnel.

1.23 SPECIAL TOOLS

.1 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Maintenance Materials Special Tools and Spare Parts.

1.24 DIELECTRIC COUPLINGS

.1 General:

.1 To be compatible with and to suit pressure rating of piping system.

.2 Where pipes of dissimilar metals are joined.

.2 Pipes NPS 50 mm (2") and under: isolating unions.

.3 Pipes NPS 65 mm (2 1/2") and over: isolating flanges.

1.25 DRAIN VALVES

.1 Locate at low points and at section isolating valves unless otherwise specified.

.2 Minimum NPS 20 mm (3/4") unless otherwise specified: bronze, with hose end male thread and complete with cap and chain.

.3 Drain valves on potable water systems shall be complete with vacuum breaker.

1.26 REPAIRS, CUTTING, AND RESTORATION

.1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

.2 Each Section of this Division shall bear expense of cutting, patching, and repairing to install their work and/or replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

.3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

.4 All patching, painting and making good of the existing walls, floors, ceilings, partitions and roof will be at the expense of this Contractor, but performed by the Contractor specializing in the type of work involved unless otherwise noted.

1.27 EXISTING SYSTEMS

.1 Connections into existing systems to be made at time approved by Consultant. Request written approval of time when connections can be made.

.2 Be responsible for damage to existing plant by this work.

1.28 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling equipment prior to turn over to owner.

.2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition including replacement of all filters in all air and piping systems.

1.29 DISCONNECTION AND REMOVAL

.1 Disconnect and/or remove equipment, piping, ductwork, etc. as indicated.

.2 Cap and conceal all redundant and obsolete connections.

.3 Provide a list of equipment to be removed to the owner, for his acceptance of same. Remove all equipment from site, which the owner does not retain.

.4 Store equipment to be retained by owner on site where directed by consultant.

1.30 OWNER SUPPLIED EQUIPMENT

.1 Connect to equipment supplied by the owner and make operable.

1.31 LOCATION OF EXISTING UNDERGROUND SERVICES

.1 This contractor shall locate existing services prior to starting any work in the affected area.

.2 This contractor shall use a video camera for the existing storm and/or sanitary drainage at the indicated connection point to confirm location, size and invert of the existing piping.

1.32 EXISTING CONCRETE SLAB X-RAY/SCANNING

.1 This contractor shall retain the services of a qualified company to provide and X-Ray and/or scan of the existing buried services in wall and/or floors prior to starting any work in the affected area.

.2 Failure to locate existing piping, conduit rebar etc., shall not relieve this contractor of repair of same prior to installing his service.

.3 This contractor shall be responsible for all repairs and/or replacement of existing services caused by cutting the existing concrete slabs and/or walls.

1.33 EXCAVATING AND BACKFILLING

.1 Provide all excavating and backfilling inside and outside the building for plumbing pipes, drains and equipment. All backfilling shall be new clean granular 'A' fill brought in specifically for the purpose of backfilling to the underside of floor slab. All backfilling shall be compacted at intervals not more than 150 mm (6") layer to the satisfaction of the Consultant.

.2 Provide excavating and backfilling outside the building with granular A brought in specifically for backfilling to a minimum of 450 mm (18") over the pipe. Backfilling outside building over and above the 450 mm (18") backfill as previously specified herein shall be by the Mechanical Contractor as specified under Division 2. Where backfilling outside the building is not specified under Division 2 the mechanical contractor shall provide new clean granular 'A' fill to grade level.

.3 Bottoms of trenches shall be excavated so that the pipe will be supported on a 150 mm (6") compacted bed of clean granular 'A' fill. Provide all necessary pumping to maintain excavation free of water.

.4 Should water be encountered during excavation, the mechanical contractor shall provide all labour and material, including all equipment required for dewatering the excavation. After the water has been removed, this Contractor shall install a 300 mm (12") base of compacted 50 mm (2") clear stone covered with filter cloth before installing backfill as detailed and/or as specified.

.5 Be responsible for all weather protection required to install piping and/or equipment to the satisfaction of the Consultant.

.6 Be responsible for providing all clear stone or granular 'A' material suitable for application to replace existing soil not suitable for backfilling above the 450 mm (18") bedding material.

1.34 CONFINED SPACES

.1 Certain areas of the building may be defined as a "Confined Space". Any personnel working in these areas must have confined space training, appropriate equipment and undertake all work in conformance with appropriate codes and standards.

.2 Refer to building documentation for any spaces deemed "Confined Space".

1.35 TSSA INSPECTION

.1 Prior to final completion of the project, this contractor shall make application, arrange, and pay for a TSSA inspection of all piping systems and equipment installations, including, but not limited to medical gasses, refrigeration, fuel piping, compressed air, heating plant, cooling plant, and associated equipment installed under the contract.

.2 Provide a copy of the TSSA report in the maintenance manuals for each system.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

.1 Conform to the General Provisions of General Requirements Section.

.2 This project is one of a retrofit nature in part, and which will require some demolition.

.3 Allow for all remedial work in areas indicated on the drawings and as generally defined in the relevant sections of the specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1 Electrical Division.

1.3 SCOPE OF WORK

.1 The scope of work is essentially the selected disconnection and/or removal of services and/or equipment, piping ductwork etc. as indicated or required to complete the work.

Part 2 Products

2.1 GENERAL

.1 This Division is to liaise with the Owners or Consultant for equipment being removed that may be suitable for reuse to that specified or handed over to the owner.

.2 This Division to take full responsibility for any special tools or equipment required to disassemble or remove material from building.

Part 3 Execution

3.1 GENERAL

.1 The general requirements are indicated on the drawings and on the outline specification in Division 1.

.2 The general execution of the demolition is to be carried out in a clean and efficient manner.

.3 Demolition of existing ceiling, walls etc., to facilitate removal of existing services or equipment or installation of new to be kept to a minimum and then restored to match existing.

.4 All openings or holes created by removal of existing mechanical systems which are not being reused are to be patched with the same material surrounding surfaces.

.5 All new holes and openings to facilitate mechanical systems are to be patched to match surrounding surfaces.

.6 Protect all existing furnishings materials and equipment. Any damage occurring as a result of the work of this Division shall be repaired or replaced at the expense of this Division.

.7 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Owners in an expedient manner with minimum disruption to the facility and systems downtime.

.8 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

.9 Where the location of any services has been shown on the plans, such information is not guaranteed. It is this Division's responsibility to verify locations, invert elevations, etc., immediately after moving on site. Should for any reason the information obtained necessitates changes in procedure or design, advise the Consultant at once. If verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Division's.

.10 Disconnect and/or remove equipment piping, ductwork, etc. as indicated.

.11 Cap and conceal all redundant and obsolete connections.

.12 Provide a list of equipment to be removed to the owner, for his acceptance of same. Remove all equipment from site which the owner does not retain.

.13 Maintain equipment to be retained by owner on site where directed by consultant.

.14 Demolition of all parts of the work must be completed within the confines of the work area and in such a way as the dust produced and risk to injury of will not adversely affect the building users.

.15 Demolished areas of the existing building will remain in their current use in some cases. Demolition in these areas must be kept to the minimum required to complete the work.

.16 Demolition shall take place within areas isolated from all other areas with appropriate hoarding, scaffolding, netting, fencing or other means of security between building users and the work.

.17 Co-ordinate making safe electrical devices, capping plumbing and removal of fixtures prior to commencement of demolition.

.18 All piping and equipment to be removed and/or abandoned shall be drained prior to capping and/or abandoning. Disposal of all liquids shall be to the approval of authority of having jurisdiction and/or provincial regulations.

3.2 EXISTING SYSTEM DRAINAGE

.1 Drain all existing piping and drainage systems including all related equipment as required to facilitate system renovations.

.2 Disposal of existing system shall be to the requirements of the local and/or provincial regulations.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ANSI/ASME B40.100, Pressure Gauges and Gauge Attachments.

.3 CAN/CGSB-14.4, Thermometers, Liquid-in-Glass, Self Indicating, Commercial/Industrial Type.

.4 CAN/CGSB-14.5, Thermometers, Bimetallic, Self-Indicating, Commercial/Industrial Type.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements.

.2 Submit manufacturer's product data for following items:

- .1 Thermometers.
- .2 Pressure gauges.
- .3 Stop clocks.
- .4 Syphons.
- .5 Wells.

Part 2 Products

2.1 GENERAL

.1 Design point to be at mid point of scale or range.

.2 Ranges: suitable for application.

2.2 DIRECT READING THERMOMETERS

.1 Industrial, variable angle type, liquid filled, 225 mm (9") scale length: to CAN/CGSB 14.4.

- .1 Acceptable materials:
  - .1 Trerice
  - .2 Winters 91T
  - .3 Wiess

2.3 THERMOMETER WELLS

.1 Copper pipe: copper or bronze.

.2 Steel pipe: brass or stainless steel.

2.4 PRESSURE GAUGES

.1 115 mm (4 1/2"), dial type: to ANSI/ASME B40.100, Grade 2A, stainless steel phosphor bronze bourdon tube having 0.5% accuracy full scale unless otherwise specified.

.1 Acceptable materials:

.1 Winters

.2 Trerice

.3 Wiess

.2 Provide:

.1 Siphon for steam service.

.2 Snubber for pulsating operation.

.3 Diaphragm assembly for corrosive service.

.4 Gasketted pressure relief back with solid front.

.5 Bronze stop cock.

Part 3 Execution

3.1 GENERAL

.1 Install so they can be easily read from floor or platform. If this cannot be accomplished, install remote reading units.

.2 Install between equipment and first fitting or valve.

3.2 THERMOMETERS

.1 Install in wells on all piping. Provide heat conductive material inside well.

.2 Install in locations as indicated and on inlet and outlet of:

.1 Water heating and cooling coils.

.2 In other locations indicated.

.3 Install wells as indicated only for balancing purposes.

.4 Use extensions where thermometers are installed through insulation.

3.3 PRESSURE GAUGES

.1 Install in following locations:

.1 Suction and discharge of pumps.

.2 Upstream and downstream of PRV's.

.3 Upstream and downstream of control valves.

.4 Inlet and outlet of coils.

.5 In other locations as indicated.

.2 Install gauge cocks for balancing purposes, elsewhere as indicated.

.3 Use extensions where pressure gauges are installed through insulation.

3.4 NAMEPLATES

.1 Install engraved lamicoid nameplates as specified in elsewhere identifying medium.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME)

.1 ANSI/ASME B31.1, Power Piping, (SI Edition).

.3 American Society for Testing and Materials (ASTM)

.1 ASTM A 125, Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A 563, Specification for Carbon and Alloy Steel Nuts.

.4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)

.1 MSS SP-58, Pipe Hangers and Supports - Materials, Design, Manufacture Selection, Application, and Installation.

1.2 DESIGN REQUIREMENTS

.1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.

.2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP-58.

.3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.

.4 Design hangers and supports to support systems under all conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.

.5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment to be in accordance with MSS SP-58.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements.

.2 Submit shop drawings and product data for following items:

.1 All bases, hangers and supports.

.2 Connections to equipment and structure.

.3 Structural assemblies.

1.4 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 GENERAL

.1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS-SP-58.

.2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.2 PIPE HANGERS

.1 Finishes:

.1 Pipe hangers and supports to ANSI & ULC requirements

.2 Ensure steel hangers in contact with copper piping are copper plated.

.2 Upper attachment structural: Suspension from upper flange of I-Beam or joist.

.1 Cold piping NPS 50 mm (2") maximum: Ductile iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.

.1 Rod: 10 mm (3/8") UL listed

.2 Cold piping NPS 65 mm (2 1/2") or greater, all hot piping: Malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed & FM approved.

.3 Upper attachment structural: Suspension from upper flange of I-Beam.

.1 Cold piping NPS 50 mm (2") maximum: Ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed.

.2 Cold piping NPS 65 mm (2 1/2") or greater, all hot piping: Malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nuts.

.4 Upper attachment to concrete.

.1 Ceiling: Carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm (1/4") minimum greater than rod diameter.

.2 Concrete inserts: wedge shaped body with knockout protector plate ULC listed. Note: Rapidex and Siporex are not considered concrete. Should one of these systems be encountered, piping/ductwork and/or equipment shall be supported from adjacent walls or from supplemental steel provided by this contractor attached to the adjacent walls/structure.

.5 Shop and field-fabricated assemblies.

.1 Trapeze hanger assemblies: ASME B31.1.

.2 Steel brackets: ASME B31.1.

.6 Hanger rods: threaded rod material to MSS SP-58.

.1 Ensure that hanger rods are subject to tensile loading only.

.2 Provide linkages where lateral or axial movement of pipework is anticipated.

.7 Pipe attachments: material to MSS SP-58.

.1 Attachments for steel piping: carbon steel.

.2 Attachments for copper piping: copper plated black steel.

.3 Use insulation shields for all piping.

.4 Oversize pipe hangers and supports to accommodate thermal insulation. Provide 1.5 mm (16 gauge) saddles.

.8 Adjustable clevis: material to MSS SP-58 UL listed, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.

.1 Ensure "U" has hole in bottom for rivetting to insulation shields.

2.3 RISER CLAMPS

.1 Steel or cast iron pipe: black carbon steel to MSS-SP-58, type 42, UL listed.

.2 Copper pipe: carbon steel copper plated to MSS-SP-58, type 42.

.3 Bolts: to ASTM A 307.

.4 Nuts: to ASTM A 563.

2.4 INSULATION PROTECTION SHIELDS

.1 Insulated cold piping:

.1 64 kg/m² (13.12 lbs/ft²) density insulation plus insulation protection shield to: MSS SP-69, galvanized sheet carbon steel. Length designed for maximum 3 m (10') span.

.2 Insulated hot piping:

.1 Curved plate 300 mm (12") long, with edges turned up, welded-in centre plate for pipe sizes NPS 300 mm (12") and over, carbon steel to comply with MSS SP-58.

2.5 EQUIPMENT SUPPORTS

.1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting requirements of miscellaneous metals, specified herein. Submit calculations with shop drawings.

2.6 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

.1 Provide templates to ensure accurate location of anchor bolts.

2.7 ROOF MOUNTED EQUIPMENT

.1 Install as per manufacturers' instructions on roof curbs provided by manufacturer as indicated.

.2 Provide all necessary continuous pressure treated wood blocking and 24 gauge metal liner on all exposed wood as required to install roof curb level.

2.8 OTHER EQUIPMENT SUPPORTS

.1 From structural grade steel meeting requirements of structural steel section specified herein.

.2 Submit structural calculations with shop drawings.

2.9 MANUFACTURER

.1 Acceptable materials:

.1 Grinnell

.2 Anvil

.3 Myatt

.4 Taylor

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with:

.1 Manufacturer's instructions and recommendations.

.2 Vibration Control Devices:

.1 Install on piping systems at pumps, boilers, chillers, cooling towers, elsewhere as indicated.

.3 Clamps on riser piping:

.1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.

.2 Bolt-tightening torques to be to industry standards.

.3 Steel pipes: Install below coupling or shear lugs welded to pipe.

.4 Cast iron pipes: Install below joint.

.4 Clevis plates:

.1 Attach to concrete with 4 minimum concrete inserts at each corner.

.5 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

3.2 HANGER SPACING

.1 Plumbing piping: most stringent requirements of Canadian Plumbing Code, Provincial Code, or authority having jurisdiction.

.2 Fire protection: to applicable fire code.

.3 Gas and fuel oil piping: up to NPS 15 mm (1/2"): every 1.8 m (6').

.4 Copper piping: up to NPS 15 mm (1/2"): every 1.5 m (5').

.5 Flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.

.6 Within 300 mm (12") of each elbow and:

Maximum Pipe Size: NPS	Spacing Steel	Maximum Spacing Copper
up to 32 mm (1 1/4")	2.1 m (7')	1.8 m (6')
40 mm (1 1/2")	2.7 m (9')	2.4 m (8')
50 mm (2")	3.0 m (10')	2.7 m (9')
65 mm (2 1/2")	3.6 m (12')	3.0 m (10')
80 mm (3")	3.6 m (12')	3.0 m (10')
90 mm (3 1/2")	3.9 m (13')	3.3 m (11')
100 mm (4")	4.2 m (14')	3.6 m (12')
125 mm (5")	4.8 m (16')	
150 mm (6")	5.1 m (17')	
200 mm (8")	5.7 m (19')	
250 mm (10")	6.6 m (22')	
300 mm (12")	6.9 m (23')	

.7 Pipework greater than NPS 300 mm (12"): to MSS SP-69.

3.3 HANGER INSTALLATION

.1 Install hanger so that rod is vertical under operating conditions.

.2 Adjust hangers to equalize load.

.3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

.4 Do “NOT” support piping, ductwork and equipment from roof deck, on bottom chord of floor and/or roof joist and/or from OWSJ bridging. Provide structural member between joist.

3.4 HORIZONTAL MOVEMENT

.1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4mm (5/32") from vertical.

.2 Where horizontal pipe movement is less than 15 mm (1/2"), offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.5 FINAL ADJUSTMENT

.1 Adjust hangers and supports:

.1 Ensure that rod is vertical under operating conditions.

.2 Equalize loads.

.2 Adjustable clevis:

.1 Tighten hanger load nut securely to ensure proper hanger performance.

.2 Tighten upper nut after adjustment.

.3 C-clamps:

.1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.

.4 Beam clamps:

.1 Hammer jaw firmly against underside of beam.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Provide separate shop drawings for each isolated system complete with performance and product data.

Part 2 Products

2.1 GENERAL

.1 Size and shape of bases type and performance of vibration isolation to be as indicated.

.2 To be of the same manufacturer for all isolation.

.3 Acceptable materials:
Korfund
Vibro-Acoustics
Vibron

2.2 HANGERS

.1 Colour coded springs, rust resistant, painted box type hangers. Arrange to permit hanger box or rod to move through a 30° arc without metal to metal contact.

.2 Type H1 - neoprene - in-shear, molded with rod isolation bushing, which passes through hanger box.

.3 Type H2 - stable spring, elastomeric washer, cup with molded isolation bushing which passes through hanger box.

.4 Type H3 - stable spring, elastomeric element with pre-compression washer and nut [with deflection indicator].

.5 Performance as indicated.

.6 Acceptable materials:
Vibron
IAC Acoustics
Korfund
Vibro-Acoustics

Part 3 Execution

3.1 INSTALLATION

.1 Install vibration isolation equipment in accordance with manufacturers instructions and adjust mountings to level equipment.

.2 Ensure piping, ducting and electrical connections to isolated equipment do not reduce system flexibility and that piping, conduit and ducting passage through walls and floors do not transmit vibrations.

.3 Unless indicated otherwise, support piping connected to isolated equipment with spring mounts or spring hangers with 25 mm (1") minimum static deflection as follows:

.1 Up to NPS 100 mm (4"): first 3 points of support. NPS 125 mm (5") to NPS 200 mm (8"): first 4 points of support. NPS 250 mm (10") and Over: first 6 points of support.

.2 First point of support shall have a static deflection of twice deflection of isolated equipment, but not more than 50 mm (2").

.4 Where isolation is bolted to floor use vibration isolation rubber washers.

.5 Block and shim level bases so that ductwork and piping connections can be made to a rigid system at the operating level, before isolator adjustment is made. Ensure that there is no physical contact between isolated equipment and building structure.

3.2 SITE VISIT

.1 Manufacturer to visit site and provide written certification that installation is in accordance with manufacturer's instructions and submit report to Consultant.

.2 Provide Consultant with notice 24 h in advance of visit.

.3 Make adjustments and corrections in accordance with written report.

3.3 TESTING

.1 Experienced and competent sound and vibration testing professional engineer to take vibration measurement for HVAC systems after start up and TAB of systems to Testing Adjusting and Balancing Section.

.2 Vibration measurements shall be taken for equipment-listed below:

.3 Provide Consultant with notice 48 h in advance of commencement of tests.

.4 Establish adequacy of equipment isolation and acceptability of noise levels in occupied areas and where appropriate, remedial recommendations including sound curves.

.5 Submit complete report of test results including sound curves.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.

.2 CAN/CGSB-24.3, Identification of Piping Systems.

.3 Canadian Standards Association (CSA).

.1 Natural Gas and Propane Installation Code CSA B149.1.

1.2 PRODUCT DATA

.1 Submit product data in accordance with General Requirements.

.2 Product data to include paint colour chips, all other products specified in this section.

1.3 PRODUCT LITERATURE

.1 Submit product literature in accordance with General Requirements.

.2 Product literature to include nameplates, labels, tags, lists of proposed legends.

Part 2 Products

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

.1 Metal or plastic lamicoid nameplate mechanically fastened to each piece of equipment by manufacturer.

.2 Lettering and numbers to be raised or recessed.

.3 Information to include, as appropriate:

.1 Equipment: Manufacturer's name, model, size, serial number, capacity.

.2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

.1 Colours:

.1 Hazardous: red letters, white background.

.2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).

.2 Construction:

.1 3 mm (1/8") thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.

.3 Sizes:

.1 Conform to following table:

Size	No. of Sizes mm (")	Height of Line mm (")	Letters mm (")
1	10 x 50 (3/8" x 2")	1 (3/64")	3 (1/8")
2	15 x 75 (1/2" x 3")	1 (3/64")	6 (1/4")
3	15 x 75 (1/2" x 3")	2 (5/64")	3 (1/8")
4	20 x 100 (3/4" x 4")	1 (3/64")	10 (3/8")
5	20 x 100 (3/4" x 4")	2 (6/64")	6 (1/4")
6	20 x 200 (3/4" x 8")	1 (3/64")	10 (3/8")
7	25 x 125 (1" x 5")	1 (3/64")	15 (1/2")
8	25 x 125 (1" x 5")	2 (5/64")	10 (3/8")
9	32 x 200 (1¼" x 8")	1 (3/64")	20 (3/4")

.2 Use maximum of 25 letters/numbers per line.

.4 Locations:

.1 Terminal cabinets, control panels: Use size #5.

.2 Equipment in Mechanical Rooms: Use size #9.

.3 Roof top equipment: use size #9.

.4 Equipment above ceiling: use size #1 riveted to ceiling suspension system.

2.3 FIRE DAMPER NAMEPLATES

.1 Colours:

.1 Black letters, yellow background.

.2 Construction:

.1 Self adhesive 50 mm x 25 mm, matte finish, with round corners.

.3 Locations:

.1 Install on adjacent ceiling grid. Where fire stop flap is installed in gypsum ceiling install on diffuser/grille frame. Where fire damper is installed above gypsum ceiling install on adjacent wall.

2.4 EXISTING IDENTIFICATION SYSTEMS

.1 Apply existing identification system to new work.

.2 Where existing identification system does not cover for new work, use identification system specified this section.

.3 Before starting work, obtain written approval of identification system from Consultant.

.4 Upon completion of this project all references to room names and numbering shall be to the Owner's requirements which may or may 'NOT' be the numbering system used on the drawings. Each contractor shall verify the proper numbering scheme to be used prior to project completion.

.5 All equipment shall be identified in sequence from the existing equipment and "NOT" duplicate numbering of equipment.

2.5 PIPING SYSTEMS GOVERNED BY CODE

.1 Identification:

.1 Natural and propane gas: To CSA B149.1-00 and authority having jurisdiction and as indicated elsewhere.

.2 Sprinklers: To NFPA 13.

.3 Standpipe and hose systems: To NFPA 14.

2.6 IDENTIFICATION OF PIPING SYSTEMS

.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

.2 Legend:

.1 Block capitals to sizes and colours listed in CAN/CGSB-24.3.

.3 Arrows showing direction of flow:

.1 Outside diameter of pipe or insulation less than 75 mm (3"): 100 mm (4") long x 50 mm (2") high.

.2 Outside diameter of pipe or insulation 75 mm (3") and greater: 150 mm (6") long x 50 mm (2") high.

.3 Use double-headed arrows where flow is reversible.

.4 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

.2 Length to accommodate pictogram, full length of legend and arrows.

.5 Materials for background colour marking, legend, arrows:

.1 Pipes and tubing 20 mm (3/4") and smaller: Waterproof and heat-resistant pressure sensitive plastic marker tags.

.2 All other pipes: Pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150°C (300°F) and intermittent temperature of 200°C (395°F).

.6 Colours and Legends:

.1 Where not listed, obtain direction from Consultant.

.2 Colours for legends, arrows: To following table:

Background colour:	Legend:	Arrows:
Yellow	White	Black
Green	White	Black
Red	White	Black

.7 Pictograms:

.1 Where required, to Workplace Hazardous Materials Information System (WHMIS) regulations.

.8 Background colour marking and legends for piping systems:

CONTENTS	BACKGROUND COLOUR MARKING	LEGEND
Hot water heating supply	Yellow	HEATING SUPPLY
Hot water heating return	Yellow	HEATING RETURN
Domestic hot water supply	Green	DOM. HW SUPPLY
Dom. HW recirculation	Green	DOM. HW CIRC
Domestic cold water supply	Green	DOM. CWS
Domestic tempered supply	Green	DOM. TEMPERED
Trap Primer	Green	TRAP PRIMER
Storm water	Green	STORM
Sanitary	Green	SAN
Plumbing vent	Green	SAN. VENT
Condensate	Green	CONDENSATE
Refrigeration suction	Yellow	REF. SUCTION
Refrigeration liquid	Yellow	REF. LIQUID
Refrigeration hot gas	Yellow	REF. HOT GAS

2.7 IDENTIFICATION DUCTWORK SYSTEMS

.1 50 mm (2") high stencilled letters and directional arrows 150 mm (6") long x 50 mm (2") high.

.2 Colours: Black, or co-ordinated with base colour to ensure strong contrast.

2.8 VALVES, CONTROLLERS

.1 Brass tags with 15 mm (1/2") stamped identification data filled with black paint.

.2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

.3 Provide adhesive coloured tab (max. size 15 mm) indication on ceiling to locate valves/equipment above. Same applies to grid. Colour to be approved by consultant.

2.9 CONTROLS COMPONENTS IDENTIFICATION

.1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.

.2 Inscriptions to include function and (where appropriate) fail-safe position.

.3 Provide equipment identification and/or indication on ceiling to locate devices/equipment above ceiling. Install identification on grid. Colours to be approved by consultant.

2.10 LANGUAGE

.1 Identification to be in English.

Part 3 Execution

3.1 TIMING

.1 Provide identification only after all painting specified has been completed.

3.2 INSTALLATION

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

.2 Provide ULC and/or CSA registration plates as required by respective agency.

3.3 NAMEPLATES

.1 Locations:

.1 In conspicuous location to facilitate easy reading and identification from operating floor.

.2 Standoffs:

.1 Provide for nameplates on hot and/or insulated surfaces.

.3 Protection

.1 Do not paint, insulate or cover in any way.

3.4 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

.1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels not more than 1.7 m (5'-8") intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.

.2 Adjacent to each change in direction.

.3 At least once in each small room through which piping or ductwork passes.

.4 On both sides of visual obstruction or where run is difficult to follow.

.5 On both sides of separations such as walls, floors, partitions.

.6 Where system is installed in pipe chases, ceiling spaces, galleries, other confined spaces, at entry and exit points, and at each access opening.

.7 At beginning and end points of each run and at each piece of equipment in run.

.8 At point immediately upstream of major manually operated or automatically controlled valves, dampers, etc. Where this is not possible, place identification as close as possible, preferably on upstream side.

.9 Identification to be easily and accurately readable from usual operating areas and from access points.

.1 Position of identification to be approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 VALVES, CONTROLLERS

.1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.

.2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Consultant. Provide one copy (reduced in size if required) in each operating and maintenance manual.

.3 Number valves in each system consecutively. Where existing numbering system is installed start new numbering system at 100.

END OF SECTION

Suddaby Public School
New Elevator, Sprinklers, and Accessibility
24-7547-RFT

Part 1 General

1.1 GENERAL

.1 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do all other work as specified in this section including all air handling systems and equipment, all plumbing systems and equipment and all temperature controls system, building automation systems and equipment.

.2 This contractor must co-ordinate their work with that of the TAB contractor.

1.2 QUALIFICATIONS OF TAB AGENCIES

.1 Names of all personnel it is proposed to perform TAB to be submitted to and approved by Consultant within 30 days of start of work.

.2 Provide documentation confirming qualifications, successful experience.

.3 Only the following NEBB (National Environmental Balancing Bureau) TAB contractors may quote:

.1 Air Audit Inc.
110 Turnbull Court, Unit 11
Cambridge, Ontario
N1T 1K6
(519) 740-0871

.2 Air Velocities Control Ltd.
100 Premium Way
Mississauga, Ontario
L5B 1A2
(905) 279-4433

.3 Airwaso Canada Inc.
PO Box 3014 White Oaks
London, Ontario
N6E 3P3
(519) 652-4040

.4 Clarke Balancing
8094 Esquesing Line,
Milton, Ontario
L9T 9C8
(905) 693-1518

.5 Dynamic Flow Balancing Ltd.
1200 Spears Road
Oakville, Ontario
L6L 2X4
(905) 338-0808

.6 Flowset Balancing Ltd.
431 Willis Dr.
Oakville, Ontario
L6L 4V6
(416) 410-9793

1.3 PURPOSE OF TAB

.1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average (95% design) and low (75% of design) loads using actual or simulated loads. TAB contractor to perform equipment evaluation upon start up and once during each season in the first year of operation.

.2 Adjust and regulate equipment and systems so as to meet specified performance requirements and to achieve specified interaction with all other related systems under all normal and emergency loads and operating conditions. Confirm all equipment interlocks and functions of associated systems.

.3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges and temperatures. Refer to BAS for system operating functions.

1.4 EXCEPTIONS

.1 TAB of systems and equipment regulated by codes, standards to be to satisfaction of authority having jurisdiction.

1.5 CO-ORDINATION

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule so as to ensure completion before acceptance of project.

.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems. Co-ordinate with other trades to ensure all systems are interlocked as indicated elsewhere prior to TAB.

1.6 PRE-TAB REVIEW

.1 Review contract documents before project construction is started and confirm in writing to Consultant adequacy of provisions for TAB and all other aspects of design and installation pertinent to success of TAB.

.2 Review specified standards and report to Consultant in writing all proposed procedures which vary from standard.

.3 During construction, co-ordinate location and installation of all TAB devices, equipment, accessories, measurement ports and fittings.

.4 During construction indicate all tolerances of piping, ductwork etc. conforms to specifications.

1.7 START-UP

.1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.

.2 Follow special start-up procedures specified elsewhere in the Mechanical Division.

1.8 OPERATION OF SYSTEMS DURING TAB

.1 Operate systems for length of time required for TAB and as required by Consultant for verification of TAB reports.

1.9 START OF TAB

.1 Notify Consultant in writing 3 days prior to start of TAB.

.2 Start TAB only when building is essentially completed, including:

.1 Installation of ceilings, doors, windows, other construction affecting TAB.

.2 Application of weather-stripping, sealing, caulking.

.3 All pressure, leakage, other tests specified elsewhere in the Mechanical Division.

.4 All provisions for TAB installed and operational.

.5 Start-up, verification for proper, normal and safe operation of all mechanical and associated electrical and control systems affecting TAB including but not limited to:

.1 Proper thermal overload protection in place for electrical equipment.

.2 Air systems:

.1 Filters in place, clean.

.2 Duct systems clean.

.3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.

.4 Correct fan rotation.

.5 Fire, smoke, volume control dampers installed and open.

.6 Coil fins combed, clean.

.7 Access doors, installed, closed.

.8 All outlets installed, volume control dampers open.

.3 Liquid systems:

.1 Flushed, filled, vented.

.2 Correct pump rotation.

.3 Strainers in place, baskets clean.

.4 Isolating and balancing valves installed, open.

.5 Calibrated balancing valves installed, at factory settings.

.6 Chemical treatment systems complete, operational.

.7 Control valves are properly piped.

.8 Coils and radiation are properly piped.

.9 BAS in operation.

1.10 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:

.1 HVAC systems: plus 10%, minus 5%.

.2 Hydronic systems: plus or minus 10%.

1.11 ACCURACY TOLERANCES

.1 Measured values to be accurate to within plus or minus 2% of actual values.

1.12 INSTRUMENTS

.1 Prior to TAB, submit to Consultant list of instruments to be used together with serial numbers.

.2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

.3 Calibrate within 3 months of TAB. Provide certificate of calibration to Consultant.

1.13 SUBMITTALS

.1 Submit, prior to commencement of TAB:

.1 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.14 PRELIMINARY TAB REPORT

.1 Submit for checking and approval of Consultant, prior to submission of formal TAB report, sample of rough TAB sheets. Include:

.1 Details of instruments used.

.2 Details of TAB procedures employed.

.3 Calculations procedures.

.4 Summaries.

1.15 TAB REPORT

.1 Format to be in accordance with NEBB, AABC, or SMACNA.

.2 The following additional information shall be provided for all air systems:

.1 Minimum damper position (MAD/Economizer) and the corresponding BAS signal and the voltage to the actuator to meet the full ASHRAE occupied ventilation requirements.

.2 Minimum damper position (MAD/Economizer) and the corresponding BAS signal and the voltage to the actuator to meet the full ASHRAE unoccupied ventilation requirements.

.3 Static pressure reading for each HVAC/AHU unit with VAV/VVT boxes open to 80% of design airflow and bypass damper closed to 0%. Provide reading at normal MAD/economizer damper position, dampers fully closed and dampers fully open.

.3 TAB report to show all results in SI or imperial units as indicated on plans and to include:

.1 Project as-built drawings.

.2 System schematics.

1.16 VERIFICATION

.1 All reported results subject to verification by Consultant.

.2 Provide manpower and instrumentation to verify up to 30% of all reported results.

.3 Number and location of verified results to be at discretion of Consultant.

.4 Bear costs to repeat TAB as required to satisfaction of Consultant.

1.17 SETTINGS

.1 After TAB is completed to satisfaction of Consultant, replace drive guards, close all access doors, lock all devices in set positions, ensure sensors are at required settings. Replace all ceiling tile etc.

.2 Permanently mark all settings to allow restoration at any time during life of facility. Markings not to be eradicated or covered in any way.

1.18 COMPLETION OF TAB

.1 TAB to be considered complete only when final TAB Report received and approved by Consultant.

1.19 AIR SYSTEMS

.1 Standard: TAB to be to most stringent of TAB standards of NEBB, AABC, SMACNA, ASHRAE.

.2 Do TAB of all systems, equipment, components, controls specified in the Mechanical Division including but not limited to following:

.1 Air handling systems and equipment

.2 Duct testing to SMACNA standards.

.3 Qualifications: personnel performing TAB to be current member in good standing of NEBB.

.4 Quality assurance: Perform TAB under direction of qualified supervisor.

.5 Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.

.6 Locations of equipment measurements: To include, but not be limited to, following as appropriate:

.1 Inlet and outlet of each damper, filter, coil, humidifier, fan, and other equipment causing changes in conditions.

.2 At each controller, controlled device.

.7 Locations of systems measurements to include, but not be limited to, following as appropriate: Each main duct, main branch, sub-branch, grille, register or diffuser.

1.20 HYDRONIC SYSTEMS

.1 Definitions: for purposes of this section, to include low pressure hot water heating, chilled water, condenser water, glycol systems.

.2 Standard: TAB to be the most stringent of TAB standards of NEBB, AABC, SMACNA, ASHRAE.

.3 Do TAB of all systems, equipment, components, controls specified in Mechanical Division including but not limited to hydronic equipment testing.

.4 Qualifications: personnel performing TAB to be current member in good standing of NEBB.

.5 Quality assurance: perform TAB under direction of qualified supervisor.

.6 Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: Flow rate, static pressure, pressure drop (or loss), temperature, specific gravity, density, RPM, electrical power voltage, noise, vibration.

.7 Locations of equipment measurement: To include, but not be limited to, following as appropriate:

.1 Inlet and outlet of each heat exchanger (primary and secondary sides), boiler, chiller, coil, humidifier, cooling tower, condenser, pump, PRV, control valve, other equipment causing changes in conditions.

.2 At each controller, controlled device.

.8 Locations of systems measurements to include, but not be limited to, following as appropriate: Supply and return of each primary and secondary loop (main, main branch, branch, sub-branch of all hydronic systems, inlet connection of make-up water.

1.21 DUCT LEAKAGE TESTING

.1 Co-ordinate leakage testing with the sheet metal contractor. TAB contractor will be responsible for all duct testing.

.2 Duct to be tested in accordance with SMACNA HVAC Duct Leakage Test Manual and as indicated.

1.22 OTHER SYSTEMS

.1 Pumped condensate systems: test for proper operation.

.2 Pumped sanitary and storm water systems: test for proper operation at all possible flow rates.

1.23 OTHER TAB REQUIREMENTS

.1 General requirements applicable to all work specified this paragraph:

.1 Qualifications of TAB personnel: as for air systems specified this section.

.2 Quality assurance: as for air systems specified this section.

.3 Building pressure conditions:

.1 Adjust HVAC systems, equipment, controls to ensure specified pressure conditions at all times.

.2 TAB procedures:

Positive	Negative
Corridors	Washrooms

.4 Zone pressure differences:

.1 Adjust HVAC systems, equipment, controls to establish air pressure differentials, with all systems in all possible combinations of normal operating modes.

.5 Provide duct testing as specified.

.6 Provide exhaust fan testing as specified.

.7 Provide testing of all new or relocated HVAC and Hydronic equipment.

.8 Changing of air handling equipment sheave and belts as required for specified air flow sheaves and belts supplied by unit manufacturer. Retest equipment after sheave change.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 The Mechanical Contractor shall provide the labour and material to conduct the closeout process as outlined in this specification section.

.2 The mechanical contractor shall perform the closeout requirements specified in conjunction with the independent commissioning consultant (CC) retained by the owner.

Part 2 Products

2.1 GENERAL

.1 The mechanical contractor and manufacturers shall provide all instrumentation and equipment necessary to conduct the tests specified. The Mechanical Contractor shall advise the Mechanical Consultant of instrumentation to be used and the dates the instruments were calibrated.

Part 3 Execution

3.1 THE CONTRACT CLOSE OUT PROCESS

.1 The mechanical contractor close out process shall consist of:

- Shop Drawings and As-built Drawings
- Installation inspection and equipment verification
- Plumbing and drainage system testing
- Testing of piping systems
- Independent contractor balancing of water systems
- Testing of air systems
- Independent contractor balancing of air systems
- Testing of equipment and systems
- BAS Commissioning
- Commissioning Consultant performance testing
- Commissioning meetings
- Operating and maintenance manuals
- Training
- Systems Demonstration and turnover
- Testing forms
- Warranties
- Contractor to provide list of equipment maintenance including schedule of maintenance parts, quantities, and model fixtures, etc.

3.2 SHOP DRAWINGS AND AS-BUILT DRAWINGS

.1 Conform to General Requirements Section for shop drawings and as-built drawings requirements.

3.3 INSTALLATION INSPECTION AND EQUIPMENT VERIFICATION

.1 The Mechanical Contractor shall co-ordinate with the Consultant who will inspect the mechanical installation.

.2 The Mechanical Contractor shall complete the equipment verification forms for each piece of equipment. The forms shall be included in the operating and maintenance manual. The equipment data shall include:

- Manufacturers name, address, and telephone number
- Distributors name, address, and telephone number
- Make, model number and serial number
- Pumps - RPM, impeller sizes, rated flow
- Fans - belt type and size, shive type and size
- Electrical - volts, amps, fuse size, overload size
- Any other special characteristics.

3.4 PLUMBING AND DRAINAGE SYSTEM TESTING

.1 The plumbing and drainage system shall be tested in accordance with the Plumbing Code under the Ontario Water Resources Act and the specification.

.2 The Mechanical Contractor shall notify the Building Inspector when systems are available for testing. The Mechanical Contractor shall document all tests performed and shall arrange for the Building Inspector to sign for tests completed. The forms shall be forwarded to the Consultant.

3.5 THE CONTRACTOR'S TESTING OF PIPING SYSTEMS

.1 Test all piping systems in accordance with all applicable plumbing codes and General Requirements section.

.2 All tests for the systems shall be performed in the presence of the Consultant or Commissioning Consultant. Complete the testing forms and forward to the Consultant.

3.6 THE INDEPENDENT CONTRACTORS TESTING AND BALANCING OF WATER SYSTEMS

.1 Conform with the specification section, Testing, Adjusting and Balancing.

.2 The Independent Contractor shall be hired by The Mechanical Contractor and shall report to the Commissioning Consultant.

3.7 THE CONTRACTORS TESTING OF AIR SYSTEMS

.1 Conform with the specification section, Testing, Adjusting and Balancing.

.2 All tests shall be performed in the presence of the Mechanical Consultant or the Commissioning Consultant. Complete the testing forms and forward to the Consultant.

3.8 THE INDEPENDENT CONTRACTORS TESTING AND BALANCING OF AIR SYSTEMS

.1 Conform with specification section, Testing, Adjusting and Balancing.

.2 The Independent Contractor shall be hired by The Mechanical Contractor and shall report to the Commissioning Consultant.

3.9 TESTING OF EQUIPMENT AND SYSTEMS

.1 General:

.1 The Mechanical Contractor shall hire the services of the manufacturers technicians to test the equipment and associated systems. The technician shall record the results of the tests on the testing forms. The tests shall be witnessed by the Consultant or Owners representative. When the tests have been completed satisfactorily the technician and witnessing authority shall sign the forms. A copy of the forms shall be forwarded to the Consultant. The original shall be inserted into the operating and maintenance manual.

.2 Should equipment or systems fail a test, the test shall be repeated after repairs or adjustments have been made. The additional tests shall be witnessed.

.3 Tests which have not been witnessed shall not be accepted and shall be repeated.

.4 The equipment and systems to be tested shall include:

- HVAC Units
- Boilers and Pumps
- ERV's
- Domestic Water Heaters, Pumps
- Life Safety and Fire Protection Systems
- Water Treatment Systems
- Building Automation Systems (BAS)

.2 BAS Testing:

.1 The BAS Contractor shall test the system as described in General Requirements and/or Controls Sections.

.2 Co-ordinate with the Consultant and submit completed test forms monthly.

.3 Demonstrate to the Owner and Consultant the operation of the BAS when all tests have been completed.

3.10 CLOSEOUT SCHEDULE

.1 The Mechanical Contractor shall include the schedule for all tests and equipment start-up tests in the construction schedule.

.2 All testing forms and reports associated with the mechanical systems shall be directed to the Consultant with copies to the Owner and Consultant.

.3 The forms and reports to be issued shall include:

- Shop drawings, issued and accepted
- Equipment verification forms
- Testing forms
- Reports resulting from tests
- Testing schedule
- Equipment Start-up Forms

3.11 OPERATION AND MAINTENANCE MANUAL

.1 Conform to General Requirements section for the Operating and Maintenance Manual requirements.

3.12 OPERATOR TRAINING

.1 Conform to General Requirements section for requirements for Instruction to Operating Staff.

.2 The training shall be conducted in a classroom and at the equipment or system.

.3 Training will begin when the operating and maintenance manuals have been delivered to The Owner and approved by the Consultant.

.4 Each training session shall be structured to cover:

The operating and maintenance manual
- Operating procedures
- Maintenance procedures
- Trouble-shooting procedures
- Spare parts required
- Submit a course outline to the Mechanical Consultant before training commences. Provide course documentation for up to eight people.

.5 The training sessions shall be scheduled and co-ordinated by the Mechanical Contractor.

.6 Training shall be provided for the following systems:

System	Minimum Training Times
Life Safety & Fire Protection Systems	2 hours
Water Treatment Systems	2 hours
The Mechanical System	8 hours

.7 The minimum training for the BAS shall be 16 hours. The training shall include:

- A walk through of the installation for the Building Owner to review the installation and equipment
- Operation of the central computer
- Operation of portable terminals
- Control sequences
- Report set-up and generation
- Managing the system
- Maintenance requirements

Refer to Controls specification section for further information.

.8 The training requirement for the mechanical system shall include a walk-through of the building by the Mechanical Contractor. During the walk through the Mechanical Contractor shall:

- Identify equipment
- Identify starters associated with equipment
- Identify valves and balancing dampers
- Identify access doors
- Review general maintenance of equipment
- Review drain points in pipework systems
- Identify maintenance items

.9 When each training session has been completed The Owner shall sign the associated form to verify completion.

3.13 MECHANICAL SYSTEM DEMONSTRATION AND TURNOVER

.1 Refer to General Requirements section, Mechanical Project Completion.

.2 The system demonstration and turnover to The Owner shall occur when:

- The installation is complete
- The acceptance test conducted by the Mechanical Consultant has been completed successfully
- The Commissioning Consultant system performance testing has been completed successfully
- Training has been completed
- Operating and Maintenance Manuals have been accepted
- Shop-drawings have been updated
- As-built drawings have been completed

.3 The systems demonstration shall be conducted by the Mechanical Contractor and the manufacturers. The demonstration shall cover a demonstration of equipment installation and operation.

3.14 TESTING FORMS

.1 The Mechanical Contractor and manufacturers shall provide forms for testing. The forms must be approved by the Consultant and The Owner before they are used.

3.15 WARRANTIES

.1 Equipment and system warranties shall not begin until the system demonstration and turnover has been conducted successfully and accepted by The Owner.

.2 The Mechanical Contractor shall fill out the warranty form listing the equipment and systems and the start and finishing dates for warranty.

.3 Refer to the general conditions specification section for the requirements during the warranty period.

3.16 CLOSEOUT PROCESS ALLOCATION

.1 The mechanical contractor closeout process shall be allocated a value equal to $5,000.00 (min. of 3% but not less than $5,000.00).

.2 The Mechanical Contractor shall submit all test and verification forms. The Consultant will use these forms to calculate percentage complete.

.3 The monies shall not be paid out until the performance testing, O & M manuals, systems demonstration, and training including all required paperwork have been completed to the satisfaction of the consultant. Refer to General Requirements section for contract breakdown.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 NFPA 13 latest edition, Installation of Sprinkler Systems.

.3 Ontario Fire Code.

.4 Ontario Building Code.

.5 Factory Mutual guidelines.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements in accordance with NFPA 13, working plans and design requirements.

.2 Shop drawings shall be approved by authority having jurisdiction prior to submission

.3 Submit to consultant for general review and information only.

.4 Submitted drawings shall be reproducible. Do not submit marked up prints.

.5 Drawings shall be in AutoCad format.

1.3 SAMPLES

.1 Submit samples in accordance with general requirements.

.2 Submit samples of following:

.1 Each type of sprinkler head.

.2 Signs.

1.4 ENGINEERING DESIGN CRITERIA

.1 Design system in accordance with Ontario Fire Marshall, local authority having jurisdiction, owner's underwriters as required, and NFPA 13 using following parameters:

.1 To suit occupancy as indicated.

.2 Pipe size and layout: Hydraulic design.

.3 Conduct flow and pressure test of water supply in vicinity of project to obtain criteria for bases of design in accordance with NFPA 13. Indicate location and flow on shop drawings.

.4 System zoning as indicated in accordance with NFPA 13.

.5 Provide complete drawings and calculations stamped by a qualified professional engineer registered in the Province of Ontario.

.6 Professional Engineer shall provide on-site review and certification for local building code review.

.2 System shall be approved by Ontario Fire Marshall, local authority, and owner's underwriter prior to shop drawing submission.

1.5 HYDRAULIC DESIGN CONSTRAINTS

.1 Municipal water pressure at this address is not substantial. The building is relatively tall with a tall cold attic space requiring a dry system. The tallest portion of the attic has sloped ceilings. Special attention to hydraulic calculations will be required.

.2 The successful contractor shall provide a complete hydraulically calculated system without the use of a fire pump.

.3 The hydraulically calculated fire suppression system design is to be completed based on confirmed flow data (flow test required to be completed by contractor).

.4 The successful contractor is responsible for scheduling a flow test date immediately after award of tender and shall conduct the flow test at the earliest available opportunity.

.5 The contractor shall inform the consultant immediately if available water pressure at this site is less than anticipated (see below).

.6 Where available flow data is less than the worst-case data tabulated below, the contractor shall provide proof-of-design based on the worst-case information provided below.

.7 The following flow test data, available from the City of Kitchener, for nearby addresses, is provided for reference only for consideration at time of tender. Detailed design is to use confirmed flow data.

Address	**200 Frederick St**	**155-159 Frederick St**	**25 Krug St**
Flow Test Date	**July 19, 2023**	**May 16, 2019**	**March 29, 2018**
Static Pressure	**55 psi**	**52 psi**	**58 psi**
Residual Pressure	**50 psi**	**48 psi**	**55 psi**
Flow Rate	**1615 US gpm (6114 Lpm)**	**1501 US gpm**	**1902 US gpm**

.8 Building Height: the peak building height above grade (peak of sloped attic) is approximately 16m. Peak building height is to be site confirmed.

1.6 COMMISSIONING & INTEGRATED TESTING OF FIRE PROTECTION & LIFE SAFETY SYSTEMS

.1 Sprinkler contractor to perform services with the Fire Commissioning Agent (FCA) to meet their requirements for administration, verification, and final sign-off.

.2 The Fire Commissioning Agent (FCA) is being retained by the electrical contractor, however; this contractor's work to satisfy the FCA requirements shall be included in the tender price.

.3 The sprinkler contractor at a minimum must include for:

.1 Providing FCA all documentation of design and shop drawings.

.2 Provide documents for sequence of operation and maintenance of system.

.3 Movement of all valves and accessories to confirm Alarm/Supervisory/Trouble at the fire panel.

.4 Create flow at all initiating devices to verify detection at the fire panel.

.5 Testing and operation of any fire pumps.

.6 Other items that may be requested by the FCA.

.7 Re-commissioning of any items that may have failed.

.8 Putting the system back into proper operation after tests are completed.

.4 All work to be performed in accordance with NFPA 3 2010 Edition. Special consideration to be given to Figure A3.3.16 (b) for Sequence of Operation Form required to be completed in conjunction with the FCA and submitted to the consultant's prior to occupancy.

.5 The work to be performed by this contractor is also described in NFPA 3 table A.5.1.1 as labelled "Construction Stage" and "Occupancy Stage".

1.7 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

1.8 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with general requirements.

.2 Provide spare sprinklers and tools as required by NFPA 13.

1.9 QUALIFICATIONS

.1 Contractor to be specialist in performing work of this section and have successful experience in this size and type of project.

1.10 PERMITS AND FEES

.1 Obtain and pay for all permits, fees, and inspections as required by authority having jurisdiction.

1.11 EQUIPMENT

.1 ULC listed and labeled.

1.12 STORAGE

.1 Store in original packaging with manufacturers' labels and seals intact.

.2 Store in dry secure location.

.3 Damaged material and/or equipment shall be replaced.

1.13 INSURANCE

.1 Confirm with owner prior to submitting quote.

.2 Owner's insurance underwriters:
Ontario School Boards' Insurance Exchange (OSBIE)
91 Westmount Road
Guelph, Ontario
N1H 5J2
Ph: (519) 767-2182 Fax: (519) 767-0281

1.14 UNDERWRITERS REQUIREMENTS

.1 Confirm with owner insurance underwriters prior to submitting quote.

Part 2 Products

2.1 PIPE, FITTINGS, AND VALVES

.1 Pipe and Fittings:

.1 25 mm (1"): Schedule 40 steel pipe with screwed fittings.

.2 32 mm (1¼") to 50 mm (2"):

.1 Schedule 40 steel pipe with screwed fittings or,

.2 Schedule 10 steel pipe with roll grooved fittings.

.3 65 mm (2½") and larger: Schedule 10 steel pipe with roll grooved fittings.

.2 Valves:

.1 ULC listed for fire protection service.

.2 Up to NPS 2: bronze, screwed ends, OS&Y gate.

.3 NPS 2 1/2 and over: cast iron, flanged or roll grooved ends, indicating butterfly valve.

.4 Swing check valves.

.5 Ball drip.

.3 Pipe hangers:

.1 ULC listed for fire protection services.

.4 End switches:

.1 Provide on all isolating valves.

.2 Coordinate voltage and location with fire alarm contractor.

.5 Flow switches:

.1 Provide where indicated and required.

.2 Coordinate voltage and location with fire alarm contractor.

2.2 SPRINKLER HEADS

.1 General: to NFPA 13 and ULC listed for fire services.

.2 Indicate type and location of sprinkler heads on drawings. Co-ordinate sprinkler heads location with other trades.

.3 Locate sprinkler heads in acoustic tile ceiling in centre of tile.

.4 Provide sprinkler heads as follows:

.1 Upright bronze / bronze sidewall / upright bronze special application:

.1 exposed in utility spaces with no ceilings

.2 exposed in attic (dry system)

.3 combustible concealed spaces

.2 Upright white sprinkler head where exposed in gymnasium.

.3 Recessed sidewall heads, colour per architectural, where sidewall heads are used in finished spaces with no dropped ceiling.

.4 Concealed frangible bulb type brass pendent with ring and cup in ceiling and brass cover plate. Cover plate finish selected by consultant. Concealed heads installed in unsupervised areas (corridors, washrooms).

.5 White semi-recessed frangible bulb type brass pendent with adjustable, recessed escutcheon ring and cup. Sprinkler and escutcheon cup. Finish selected by consultant. Semi-recessed heads installed in supervised areas (classrooms, offices, seminar rooms etc.).

.6 Sprinkler heads with O-ring design shall not be used.

.7 Provide guards on upright sprinkler heads in all storage rooms, in the gymnasium and on heads below 1800 mm AFF.

.5 Provide sprinkler heads under all equipment/ductwork over 1200 mm wide.

2.3 WATERFLOW DETECTORS (WFD)

.1 Provide, where shown, waterflow detectors, complete with vane type sensor to actuate two single pole, double throw snap action switches when waterflow exceeds a sustained 0.63 L/s (10 gpm) flow.

.2 Provide a built-in pneumatic retard device, with automatic reset to reduce false alarms. The time delay shall be field adjustable from 0 to 70 seconds.

.3 Provide local wiring at WFD. Refer to Division 16 for alarm wiring to annunciator panel.

.4 WFD shall be suitable for 1750 kPa (250 psig) service pressure.

2.4 SUPERVISORY SWITCHES

.1 General: to NFPA 13 and ULC listed for fire service.

.2 Valves:

.1 Mechanically attached to valve body, with normally open and normally closed contacts and supervisory capability.

.3 Flow switch type:

.1 With normally open and normally closed contacts and supervisory capability.

.4 Pressure alarm switch:

.1 With normally open and normally closed contacts and supervisory capability.

2.5 DRY PIPE ALARM CHECK VALVE

.1 Alarm check valve to NFPA 13 AND ULC listed for fire service.

.2 Cast iron body, stainless steel fitted with EPDM seal on bronze seated ring, flanged connections.

.3 Trim kit with air control and relief valve, main drain valve, priming level and alarm valves, ball drip valves, pressure gauges and electric sprinkler alarm gauges, priming chamber attachment and fill chamber attachment, interior electric alarm, exterior gong, signage and fire alarm connection.

.4 Provide 120V/1/60 maintenance air compressor and devices to automatically charge system.

.5 Connect to 120V/1/60 power source provided by Electrical division.

2.6 FIRE DEPARTMENT CONNECTION

.1 To NFPA 13 and ULC listed, siamese type, location as indicated. Thread specifications to be compatible with local fire department.

.2 Polished chrome plated recessed with identifying sign cast on plate. Threaded metal caps and chains.

2.7 FIRE PUMP

.1 Fire pump is not permitted.

.2 Hydraulic calculations are to be completed without the use of a fire pump.

2.8 PRESSURE GAUGES

.1 ULC listed

.2 Shall have maximum limit of not less than twice normal working pressure at point where installed.

2.9 SIGNS

.1 Signs for control drain and test valves: to NFPA 13.

.2 Provide exterior signage for Fire Department connection. Location of signage and text shall be to the approval of the local authority having jurisdiction.

2.10 SPARE PARTS CABINET

.1 For storage of maintenance materials, spare sprinkler heads and special tools.

.2 Include all types and temperature ratings of sprinkler heads installed.

.3 Construct to sprinkler head manufacturers standard.

.4 Install where directed on site or next to alarm valve.

2.11 DOUBLE CHECK VALVE ASSEMBLY (DCVA)

.1 The double check backflow preventer shall be ASSE 1015 approved, and supplied with full port gate valves. The main body and access covers shall be epoxy coated cast iron (ASTM A126 Class B), the seat ring and check valve shall be cast bronze (ASTM B584), the stem shall be stainless steel (ASTM A276) and the seat disc elastomers shall be EPDM.

.2 The checks shall be accessible for maintenance without removing the device from the line.

.3 Complete with supervisory switches for connection and monitoring by the fire alarm.

.4 Install to manufacturer's requirements and not higher than 1200 mm (4'-0") AFF.

.5 Acceptable materials:

.1 Watts 709 2½" - 10"

.2 Wilkins 950 2" - 10", 350 4" - 6"

.3 Conbraco 40-100 Series

2.12 INSPECTORS TEST CONNECTIONS

.1 Provide where indicated and to requirements of local authority.

.2 Discharge to building exterior to acceptance of consultant.

.3 Provide suitable signage to satisfaction of authority having jurisdiction and consultant.

2.13 DOCUMENTATION

.1 Prepare documentation as indicated.

.2 Provide documentation based on tender documents. Coordinate sprinkler drawings with all trades.

.3 Provide one hard copy and one electronic copy of As Built drawings acceptable to consultant prior to final payment.

2.14 UNIT PRICES

.1 Provide unit prices as follows.

.1 Additional sprinkler head including hangers, 3.6 M piping and two elbows.

.2 Delete sprinkler head including hangers, 3.6 M piping and two elbows.

2.15 UNDERWRITERS APPROVED GATE VALVE

.1 NPS 65 – 350 mm (2 1/2" - 14"), OS&Y:

.1 Approvals: UL and FM approved for fire service.

.2 UL and FM Label: on valve yoke.

.3 Body, Bonnet: cast iron to ASTM A 126 Class B. Wall thicknesses to ANSI B 16.1 and ULC 262(B).

.4 Bonnet bushing, yoke sleeve: bronze, to FM requirements.

.5 Packing gland: bronze.

.6 Stem: manganese bronze. Diameter to ULC C-262(B).

.7 Stuffing box dimensions, gland bolt diameter: to ULC C 262(B).

.8 Bosses for bypass valve, drain: on NPS 100 mm (4") and over.

.9 Disc: solid taper wedge. Up to NPS 80 mm (3"): bronze. NPS 100 mm (4") and over: cast iron with bronze disc rings.

.10 Disc seat ring: self-aligning, Milwood undercut on NPS 80 mm (3").

.11 Pressure rating:

.1 NPS 65 – 300 mm (2-1/2" - 12"): 1.7 MPa (250 psi) CWP

.2 NPS 350 mm (14"): 1.2 MPa (175 psi) CWP

.12 Operator: Handwheel.

Part 3 Execution

3.1 INSTALLATION

.1 Install, inspect and test to acceptance in accordance with NFPA 13 and FC 403.

.2 Install excess pressure pump across alarm valve in accordance with manufacturer's instructions.

.3 Pipe a bypass complete with indicating valve, between Fire department connection and sprinkler main downstream of DCVA. Bypass shall be sized to allow flow test of system demand as per NFPA 13 forward flow test thru the backflow preventor.

.4 Testing to be witnessed by authority having jurisdiction.

.5 Space hangers and support of sprinkler piping in accordance with N.F.P.A. regulations.

.6 Hydrostatically test systems at 350kPa in excess of normal working pressure, but not less than 1.4 MPA for two hours without loss under supervision of authority having jurisdiction and NFPA requirements.

.7 Provide hydraulic pump, temporary connections and labour required for tests.

.8 Protect exposed work, in accordance with ‘Painting’ section.

.9 Do not cover or conceal piping accessories or work prior to inspection and approval by authorities having jurisdiction.

.10 Adjust equipment to satisfaction of authority having jurisdiction and consultant.

.11 Protect equipment during painting. Replace damaged and painted components.

.12 Co-ordinate the sprinkler piping and equipment with that of other trades on the job. Mains and branches shall be run so as not to interfere with the building’s structure, mechanical, or electrical installations. Branch piping above ceilings is to run in joist space or minimum 300 mm above ceiling. Provide drops at head locations only. All exposed piping to run in joist space.

.13 Guarantee that the systems and equipment be installed in accordance with all Local and Provincial by-laws and the rules and regulations of the Insurance Underwriters and the Building Code of Ontario.

.14 Provide a flow test for each system on the remote inspector's test connection using methods approved by the local fire department and local water commission. Report the test results in writing to the consultant.

3.2 FIRE PUMP

.1 Not permitted.

3.3 EXCESS PRESSURE PUMP

.1 Provide automatic excess pressure pump system to serve each wet zone.

3.4 WATER FLOW TEST

.1 Provide a flow test to approval of local fire department and local water commission at nearest fire hydrant adjacent to building to determine water flow rate and pressure. Provide written test results with shop drawing submission.

.2 Provide a forward flow test thru the bypass to prove system demand can be provided thru the backflow preventer.

.3 See additional information under Part 1 General requirements of this specification section.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian General Standards Board (CGSB)

.1 ASTM C553, Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.2 CGSB 51-GP-52Ma, Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.3 CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketing Sheet, for Insulating Pipes, Vessels and Round Ducts.

.3 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.4 American Society for Testing and Materials (ASTM)

.1 ASTM C 335, Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.2 ASTM C 921, Practice for Determining the Properties Jacketing Materials for Thermal Insulation.

.3 ASTM B 209M, Specification for Aluminum and Aluminum Alloy Sheet and Plate.

.5 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

.1 ASHRAE Standard 90.1.

.6 Manufacturer's Trade Associations

.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for pipe, fittings, valves and jointing recommendations.

1.3 INSTALLATION INSTRUCTIONS

.1 Submit manufacturer's installation instructions in accordance with general requirements.

.2 Installation instructions to include procedures to be used, installation standards to be achieved.

1.4 QUALIFICATIONS

.1 Installer to be specialist in performing work of this section, and have expertise and be trained in this size and type of project, qualified to standards of TIAC.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Protect from weather, construction traffic.

.3 Protect against damage from any source.

.4 Store at temperatures and conditions required by manufacturer.

1.6 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - will mean "not concealed" as defined herein.

Part 2 Products

2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Mineral fibre as specified herein includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C (75°F) mean temperature when tested in accordance with ASTM C 335.

.3 Type A-1: Rigid moulded mineral fibre with factory applied vapour retarder jacket.

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52 Ma.

.3 Maximum "k" factor: to ASTM C553.

.4 Type A-2: Mineral fibre faced with factory applied vapour retarder jacket.

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52 Ma.

.3 Maximum "k" factor: to ASTM C553.

.5 Materials:

.1 All materials must be supplied by the same manufacturer.

.2 Acceptable Materials:
Fibreglass Canada
Knauf
Manson
Pittsburgh Corning

2.3 INSULATION SECUREMENT

.1 Tape: Self-adhesive, aluminum, reinforced, 50 mm (2") wide minimum.

.2 Contact adhesive: Quick setting.

.3 Canvas adhesive: Washable.

2.4 CEMENT

.1 Thermal insulating and finishing cement:

.1 To ASTM C553.

.2 Hydraulic setting or Air drying on mineral wool, to ASTM C 449M.

2.5 VAPOUR RETARDER LAP ADHESIVE

.1 Water based, fire retardant type, compatible with insulation.

2.6 INDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

2.7 JACKETS

.1 Polyvinyl Chloride (PVC):

.1 One-piece moulded type [and sheet] to CAN/CGSB-51.53 with pre-formed shapes as required.

.2 Colours: white.

.3 Minimum service temperatures: -20°C (-4°F).

.4 Maximum service temperature: 65°C (150°F).

.5 Moisture vapour transmission: 0.02 perm.

.6 Fastenings:

.1 Use solvent weld adhesive compatible with insulation to seal laps and joints.

.2 Tacks.

.3 Pressure sensitive vinyl tape of matching colour.

2.8 CAULKING FOR JACKETS

.1 Caulking: Silicone clear caulking.

Part 3 Execution

3.1 PRE-INSTALLATION REQUIREMENT

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.

.2 Surfaces to be clean, dry, free from foreign material.

3.2 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturers' instructions and this specification.

.3 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Hangers, supports to be outside vapour retarder jacket.

.4 Supports, Hangers:

.1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.3 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

.1 Application: At expansion joints, valves, primary flow measuring elements, flanges, and unions at equipment.

.2 Design: To permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.

.3 Insulation:

.1 Insulation, fastenings and finishes: same as system.

.2 Jacket: As per adjacent insulation.

3.4 INSTALLATION OF ELASTOMERIC INSULATION

.1 Insulation to remain dry at all times. Overlaps to manufacturers instructions. Ensure tight joints.

.2 Provide vapour retarder as recommended by manufacturer.

3.5 PIPING INSULATION SCHEDULES

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

.2 Install insulator and jackets to applicable TIAC codes.

.3 Insulate ends of capped piping with type and thickness indicated for capped service.

.4 Thickness of insulation to be as listed in following table.

.1 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

.2 All storm piping including all vertical and horizontal piping shall be insulated.

Application	Type	Pipe sizes through (NPS) and insulation thickness mm (")				
		to 25 (1")	32 (1¼") 40 (1½")	50 (2") 80 (3")	105 (4") 150 (6")	200 (8") & over
Domestic Water Piping	A-1	25 (1")	25 (1")	40 (1½")	40 (1½")	40 (1½")
Storm Piping	A-1	25 (1")	25 (1")	25 (1")	25 (1")	25 (1")
Cooling Coil cond. Drain	A-1	25 (1")	25(1")	25 (1")	25 (1")	25 (1")
Roof Drain sumps	A-2	25 (1")	25 (1")	25 (1")	25 (1")	25 (1")
Horizontal Cast Iron Sanitary Piping	A-1	N/A	N/A	25 (1")	25 (1")	25 (1")
Trap Primer Piping	A-1	15 (½")	15 (½")	25 (1")		

.5 Finishes: Conform to the following table:

Application	Piping	Valves & Fittings
Exposed indoors	PVC	PVC
Exposed in mech. rooms	PVC	PVC
Concealed indoors	N/A	PVC

.6 Connection: To appropriate TIAC code.

.7 Finish attachments: SS bands, @ 150 mm (6") oc. seals: closed.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ANSI/ASME B16.15, Cast Copper Alloy Threaded Fittings, Classes 125 and 250.

.3 ANSI B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.

.4 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.

.5 ANSI B16.24, Cast Copper Alloy, Pipe Flanges and Flanged Fittings: Classes 150, 300, 600, 900, 1500, and 2500.

.6 ASTM B88M, Specification for Seamless Copper Water Tube (Metric).

.7 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.

.8 MSS-SP-71, Cast Iron Swing Check Valves, Flanged and Threaded Ends.

.9 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

1.2 SHOP DRAWINGS

.1 Submit shop drawing data in accordance with general requirements.

1.3 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 PIPING

.1 Domestic hot, cold and recirculation systems, within building.

.1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.

.2 Buried or embedded: copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no buried joints.

2.2 FITTINGS

.1 Bronze pipe flanges and flanged fittings, Class 150 and 300: to ANSI B16.24.

.2 Cast bronze threaded fittings, Class 125 and 250: to ANSI/ASME B16.15.

.3 Cast copper, solder type: to ANSI B16.18.

.4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.

.5 Tee drill NPS 25 mm (1") and larger.

2.3 JOINTS

.1 Solder: 95/5.

.2 Teflon tape: for threaded joints.

.3 Dielectric connections between dissimilar metals: dielectric fitting to ASTM F1545, complete with thermoplastic liner.

.4 Tee drill fittings shall be brazed with silver solder, 45% Ag - 15% Cu or copper phosphorous, 95% Cu, 5% P and non-corrosive flux.

2.4 VALVES

.1 All valves shall be of commercial grade and of same manufacturer, Lead-Free.

.2 Acceptable materials:
Milwaukee
Crane
Kitz

2.5 BALL VALVES

.1 All valves shall be of commercial grade and of same manufacturer.

.2 NPS 80 mm (3") and under, soldered:

.1 To ANSI B16.18, Class 150.

.2 Bronze body, full port stainless steel ball, PTFE Teflon adjustable packing, brass gland and PTFE Teflon seat, steel lever handle, with NPT to copper adaptors.

2.6 GATE VALVES

.1 NPS 50 mm (2") and under, soldered:

.1 Rising stem: to MSS SP-80, Class 125, 860 kPa (125 psi), bronze body, screw-in bonnet, solid wedge disc.

.2 NPS 50 mm (2") and under, screwed:

.1 Rising stem: to MSS SP-80, Class 125, 860 kPa (125 psi), bronze body, screw-in bonnet, solid wedge disc.

.3 NPS 65 mm (2-1/2") and over, in mechanical rooms, flanged:

.1 Rising stem: to MSS SP-70, Class 125, 860 kPa (125 psi), flat flange faces, cast-iron body, OS&Y bronze trim.

.4 NPS 65 mm (2-1/2") and over, other than mechanical rooms, flanged:

.1 Non-rising stem: to MSS SP-70, Class 125, 860 kPa (125 psi), flat flange faces, cast-iron body, bronze trim, bolted bonnet.

2.7 GLOBE VALVES

.1 NPS 50 mm (2") and under, soldered:

.1 To MSS SP-80, Class 125, 860 kPa (125 psi), bronze body, renewable composition disc, screwed over bonnet.

.2 Lockshield handles: as indicated.

.2 NPS 50 mm (2") and under, screwed:

.1 To MSS SP-80, Class 150, 1.03 MPa (150 psi), bronze body, screwed over bonnet, renewable composition disc.

.2 Lockshield handles: as indicated.

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with Provincial Plumbing Code and local authority having jurisdiction.

.2 Cut square, ream and clean tubing and tube ends, clean recesses of fittings and assemble without binding.

.3 Assemble all piping using fittings manufactured to ANSI standards.

.4 Install tubing close to building structure to minimize furring, conserve headroom and space. Group exposed piping and run parallel to walls.

.5 Install CWS piping below and away from HWS and HWC and all other hot piping so as to maintain temperature of cold water as low as possible.

.6 Connect to fixtures and equipment in accordance with manufacturers instructions unless otherwise indicated.

.7 Bent tubing is not acceptable.

3.2 VALVES

.1 Isolate equipment, fixtures and branches with ball valves.

.2 Balance recirculation system using lockshield globe valves. Mark settings and record on record drawings on completion.

3.3 PRESSURE TESTS

.1 Conform to requirements of general requirements.

.2 Test pressure: greater of 1½ times maximum system operating pressure or 860 kPa (125 psi).

3.4 FLUSHING AND DISINFECTING

.1 Maintain testable RP backflow preventor between municipal water and new plumbing system.

.2 Ensure a minimum of 90% of plumbing fixtures are installed.

.3 Flush water mains through available outlets with a sufficient flow of potable water to produce a velocity of 1.5 m/s, within pipe for 10 min, or until foreign materials have been removed and flushed water is clear with backflow protection.

.4 Provide connections and pumps for flushing as required.

.5 Open and close valves, and operate fixtures to ensure thorough flushing.

.6 When flushing has been complete to satisfaction of Consultant introduce a strong solution of Chlorine into water system and ensure that it is distributed throughout entire system.

.7 Rate of chlorine application to be proportional to rate of water entering pipe.

.8 Chlorine injection to be close to point of filling water main or at building water service and to occur simultaneously.

.9 Confirm adequate chlorine residual not less than 50 ppm has been obtained, leave system charged with chlorine solution for 24 h. After 24 h, further samples shall be taken to ensure that there is still not less than 10 ppm of chlorine residual remaining throughout system.

.10 Upon 10 ppm confirmation and 24 hr elapsed time flush line to remove chlorine solution.

.11 Measure chlorine residuals at extreme end of pipe-line being tested.

.12 Perform bacteriological tests on water main, after chlorine solution has been flushed out. Take samples daily for minimum of two days. Should contamination remain or reoccur during this period, repeat disinfecting procedure. Specialist contractor shall submit certified copy of test results.

.13 Take water samples at remote fixtures and service connections.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ASTM A126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

.3 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

.4 PDI-WH201, Water Hammer Arresters.

.5 CAN/CSA-B64 Series, Backflow Preventers and Vacuum Breakers.

1.2 SUBMITTALS

.1 Submit shop drawings and product data in accordance with general requirements.

.2 For shop drawings, indicate dimensions, construction details and materials.

.3 For product data, indicate dimensions, construction details and materials for all items specified herein.

1.3 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

.2 Data to include:

.1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

Part 2 Products

2.1 WATER HAMMER ARRESTORS

.1 Copper construction, bellows type: to PDI-WH 201.

.2 Acceptable material:
Zurn Z-1700
Mifab MWH-100
Ancon No. 15

2.2 BACK FLOW PREVENTORS

.1 The backflow preventor shall prevent backflow by either backpressure or backsiphonage from a cross-connection between potable water lines and substances that are objectionable.

.2 To CAN/CSA-B64.

.3 Application: as indicated.

.4 Double check valve assembly (DCVA):
The double check type backflow preventer shall be ASSE 1015 approved, and supplied with full port ball valves. The main body and access covers shall be bronze (ASTM B584), the seat rings and all internal polymers shall be NSF® Listed Noryl™ and the seat disc elastomers shall be silicone. The first and second checks shall be accessible for maintenance without removing the device from the line.

.1 Acceptable materials:
Watts 007 ½"- 2"
Wilkins 950XL ¾ "- 2"
Conbraco 40-100 Series

.5 Double check valve assembly (DCVA)
The double check backflow preventer shall be ASSE 1015 approved, and supplied with full port gate valves. The main body and access covers shall be epoxy coated cast iron (ASTM A126 Class B), the seat ring and check valve shall be cast bronze (ASTM B584), the stem shall be stainless steel (ASTM A276) and the seat disc elastomers shall be EPDM. The checks shall be accessible for maintenance without removing the device from the line.

.1 Acceptable materials:
Watts 709 2½" - 10"
Wilkins 950 2" - 10", 350 4" - 6"
Conbraco 40-100 Series

2.3 VACUUM BREAKERS

.1 To CAN/CSA-B64 Series.

.2 Atmospheric vacuum breaker (A-VB):

.1 Acceptable materials:
Watts 288A
Conbraco 38-103 Series
Wilkins 35

.3 Hose connection vacuum breaker (HCVB):

.1 Acceptable materials:
Watts Series 8
Conbraco 38-304-AS
Wilkins BFP-8

2.4 HOSE BIBBS AND SEDIMENT FAUCETS

.1 Bronze construction complete with integral back flow preventer, hose thread spout, replaceable composition disc, and chrome plated in finished areas.

.1 Acceptable materials:
Watts BD series
Emco
Chicago
Zurn

2.5 OWNER SUPPLIED EQUIPMENT (WHERE APPLICABLE)

.1 The mechanical contractor shall supply and install all water, gas, condensate and sanitary piping to the owner supplied equipment. Connection to equipment shall be by this contractor.

.2 Provide flexible riser stops to all sinks and ball valves to all other equipment.

.3 Provide backflow preventors on equipment required by the local plumbing inspector.

.4 Provide flexible gas piping to all gas equipment.

.5 All equipment in store equipment schedule will be supplied and set in place by Mechanical Contractor unless otherwise noted.

.6 Coordinate all rough-ins and connection with the supplier on site.

.7 Owner supplied equipment includes existing relocated equipment.

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with provincial codes, and local authority having jurisdiction.

.2 Install in accordance with manufacturer's instructions and as specified.

3.2 WATER HAMMER ARRESTORS

.1 Install on branch supplies to each fixture or group of fixtures and where indicated.

3.3 STRAINERS

.1 Install with sufficient room to remove basket.

.2 Strainer size to match pipe size.

3.4 BACK FLOW PREVENTORS

.1 Install in accordance with CAN/CSA-B64 Series, where indicated and elsewhere as required by code.

.2 Pipe discharge to terminate over nearest drain and or service sink.

.3 Provide test results in manual and leave tag with test results on device.

3.5 HOSE BIBBS AND SEDIMENT FAUCETS

.1 Install at bottom of all risers, at low points to drain systems, and as indicated.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ASTM A126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

.3 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

.4 CAN/CSA-B79, Commercial and Residential Drains and Cleanouts.

1.2 SUBMITTALS

.1 Submit shop drawings and product data in accordance with general requirements.

.2 For shop drawings, indicate dimensions, construction details and materials.

.3 For product data, indicate dimensions, construction details and materials for all items specified herein.

1.3 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

.2 Data to include:

.1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

Part 2 Products

2.1 FLOOR DRAINS

.1 Floor drains and trench drains: to CAN/CSA-B79.

.2 Type FD-1: general duty; cast iron body, adjustable head, nickel bronze strainer, integral seepage pan, and clamping collar. Use square strainer in tiled areas and round strainer elsewhere.

.1 Acceptable materials:
Zurn ZN-415-B
Mifab F1100C
Watts Drainage FD-100-C-AS-1 or FD-100-C-LS-1
Enpoco
Contour C2000R5NB or C2000S5NB
Ancon

2.2 CLEANOUTS

.1 Cleanout plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.

.2 Wall access: face or wall type, stainless steel round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.

.1 Acceptable material:
Zurn ZSS-1469
Mifab C1400-RD
Ancon CO-480-RD-3
Contour C3700RAC

.3 Floor access: rectangular, round, as indicated, cast iron body and frame with adjustable secured 15 mm (½") thick flush mounted heavy duty nickel bronze top and:
Plugs: bolted bronze with neoprene gasket.

.1 Cover for unfinished concrete floors: nickel bronze round, gasket, vandal-proof screws.

.1 Acceptable material:
Zurn ZN-1400 – HD or Zurn ZXN-1612
Mifab C1100-XR-6
Ancon CO-200-RX-1-6
Contour C3000RXNB

.2 Cover for terrazzo finish: round polished nickel bronze with recessed cover for filling with terrazzo, vandal-proof locking screws.

.1 Acceptable materials:
Zurn ZN-1400-Z
Mifab C1100-UR-6
Ancon CO-200-U-1-6
Contour C3000RZNB

.3 Cover for VCT tile and linoleum floors: square polished nickel bronze with 15 mm (1/2") thick flush mounted heavy duty nickel bronze cover, complete with vandal-proof locking screws.

.1 Acceptable materials:
Zurn ZN-1400-T – HD
Mifab C1100-TS-6
Ancon CO-200-TS-1-6
Contour C3000SYNB

.4 Cover for ceramic tile floors: 15 mm (½") thick heavy duty nickel bronze square, cover complete with gasket, vandal-proof screws, for flush finish.

.1 Acceptable material:
Zurn ZN-1400 – T-HD or Zurn ZXN-1612
Mifab C1100-S-6
Ancon CO-200-S-1-6
Contour C3000SNB

.5 Cover for carpeted floors: round polished nickel bronze with flush cover, complete with stainless steel carpet marker, vandal-proof locking screws.

.1 Acceptable materials:
Zurn ZN-1400-HD-CM or ZN-1612-CM
Mifab C1100C-S-1-6
Ancon CO-200-RC-1-6
Smith
Contour C3000RMNB

2.3 TRAP SEAL PRIMERS

.1 All brass, with integral vacuum breaker, NPS 15 mm (1/2") solder ends, NPS 15 mm (1/2") drip line connection.

.2 Acceptable materials:
Zurn Z-1022
Mifab
Ancon MS-810
Smith

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with provincial codes, and local authority having jurisdiction.

.2 Install in accordance with manufacturer's instructions and as specified.

3.2 CLEANOUTS

.1 In addition to those required by code, and as indicated, install at base of all soil and waste stacks.

.2 Bring cleanouts to wall or finished floor unless serviceable from below floor.

.3 Building drain cleanout and stack base cleanouts: line size to maximum NPS 100 mm (4").

3.3 TRAP SEAL PRIMERS

.1 Install for all floor, hub and trench drains and elsewhere, as indicated.

.2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space, to approval of Consultant.

.3 Install soft copper tubing to floor drains above grade and polyethylene piping to floor drains below grade.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ASTM B32, Specification for Solder Metal.

.3 ASTM B306, Specification for Copper Drainage Tube (DWV).

.4 ASTM C564, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.5 CAN/CSA-B70, Cast Iron Soil Pipe, Fittings and Means of Joining.

.6 CAN/CSA-B125.3, Plumbing Fittings.

Part 2 Products

2.1 BELOW GRADE

.1 Piping and fittings

.1 Buried sanitary, storm and vent piping to:

.1 80 mm (3”) and smaller: ABS drain waste and vent pipe to CAN/CSA-B181.1.

.2 100 mm (4”) and larger: SDR-35 PVC drain waste and vent pipe to CAN/CSA-B181.2.

.3 Vent piping: any size, PVC-DWV plastic drain and sewer pipe and fittings CAN/CSA-B181.2.

.2 Joints

.1 Solvent weld for PVC: to ASTM D2564.

.2 Solvent weld for ABS: to ASTM D2235.

2.2 ABOVE GRADE

.1 Copper tube and fittings

.1 Sanitary, storm and vent, maximum 65 mm (2½") Type DWV copper to: ASTM B306.

.1 Fittings.

.1 Cast brass: to CAN/CSA B125.3.

.2 Wrought copper: to CAN/CSA B125.3.

.2 Solder: tin-lead, 50:50, to ASTM B32, type 50A.

.2 Cast iron piping and fittings

.1 Sanitary, storm and vent, minimum NPS 80 mm (3"), cast iron to: CAN/CSA-B70.

.1 Mechanical joints (vents)

.1 Neoprene or butyl rubber compression gaskets: to ASTM C564 or CAN/CSA-B70.

.2 Stainless steel clamps (2 band).

.2 Mechanical joints (sanitary)

.1 Heavy duty neoprene or butyl rubber compression gaskets to: ASTM C1540.

.2 Stainless steel clamps (4 band min).

.3 Plastic

.1 Sanitary, storm and vent piping:

.1 80 mm (3”) and smaller: IPEX: PVC-XFR fire rated drain waste and vent pipe to CAN/CSA-B181.1.

.2 100 mm (4”) and larger: IPEX: PVC-XFR drain waste and vent pipe to CAN/CSA-B181.2.

.3 Vent piping: any size, IPEX: PVC-XFR plastic drain and sewer pipe and fittings CAN/CSA-B181.2.

.2 Joints

.1 Solvent weld for PVC: to ASTM D2564.

.2 Solvent weld for ABS: to ASTM D2235.

.3 Use plastic XFR – DWV in pipe chase for urinal piping to 1.5 m (5' –0") above finished floor.

.4 Where piping pierces a fire separation an approved fire stop system to the approval of authority having jurisdiction shall be used.

2.3 VENT FLASHINGS

.1 Thaler or equal spun aluminum complete with insulation, cap, and rubber gasket.

2.4 FORCED MAINS

.1 Above and below ground sewage pump discharge, maximum 50 mm (2") type ‘L’ copper to ASTMB88M.

.2 Cast copper, solder fitting to ANSI B16.18.

.3 Cast bronze threaded fittings, class 125 to ANSI/ASME B16.15.

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with Provincial Plumbing Code and local authority having jurisdiction.

.2 Install above ground piping parallel and close to walls and ceilings to conserve headroom and space, and to grade as indicated.

.3 Place Cleanouts

.1 Where shown on Drawings and near bottom of each stack and riser.

.2 At every 90 degree change of direction for horizontal lines.

.3 Every 15 m (50') of horizontal run.

.4 Extend clean out to accessible surface. Do not place cleanouts in carpeted floors. In such locations, use wall type cleanouts.

.4 Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have a seal trap in connection with a complete venting system so gases pass freely to atmosphere with no pressure or syphon condition on water seal.

.5 Vent entire waste system to atmosphere.

.1 Discharge 500 mm (20") above roof. Join lines together in fewest practicable number before projecting above roof.

.2 Set back vent lines so they will not pierce roof near an edge or valley.

.3 Do not terminate vents within 3600 mm of any building intake and/or exhaust opening.

.4 Provide copper vent piping through roof as per detail.

.6 Use torque wrench to obtain proper tension in cinch bands when using hubless cast iron pipe. Butt ends of pipe against centering flange of coupling.

.7 Flash pipes passing through roof with 453 g (16 oz) sheet copper flashing fitted snugly around pipes and caulk between flashing and pipe with flexible waterproof compound.

.1 Flashing base shall be at least 600 mm (24") square.

.2 Flashing may be a 24 kg/m^2 (5 lb/ft^2) lead flashing fitted around pipes and turned down into pipe 15 mm (½") with turned edge hammered against pipe wall.

.8 Before piping is covered, conduct tests in presence of Consultant and correct leaks or defective work. Conduct test prior to placing floor slab but after backfill is placed.

.1 Do not caulk threaded work.

.2 Fill waste and vent system to roof level [a minimum of 3,100 mm - (10')] with water and show no leaks for 2 hours.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Indicate:

.1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled.

.2 Wiring and schematic diagrams.

.3 Dimensions and recommended installation.

.4 Pump performance and efficiency curves.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance and engineering data for incorporation into manual specified in general requirements.

.2 Data to include:

.1 Manufacturer's name, type, model year, capacity, and serial number.

.2 Details of operation, servicing, and maintenance.

.3 Recommended spare parts list with names and addresses.

Part 2 Products

2.1 ELEVATOR SUMP AND SIMPLEX PUMP

.1 Pump shall be of the centrifugal type and submersible type motor. The unit shall be capable of 2" solid capacity for normal grey water and 2" discharge pipe.

.2 Pump shall have a capacity of 50 GPM at a total head of 27 feet.

.3 Pump Motor:

.1 Pump motor shall be of the submersible type rated 0.5 horsepower at 3450 RPM. Motor shall be for 60 Hz., three phase, 575 volts (575/3/60). Motor shall be capacitor start, capacitor run type for high starting torque. Motors rated for VFD/continuous duty operation.

.2 Starter winding shall be of the open type with Class F insulation, good for 155°C (311°F) maximum operating temperature. Winding housing shall be filled with a clean, high dielectric oil that lubricates bearings and seals and transfers heat from windings and rotor to outer shell. Air-filled motors which do not have the superior heat dissipating capabilities of oil-filled motors shall not be considered equal.

.3 Motor shall have two heavy-duty ball bearings to support pump shaft and take radial and thrust loads. Ball bearings shall be designed for 50,000 hours B-10 life. Stator shall be bolted to seal plate for easy motor replacement.

.4 The motor shall have a heat sensor thermostat and overload attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 200°F. The high temperature shutoff will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The thermostat shall reset automatically when the motor cools to a safe operating temperature.

.5 The common motor pump shall be of #416 stainless steel threaded to take pump impeller and impeller.

.6 Motor shall be protected by one rotary mechanical seal. Seal face shall be carbon and ceramic and lapped to a flatness of one light band.

.4 The pump impeller shall be of the recessed type to provide an open unobstructed passage through the volute for the solids. Impeller shall be engineered thermoplastic (MC/MGF) or ductile iron (MGH) and shall be threaded onto stainless steel shaft.

.5 All iron castings shall be pre-treated with phosphate and chromic rinse and to be painted before machining, and all machined surfaces exposed to the sewage water to be re-painted. All fasteners to be 302 stainless steel.

.6 The motor power cord shall be 14 GA SJOW/SJOWA or SOOW. The cable jacket shall be sealed at the motor entrance by means of a rubber compression washer and compression nut. A heat shrink tube filled with epoxy shall seal the outer cable jacket and the individual leads to prevent water from entering the motor housing.

.7 The pump shall be complete with integral float and power cord.

.8 High level alarm system with audible signal and test button suited for 120/1/60 with plug. Supply sufficient cord length to nearest plug.

.9 Sump System

.1 Factory assembled 750 mm (30") diameter basin.

.2 Packaged basin units with basin and cover designed for off-set mounting.

.3 System includes fiberglass basin with anti-floatation ring, epoxy coated steel cover with separate cover for access to each pump and controls, control panel mounting sleeve, galvanized lifting chain and 100 mm (4") inlet.

.4 Depth of sump to be as indicated on drawings but not less than 750 mm (30") below inlet pipe.

.5 Provide guiderail in pit for all pumps with 2 hp motor or greater.

.10 Oil Detector and Control Panel

.1 Packaged system including control panel, remote alarm, oil sensor, floats. UL, CSA listed. Conforms to ASME 17.1.

.2 Control panel is Nema-1 enclosure (9" H x 7" W x 5" D) with connections for:
- low voltage level sensor
- line voltage pump power (120V)
- line voltage incoming power cord (120V)
- low voltage remote alarm.

Indicator lights (power on, pump run, high level, and high oil).

.3 Remote alarm capable of installation up to 2500 ft. cable from control panel.
Auxilliary contacts for BAS monitoring.
Backup 9V battery.
LED and audible alarm indicators, 103 db buzzer and auto/test/reset control.

.4 Cable of operating ½, ⅓ hp or smaller pumps at 120V.

.5 Acceptable manufacturers:
Myers EPC-115
Barnes
Grundfos

.11 Acceptable manufacturers:
Myers WHR5H-53
Barnes
Grundfos

2.2 SEWAGE SUMP AND SIMPLEX PUMP

.1 Pump shall be of the centrifugal type and submersible type motor. The unit shall be capable of passing 2" solid material in normal domestic and commercial sewage and 2" discharge pipe.

.2 Pump shall have a capacity of 40 GPM at a total head of 40 feet.

.3 Pump Motor:

.1 Pump motor shall be of the submersible type rated 1.0 horsepower at 3450 RPM. Motor shall be for 60 Hz., three phase, 208 volts (208/3/60). Motor shall be capacitor start, capacitor run type for high starting torque. Motors rated for VFD/continuous duty operation.

.2 Starter winding shall be of the open type with Class F insulation, good for 155°C (311°F) maximum operating temperature. Winding housing shall be filled with a clean, high dielectric oil that lubricates bearings and seals and transfers heat from windings and rotor to outer shell. Air-filled motors which do not have the superior heat dissipating capabilities of oil-filled motors shall not be considered equal.

.3 Motor shall have two heavy-duty ball bearings to support pump shaft and take radial and thrust loads. Ball bearings shall be designed for 50,000 hours B-10 life. Stator shall be bolted to seal plate for easy motor replacement.

.4 The motor shall have a heat sensor thermostat and overload attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 200°F. The high temperature shutoff will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The thermostat shall reset automatically when the motor cools to a safe operating temperature.

.5 The common motor pump and grinder shaft shall be of #416 stainless steel threaded to take pump impeller and grinder impeller.

.4 Motor shall be protected by one rotary mechanical seal. Seal face shall be carbon and ceramic and lapped to a flatness of one light band.

.5 The pump impeller shall be of the recessed type to provide an open unobstructed passage through the volute for the ground solids. Impeller shall be engineered thermoplastic (MC/MGF) or ductile iron (MGH) and shall be threaded onto stainless steel shaft.

.6 All iron castings shall be pre-treated with phosphate and chromic rinse and to be painted before machining, and all machined surfaces exposed to the sewage water to be re-painted. All fasteners to be 302 stainless steel.

.7 The motor power cord shall be 14 GA SJOW/SJOWA or SOOW. The cable jacket shall be sealed at the motor entrance by means of a rubber compression washer and compression nut. A heat shrink tube filled with epoxy shall seal the outer cable jacket and the individual leads to prevent water from entering the motor housing.

.8 The pump shall be complete with integral float and power cord.

.9 High level alarm system with audible signal and test button suitable for 120/1/60 Hz with plug. Supply sufficient cord length to nearest plug.

.10 Simplex Sump System

.1 Factory assembled 750 mm (30") diameter basin.

.2 Packaged basin units with basin and cover designed for off-set mounting and wiring.

.3 System includes fiberglass basin with anti-floatation ring, epoxy coated steel cover with separate cover for access to pump, control panel mounting sleeve, galvanized lifting chain and 100 mm (4") inlet.

.4 Depth of sump to be as indicated on drawings but not less than 750 mm (30") below inlet pipe.

.5 Provide guiderail in pit for all pumps with 2 hp motor or greater.

.11 Acceptable manufactures:
Myers WHRH-10
Barnes
Grundfos

Part 3 Execution

3.1 SEWAGE SUMPS AND PUMPS

.1 Install in accordance with manufacturers recommendations.

.2 Clean sump upon completion.

.3 Confirm operation of pumps, controls, and high level alarms.

3.2 FIELD QUALITY CONTROL

.1 Check power supply.

.2 Check starter protective devices.

.3 Start up, check for proper and safe operation.

.4 Check settings and operation of all hand-off-auto selector switch, operating, safety and limit controls, audible and visual alarms, over-temperature and other protective devices.

.5 Adjust flow from water-cooled bearings.

.6 Adjust impeller shaft stuffing boxes, packing glands.

.7 Demonstrate equipment operation as directed by consultant.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ASTM B306, Specification for Copper Drainage Tube (DWV).

.3 ASTM C564, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.4 CAN/CSA-B70, Cast Iron Soil Pipe, Fittings and Means of Joining.

Part 2 Products

2.1 BELOW GRADE

.1 Piping and fittings

.1 Buried sanitary, storm and vent piping to:

.1 80 mm (3”) and smaller: ABS drain waste and vent pipe to CAN/CSA-B181.1.

.2 100 mm (4”) and larger: SDR-35 PVC drain waste and vent pipe to CAN/CSA-B181.2.

.3 Vent piping: any size, PVC-DWV plastic drain and sewer pipe and fittings CAN/CSA-B181.2.

.2 Joints

.1 Solvent weld for PVC: to ASTM D2564.

.2 Solvent weld for ABS: to ASTM D2235.

2.2 ABOVE GRADE

.1 Copper tube and fittings

.1 Sanitary, storm and vent, maximum 65 mm (2½") Type DWV copper to: ASTM B306.

.1 Fittings.

.1 Cast brass: to CAN/CSA B125.3.

.2 Wrought copper: to CAN/CSA B125.3.

.2 Solder: tin-lead, 50:50, to ASTM B32, type 50A.

.2 Cast iron piping and fittings

.1 Sanitary, storm and vent, minimum NPS 80 mm (3"), cast iron to: CAN/CSA-B70.

.1 Mechanical joints (vents)

.1 Neoprene or butyl rubber compression gaskets: to ASTM C564 or CAN/CSA-B70.

.2 Stainless steel clamps (2 band).

.2 Mechanical joints (sanitary)

.1 Heavy duty neoprene or butyl rubber compression gaskets to: ASTM C1540.

.2 Stainless steel clamps (4 band min).

.3 Plastic

.1 Sanitary, storm and vent piping:

.1 80 mm (3”) and smaller: IPEX: PVC-XFR fire rated drain waste and vent pipe to CAN/CSA-B181.1.

.2 100 mm (4”) and larger: IPEX: PVC-XFR drain waste and vent pipe to CAN/CSA-B181.2.

.3 Vent piping: any size, IPEX: PVC-XFR plastic drain and sewer pipe and fittings CAN/CSA-B181.2.

.2 JOINTS

.1 Solvent weld for PVC: to ASTM D2564.

.2 Solvent weld for ABS: to ASTM D2235.

.3 Use plastic XFR – DWV in pipe chase for urinal piping to 1.5 m (5' –0") above finished floor.

.4 Where piping pierces a fire separation an approved fire stop system to the approval of authority having jurisdiction shall be used.

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with Provincial Plumbing Code and local authority having jurisdiction.

.2 Install above ground piping parallel and close to walls and ceilings to conserve headroom and space, and to grade as indicated.

.3 Place Cleanouts

.1 Where shown on Drawings and near bottom of each stack and riser.

.2 At every 90 degree change of direction for horizontal lines.

.3 Every 15 m (50') of horizontal run.

.4 Extend clean out to accessible surface. Do not place cleanouts in carpeted floors. In such locations, use wall type cleanouts.

.4 Use torque wrench to obtain proper tension in cinch bands when using hubless cast iron pipe. Butt ends of pipe against centering flange of coupling.

.5 Before piping is covered, conduct tests in presence of Consultant and correct leaks or defective work. Conduct test prior to placing floor slab but after backfill is placed.

.1 Do not caulk threaded work.

.2 Fill waste and vent system to roof level [a minimum of 3,100 mm - (10')] with water and show no leaks for 2 hours.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 CAN/CSA B45S1, Supplement #1 to CAN/CSA B-45 Series Plumbing Fixtures.

.3 CAN/CSA-B45 Series, CSA Standards on Plumbing Fixtures.

.4 CAN/CSA-B125.3, Plumbing Fittings.

.5 CAN/CSA-B651, Accessible Design for the Built Environment.

1.2 SHOP DRAWINGS

.1 Submit shop drawings and product data in accordance with general requirements.

.2 Indicate, for all fixtures and trim:

.1 Dimensions, construction details, roughing-in dimensions.

.2 Factory-set water consumption per flush at recommended pressure.

.3 For water closets, urinals: minimum pressure required for flushing.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data including monitoring requirements for incorporation into manual specified in general requirements.

.2 Include:

.1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.

.2 Details of operation, servicing, maintenance.

.3 List of recommended spare parts.

1.4 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

.1 Install rough-in for equipment supplied by others, complete with valves on hot and cold water supplies, waste and vent.

.2 Equipment installed by others.

.1 Connect with unions.

.3 Equipment not installed.

.1 Capped with valves for future connection by others.

Part 2 Products

2.1 MANUFACTURED UNITS

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.

.2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.

.3 Exposed plumbing brass to be chrome plated.

.4 Number, locations: Architectural drawings to govern.

.5 Fixtures in any one location to be product of one manufacturer and of same type.

.6 Trim in any one location to be product of one manufacturer and of same type.

2.2 FIXTURE CARRIERS

.1 Provide factory manufactured floor-mounted carrier systems for all wall-mounted fixtures.

.2 Acceptable materials:

.1 Zurn

.2 Smith

.3 Ancon

2.3 PLUMBING FIXTURES

.1 As noted on drawing schedules.

2.4 FIXTURE PIPING

.1 Hot and cold water supplies to each fixture/faucet:

.1 Chrome plated flexible supply pipes each with screwdriver stop, reducers, escutcheon and chrome plated nipple.

.2 Acceptable materials:

.1 Delta 47T900 Series

.2 McGuire

.2 Waste:

.1 Open grid strainer, or pop up as indicated, offset open grid strainer on Barrier-Free fixtures, cast brass fittings with tubular piping, chrome plated, rubber gasket compression fitting, and overflow flange.

.2 Acceptable materials:

.1 Delta 33T200 Series

.2 McGuire

.3 ‘P’ Traps:

.1 Cast brass P trap with cleanout on each fixture not having integral trap.

.2 Chrome plated in all exposed places.

.3 Acceptable materials:

.1 Delta 33T300 Series

.2 McQuire

Part 3 Execution

3.1 INSTALLATION

.1 Mounting heights:

- .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified. Confirm mounting height(s) with consultant prior to rough-in.
- .2 Wall-hung fixtures: measured from finished floor.
- .3 Physically Barrier-Free: to comply with most stringent of either NBCC or CAN/CSA B651.

.2 Drinking fountains:

- .1 In accordance with CAN/CSA B45S1.

3.2 ADJUSTING

.1 Conform to water conservation requirements specified this section.

.2 Adjustments.

- .1 Adjust water flow rate to design flow rates.
- .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
- .3 Adjust flush valves to suit actual site conditions.
- .4 Adjust urinal flush timing mechanisms.
- .5 Adjust water cooler, drinking fountain flow stream to ensure no spillage.
- .6 Automatic flush valves for water closets and urinals: set controls to prevent unnecessary flush cycles during silent hours.

.3 Checks.

- .1 Water closets, urinals: flushing action.
- .2 Aerators: operation, cleanliness.
- .3 Vacuum breakers, backflow preventors: operation under all conditions.

.4 Thermostatic controls.

- .1 Verify temperature settings, operation of control, limit and safety controls.

.5 Floor and wall mounted fixtures: caulk to floor or wall using silicone caulking to make water tight, colour to match fixture.

.6 Counter mounted fixtures: lay fixtures into bead of caulking to ensure excess moisture does not reach the cut edge of the countertop. Clean excess caulking off outside the sink.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian General Standards Board (CGSB)

.1 ASTM C553, Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.2 CAN/ULC-S702, Mineral Fiber Thermal Insulation for Buildings.

.3 ASTM C612, Mineral Fiber Block and Board Thermal Insulation.

.4 CGSB 51-GP-52Ma-[89], Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.3 Underwriters Laboratories of Canada (ULC).

.1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.

.4 American Society for Testing and Materials (ASTM).

.1 ASTM C 335, Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.2 ASTM C 449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.3 ASTM B 209M, Specification for Aluminum and Aluminum Alloy Sheet and Plate.

.5 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

.1 ASHRAE Standard 90.1.

.6 Manufacturer's Trade Associations.

.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for duct jointing recommendations.

1.3 INSTALLATION INSTRUCTIONS

.1 Submit manufacturer's installation instructions in accordance with general requirements.

.2 Installation instructions to include procedures to be used, installation standards to be achieved.

1.4 QUALIFICATIONS

.1 Installer to be specialist in performing work of this section, and have expertise and be trained in this size and type of project, qualified to standards of TIAC.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.

.2 Protect from weather and construction traffic.

.3 Protect against damage from any source.

.4 Store at temperatures and conditions required by manufacturer.

1.6 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - will mean "not concealed" as defined herein.

.2 Insulation systems - insulation material, fasteners, jackets, and other accessories.

Part 2 Products

2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Mineral fibre as specified herein includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C (75°F) mean temperature when tested in accordance with ASTM C 335.

.3 Type C-1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket to CGSB 51-GP-52Ma:

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52 Ma.

.3 Maximum "k" factor: to ASTM C553.

.4 Type C-2: Mineral fibre blanket to ASTM C553 faced with factory applied vapour retarder jacket to CGSB 51-GP-52Ma:

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52 Ma.

.3 Maximum "k" factor: to ASTM C553.

.5 Manufacturers:

.1 All materials must be supplied by the same manufacturer.

.2 Acceptable Materials:

.1 Johns Manville

.2 Fibreglass Canada

.3 Knauf

.4 Manson

.5 Roxul

2.3 JACKETS

.1 Canvas:

.1 220 g/m² (0.0451 lb/ft²) cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.

.2 Lagging adhesive: Compatible with insulation.

2.4 ACCESSORIES

.1 Vapour retarder lap adhesive:

.1 Water based, fire retardant type, compatible with insulation.

.2 Indoor Vapour Retarder Finish:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C 449.

.4 ULC Listed Canvas Jacket:

.1 220 g/m² (0.0451 lb/ft²) cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.

.5 Tape: self-adhesive, aluminum, reinforced, 75 mm (3") wide minimum.

.6 Contact adhesive: quick-setting Duro Dyne 1A-22 or equal.

.7 Canvas adhesive: washable.

.8 Tie wire: 1.5 mm (16 gauge) stainless steel.

.9 Facing: 25 mm (1") stainless steel hexagonal wire mesh stitched on one face of insulation

.10 Fasteners: weld pins, length to suit insulation, with 40 mm (1½") diameter clips.

Part 3 Execution

3.1 PRE-INSTALLATION REQUIREMENTS

.1 Pressure testing of ductwork systems to be complete, witnessed and certified.

.2 Surfaces to be clean, dry, free from foreign material.

3.2 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturers instructions and this specification.

.3 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Hangers, supports to be outside vapour retarder jacket.

.4 Supports, Hangers in accordance with general requirements.

.1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.

.5 Fasteners: At 300 mm (12") oc. in horizontal and vertical directions, minimum two rows each side.

.6 Provide rigid insulation for exposed ductwork.

3.3 DUCTWORK INSULATION SCHEDULE

.1 Insulation types and thickness' conform to following table:

Application	Type	Thickness
Rectangular supply air ducts	C-1	25 mm (1")
Round supply air ducts	C-2	25 mm (1")
Supply, return and exhaust ducts exposed (visible) in space being served	none	
Outdoor air intake ductwork and plenums	C-1	50 mm (2")
Exhaust plenums dampers and louvres	C-1	25 mm (1")
Interior acoustically lined ducts	none	
Last 1.5m of Exhaust duct	C-1	25 mm (1")

.2 Exposed round ducts 600 mm (24") and larger, smaller sizes where subject to abuse:

.1 Use TIAC code C-1 insulation, scored to suit diameter of duct.

.3 Finishes: Conform to following table:

Application	Rectangular	Round
Indoor, concealed	none	none
Indoor, exposed	Canvas	Canvas

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian General Standards Board (CGSB)

.1 ASTM C553, Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.2 CGSB 51-GP-52Ma, Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.3 CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketing Sheet, for Insulating Pipes, Vessels, and Round Ducts.

.3 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.4 American Society for Testing and Materials (ASTM)

.1 ASTM C 335, Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.2 ASTM C 921, Practice for Determining the Properties Jacketing Materials for Thermal Insulation.

.3 ASTM B 209M, Specification for Aluminum and Aluminum Alloy Sheet and Plate.

.5 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

.1 ASHRAE Standard 90.1.

.6 Manufacturer's Trade Associations

.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for pipe, fittings, valves and jointing recommendations.

1.3 INSTALLATION INSTRUCTIONS

.1 Submit manufacturer's installation instructions in accordance with general requirements.

.2 Installation instructions to include procedures to be used, installation standards to be achieved.

1.4 QUALIFICATIONS

.1 Installer to be specialist in performing work of this section and have expertise and be trained in this size and type of project, qualified to standards of TIAC.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Protect from weather, construction traffic.

.3 Protect against damage from any source.

.4 Store at temperatures and conditions required by manufacturer.

1.6 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - will mean "not concealed" as defined herein.

Part 2 Products

2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Mineral fibre as specified herein includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C (75°F) mean temperature when tested in accordance with ASTM C 335.

.3 Type A-1: Rigid moulded mineral fibre with factory applied vapour retarder jacket.

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52 Ma.

.3 Maximum "k" factor: to ASTM C553.

.4 Type A-3: Flexible unicellular tubular elastomer.

.1 Insulation to ASTM C553 with vapour retarder jacket.

.2 Jacket: to CGSB 51-GP-52 Ma.

.3 Maximum “k” factor: to ASTM C553.

.4 To be certified by manufacturer to be free of potential stress corrosion cracking corrodants.

.5 Materials:

.1 All materials must be supplied by the same manufacturer.

.2 Acceptable Materials:
Fibreglass Canada
Knauf
Manson
Pittsburg Corning

2.3 INSULATION SECUREMENT

.1 Tape: Self-adhesive, aluminum, reinforced, 50 mm (2") wide minimum.

.2 Contact adhesive: Quick setting.

.3 Canvas adhesive: Washable.

2.4 CEMENT

.1 Thermal insulating and finishing cement:

.1 To ASTM C553.

.2 Hydraulic setting or Air drying on mineral wool, to ASTM C 449M.

2.5 VAPOUR RETARDER LAP ADHESIVE

.1 Water based, fire retardant type, compatible with insulation.

2.6 INDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

2.7 OUTDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

.2 Reinforcing fabric: Fibrous glass, untreated 305 g/m^2 (0.062 lb/ft^2).

2.8 JACKETS

.1 Polyvinyl Chloride (PVC):

.1 One-piece moulded type [and sheet] to CAN/CGSB-51.53 with pre-formed shapes as required.

.2 Colours: white.

.3 Minimum service temperatures: -20°C (-4°F).

.4 Maximum service temperature: 65°C (150°F).

.5 Moisture vapour transmission: 0.02 perm.

.6 Fastenings:

.1 Use solvent weld adhesive compatible with insulation to seal laps and joints.

.2 Tacks.

.3 Pressure sensitive vinyl tape of matching colour.

.2 Aluminum:

.1 To ASTM B 209M.

.2 Thickness: 0.50 mm (26 gauge) sheet.

.3 Finish: Smooth.

.4 Joining: Longitudinal and circumferential slip joints with 50 mm (2") laps.

.5 Fittings: 0.50 mm (26 gauge) thick die-shaped fitting covers with factory-attached protective liner.

.6 Metal jacket banding and mechanical seals: stainless steel, 20 mm (3/4") wide, 0.50 mm (26 gauge) thick at 300 mm (12") spacing.

2.9 CAULKING FOR JACKETS

.1 Caulking: Silicone clear caulking.

Part 3 Execution

3.1 PRE-INSTALLATION REQUIREMENT

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.

.2 Surfaces to be clean, dry, free from foreign material.

3.2 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturers' instructions and this specification.

.3 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Hangers, supports to be outside vapour retarder jacket.

.4 Supports, Hangers:

.1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.3 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

.1 Application: At expansion joints, valves, primary flow measuring elements, flanges, and unions at equipment.

.2 Design: To permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.

.3 Insulation:

.1 Insulation, fastenings, and finishes: same as system.

.2 Jacket: As per adjacent insulation.

3.4 PIPING INSULATION SCHEDULES

.1 Includes valves, valve bonnets, strainers, flanges, and fittings unless otherwise specified.

.2 Install insulator and jackets to applicable TIAC codes.

.3 Insulate ends of capped piping with type and thickness indicated for capped service.

.4 Thickness of insulation to be as listed in following table.

.1 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Type	Pipe sizes through (NPS) and insulation thickness mm (")				
		to 25 (1")	32 (1¼") 40 (1½")	50 (2") 80 (3")	105 (4") 150 (6")	200 (8") & over
Hot Water Heating	A-1	40 (1½")	50 (2")	50 (2")	50 (2")	50 (2")
Refrigerant piping	A-3	25 (1")	25 (1")	25 (1")	25 (1")	25 (1")
Cooling Coil cond. Drain	A-1	25 (1")	25(1")	25 (1")	25 (1")	25 (1")

.5 Finishes: Conform to the following table:

Application	Piping	Valves & Fittings
Exposed indoors	PVC	PVC
Concealed indoors	N/A	PVC
Exterior refrigerant piping	Aluminum	Aluminum

.6 Connection: To appropriate TIAC code.

.7 Finish attachments: SS bands, @ 150 mm (6") oc. seals: closed.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian Standards Association (CSA).

.1 CSA W47.1, Certification of Companies for Fusion Welding of Steel.

.3 American National Standards Institute (ANSI).

.1 ANSI/ASME B16.1, Gray Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.

.2 ANSI/ASME B16.3, Malleable-Iron Threaded Fittings, Classes 150 and 300.

.4 American Society for Testing and Materials (ASTM).

.1 ASTM A47/A47M, Specification for Ferritic Malleable Iron Castings.

.2 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.

.3 ASTM A536, Specification for Ductile Iron Castings.

.4 ASTM B61, Specification for Steam or Valve Bronze Castings.

.5 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

.5 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).

.1 MSS-SP-67, Butterfly Valves.

.2 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.

.3 MSS-SP-71, Cast Iron Swing Check Valves, Flanged and Threaded Ends.

.4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

.5 MSS-SP-85, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

Part 2 Products

2.1 STEEL PIPE

.1 Steel pipe: to ASTM A53/A53M, Grade B, as follows:

.1 NPS 150 mm (1¼") and smaller: Schedule 40.

.2 Final connection to copper heating elements.

.1 Type “L” copper with 95/5 solder joints and dielectric couplings. Maximum length 600 mm (24").

.3 Pipe Joints

.1 NPS 50 mm (1¼") and under: screwed fittings with pulverized lead paste.

.2 Pipe thread: taper.

.4 Fittings

.1 Screwed fittings: malleable iron, to ANSI/ASME B16.3, Class 150.

.2 Unions: malleable iron, to ASTM A47/A47M and ANSI/ASME B16.3.

2.2 VALVES

.1 Connections:

.1 NPS 50 mm (1¼") and smaller: screwed ends.

.2 Drain valves: Gate, Class 125, non-rising stem, solid wedge disc, with chain and cap.

.3 Ball valves:

.1 NPS 32 mm (1¼") and under:

.1 Body and cap: cast high tensile bronze to ASTM B62.

.2 Pressure rating: Class 125, 860 kPa (125 psi) steam, WP = 1.4 MPa (203 psi) WOG.

.3 Connections: screwed ends to ANSI B1.20.1 and with hex. shoulders.

.4 Stem: stainless steel tamperproof ball drive.

.5 Ball and seat: replaceable stainless steel solid ball and teflon seats.

.6 Operator: removable lever handle.

.7 Extended handles on chilled water valves.

.8 Full port.

.9 Jenkins 201SJ

.4 All valves shall be of commercial grade and of same manufacturer.

.5 Acceptable Manufacturers:

.1 Newman Hattersley Canada Ltd.

.2 Jenkins/Crane

.3 Milwaukee

.4 Toyo

.5 Kitz

2.3 BALANCING VALVES

.1 Size 15 mm (1/2") to 32 mm (1¼"): Bronze body, brass ball, NPT connections and variable orifice.

.2 Differential pressure readout ports with internal EPT inserts and check values, 6 mm (¼") NPT tapped drain/purge ports, memory stop and calibrated nameplate.

.3 Acceptable materials: Tour & Anderson (match Victaulic pipe section).

2.4 AUTOMATIC AIR VENT

.1 Industrial float vent: cast iron body and NPS 15 mm (1/2") connection and rated at 860 kpa (125 psi) working pressure.

.2 Float: solid material suitable for 115°C (240°F) working temperature.

.3 Plastic vents are not acceptable.

.4 Acceptable materials:

.1 Maid-O-Mist No. 67

.2 Spirax Sarco

Part 3 Execution

3.1 PIPING INSTALLATION

.1 Installation shall be by a licensed pipe fitter.

.2 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

.3 Install concealed pipes close to building structure to keep furring space to minimum. Install to conserve headroom and space. Run exposed piping parallel to walls. Group piping wherever practical.

.4 Slope piping in direction of drainage and for positive venting.

.5 Use eccentric reducers at pipe size change installed to provide positive drainage or positive venting.

.6 Provide clearance for installation of insulation and access for maintenance of equipment, valves and fittings.

.7 Ream pipes, clean scale and dirt, inside and outside, before and after assembly.

.8 Assemble piping using fittings manufactured to ANSI standards.

.9 Saddle type branch fittings may be used on mains if branch line is no larger than half the size of main. Hole saw or drill and ream main to maintain full inside diameter of branch line prior to welding saddle.

3.2 VALVE INSTALLATION

.1 Install rising stem valves in upright position with stem above horizontal.

.2 Install ball valves at branch take-offs and to isolate each piece of equipment, and as indicated.

.3 Install CBVs for balancing as indicated.

.4 Provide swing check valves in horizontal lines as indicated.

3.3 AIR VENTS

.1 Install at high points of systems.

.2 Install ball valve on automatic air vent inlet.

.3 Extend vent lines in Mechanical Room with screwdriver stop at 1.8 m AFF.

3.4 CIRCUIT BALANCING VALVES

.1 Install flow measuring stations and flow balancing valves as indicated.

.1 On return side of all heating devices (convectors, panels, force flows, radiation, coils, etc.).

.2 On return side of all water or glycol cooling coils.

.3 On return side of all reverse return piping loops and/or branch circuits.

.2 Install to manufacturers requirements.

.3 Valve size shall be one pipe size smaller than piping or 20 mm (¾"), whichever is larger.

.4 Refer to Testing Adjusting and Balancing Section for applicable procedures.

3.5 FILLING OF SYSTEM

.1 Refill system with clean water adding water treatment as specified.

.2 Co-ordinate filling of system with HVAC water treatment contractor.

3.6 TESTING

.1 Test system in accordance with Mechanical General Requirements Section.

3.7 FLUSHING AND CLEANING

.1 Refer to Water Treatment section.

3.8 EXISTING SYSTEM DISPOSAL

.1 Drain existing hot hydronic system as required to facilitate system renovations.

.2 Disposal of existing system shall be to the requirements of the local and/or provincial regulations.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 American National Standards Institute (ANSI).

- .1 ANSI/ASME B16.1, Gray Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.
- .2 ANSI/ASME B16.3, Malleable-Iron Threaded Fittings, Classes 150 and 300
- .3 ANSI B18.2.1, Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series).
- .4 ANSI/ASME B18.2.2, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).
- .5 ANSI/AWWA C111/A21.11, Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.3 American Society for Testing and Materials (ASTM).

- .1 ASTM A47/A47M, Specification for Ferritic Malleable Iron Castings.
- .2 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
- .3 ASTM A536, Specification for Ductile Iron Castings.
- .4 ASTM B61, Specification for Steam or Valve Bronze Castings.
- .5 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings
- .6 ASTM F-1476, Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.

.4 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).

- .1 MSS-SP-67, Butterfly Valves.
- .2 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.
- .3 MSS-SP-71, Cast Iron Swing Check Valves, Flanged and Threaded Ends.
- .4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.
- .5 MSS-SP-85, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Indicate on manufacturers' catalogue literature the following:

- .1 Piping
- .2 Valves
- .3 Accessories
- .4 Grooved joint products shall be shown on drawings and product submittals and shall be specifically identified with the applicable Victaulic style or series number.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 ACCEPTABLE MATERIALS

.1 Victaulic.

.2 No alternates.

2.2 PIPE

.1 Steel pipe: to ASTM A53/A53M, Grade B, as follows:

.1 NPS 150 mm (6") and smaller: Schedule 40.

.2 Final connection to copper heating elements.

.1 Type “L” copper with 95/5 solder joints and dielectric couplings. Maximum length 600 mm (24").

2.3 PIPE JOINTS

.1 NPS 50 mm (2") and under: screwed fittings with pulverized lead paste.

.2 Rolled grooved with Grade E (EPDM) gaskets.

2.4 FITTINGS

.1 Grooved fittings: ASTM A536, Grade 65-45-12, ductile iron; ASTM A234, Grade WPB, wrought steel; or factory-fabricated from ASTM A53 steel pipe.

.2 Grooved joint couplings shall consist of two ductile iron housing segments, pressure responsive elastomer gasket, and ASTM A449 zinc-electroplated steel bolts and nuts. Couplings shall comply with ASTM F-1476, Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.

.1 Rigid: Couplings shall be Victaulic Style 107N Installation-Ready with angled bolt pad design to provide system rigidity and support and hanging in accordance with ANSI B31.1 and B31.9. Couplings must be installed with Grade EHP (EPDM-HP) gaskets, rated for water service to 120°C (250°F).

.2 Flexible: Use in locations where vibration attenuation and stress relief are required. Flexible couplings may be used in lieu of flexible connectors at equipment connections. Three couplings, for each connector, shall be placed in close proximity to the vibration source. Basis of Design: Victaulic Style 177 Installation-Ready, and Style 77.

.3 AGS series two-segment couplings with lead-in chamfer on housing key and wide-width FlushSeal gasket. Basis of Design: Victaulic Style W07 (rigid) and Style W77 (flexible).

.3 Flanges: Victaulic Style 741 / W741.

.4 Hole Cut Products and Branch Connections:

Victaulic Style 920 / 920N Mech. Tee
Victaulic Style 923 Vic-Let Outlet
Victaulic Style 924 Vic-O-Well Thermometer Outlet

2.5 VALVES

.1 Connections:

.1 NPS 50 mm (2") and smaller: screwed ends.

.2 NPS 65 mm (2 ½") and larger: rolled grooved ends.

.2 Butterfly valves: Application: Isolating each cell or section of multiple component equipment and where indicated. Valve seat shall be pressure responsive in sizes through NPS 300 mm (12”). The stem shall be offset from the disc centerline to provide complete 360-degree circumferential seating.

.1 NPS 50 mm (2") to 300 mm (12"): Victaulic Vic 300 MasterSeal

.2 NPS 350 mm (14") and over: Victaulic AGS-Vic300

.3 Drain valves: Gate, Class 125, non-rising stem, solid wedge disc, with chain and cap.

.4 Check valves:

.1 NPS 50 mm (2") and under:

.1 Class 150, swing, with PFTE disc, as specified.

Bronze. Jenkins 4475TJ.

.2 NPS 65 mm (2 1/2") and over: Victaulic Style 716 Vic – check and AGS W715 for NPS 350 mm (14”) and over.

.5 Ball valves:

.1 NPS 50 mm (2") and under:

.1 Body and cap: cast high tensile bronze to ASTM B62.

.2 Pressure rating: Class 125, 860 kPa (125 psi) steam, WP = 1.4 MPa (203 psi) WOG.

.3 Connections: Screwed ends to ANSI B1.20.1 and with hex. shoulders.

.4 Stem: stainless steel tamperproof ball drive.

.5 Stem packing nut: external to body.

.6 Ball and seat: replaceable stainless steel solid ball and teflon seats.

.7 Stem seal: TFE with external packing nut.

.8 Operator: removable lever handle.

.9 Extended handles on chilled water valves.

.10 Full port.

.11 Jenkins 201SJ.

.6 Strainers:

.1 Tee strainers: NPS 40 mm (1½") and over: Victaulic 730/W730 Tee Type Vic-Strainer.

.2 Wye Strainer: NPS 50 mm (2") and over: Victaulic 732/W732 Wye Type Vic-Strainer.

2.6 BALANCING VALVES

.1 Size 15 mm (1/2") to 50mm (2"): DZR Brass (Ametal®) globe type or bronze body, brass ball, NPT connections and variable orifice. Victaulic Series 786 / 787.

.1 Victaulic Koil-Kits Series 799, 79V, 79A, and 79B may be used at coil connections. The kit shall include a Series 786/787/78K circuit balancing valve or series 76 (where automatic balancing valves are required), Series 78Y Strainer-Ball or Series 78T Union-Ball valve combination, Series 78U Union-Port fitting, and required coil hoses. A Style 793 and/or 794 and/or Pilot R differential pressure controller shall be provided as required. A meter shall be provided by the valve manufacturer that shall remain with the building owner after commissioning.

.2 Combination balancing and control valve: at mechanical contractor and control contractor agreement, combination balancing/control valves will be accepted: ½" – 2" Victaulic TC on/off, Victaulic Series TM Modulating. For sizes 2-1/2" – 6" Fusion C

.3 Pressure Independent balancing and control valve (PIBCV) to be provided where required: Victaulic Series TCP/7CP/Fusion P

.2 Size 65 mm (2 1/2") to larger: Victaulic Tour Anderson Series 788/789.

.3 Differential pressure readout ports with internal EPT inserts and check values, 6 mm (¼")NPT tapped drain/purge ports, memory stop and calibrated nameplate.

.4 Acceptable materials:

.1 Tour & Anderson

.2 No alternates.

2.7 AUTOMATIC AIR VENT

.1 Industrial float vent: cast iron body and NPS 15 mm (1/2") connection and rated at 860 kPa (125 psi) working pressure.

.2 Float: solid material suitable for 115°C (240°F) working temperature.

.3 Plastic vents are not acceptable.

.4 Acceptable materials:

.1 Maid-O-Mist No. 67

.2 Spirax Sarco

2.8 SUCTION DIFFUSERS AND TRIPLE DUTY VALVES

.1 Suction Diffuser: Victaulic Style 731 and W731.

.2 Triple Duty Valve: Victaulic Triple Service Combination.

2.9 EXPANSION JOINTS AND FLEXIBLE CONNECTIONS

.1 Application: to suit motion.

.2 Minimum length in accordance with manufacturers recommendations to suit offset.

.3 Victaulic Style 150 Mover slip-type expansion joint or Style 155 Expansion Compensators. The expansion joint shall be installed with Style 07 Zero-Flex couplings.

Part 3 Execution

3.1 PIPING INSTALLATION

.1 Installation shall be by a licensed pipe fitter.

.2 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

.3 Install concealed pipes close to building structure to keep furring space to minimum. Install to conserve headroom and space. Run exposed piping parallel to walls. Group piping wherever practical.

.4 Slope piping in direction of drainage and for positive venting.

.5 Use eccentric reducers at pipe size change installed to provide positive drainage or positive venting.

.6 Provide clearance for installation of insulation and access for maintenance of equipment, valves, and fittings.

.7 Ream pipes, clean scale, and dirt, inside and outside, before and after assembly.

.8 Assemble piping using fittings manufactured to ANSI standards.

.9 Saddle type branch fittings may be used on mains if branch line is no larger than half the size of main. Hole saw or drill and ream main to maintain full inside diameter of branch line prior to welding saddle.

.10 Grooved Joints: Install in accordance with the manufacturer’s latest published installation instructions.

.1 Pipe ends shall be clean and free from indentations, projections and roll marks in the area from pipe end to (and including) groove.

.2 Gasket shall be manufactured by the coupling manufacturer and verified as suitable for the intended service.

.3 A factory trained representative (direct employee) of the coupling manufacturer shall provide on-site training for contractor’s field personnel in the use of grooving tools, application of groove, and product installation. The representative shall periodically visit the job site and review installation to ensure best practices in grooved joint installation are being followed. Contractor shall remove and replace any improperly installed products.

3.2 PIPE END PREPARATION

.1 Refer to the latest Victaulic installation instructions.

.2 Outside diameter of grooved pipe shall not vary more than the tolerance approved. Any internal or external weld bead or seams in the groove area must be ground smooth and flush. The end of the pipe internally must be cleaned of any material that might interfere with or damage the internal roll.

.3 Pipe surface shall be free from indentations and projections from the end of the pipe to the groove, to provide a leak tight seat for the gasket. All loose paint, scale, dirt, chips, grease, and rust must be removed. It is the recommendations of Victaulic that the pipe be square cut.

.4 Bottom of the groove must be free of loose dirt, chips, rust, and scale that may interfere with proper coupling assembly.

.5 Groove dimensions shall conform to standard roll groove specifications as published by Victaulic.

.6 Pipe shall be grooved using Victaulic roll grooving system with track enhanced grooving rolls.

3.3 "ZERO-FLEX" COUPLING INSTALLATION

.1 Refer to the latest Victaulic installation instructions.

.2 Pipe must be free from indentation, projections, or roll marks on exterior from the end to the groove, to assure a leak tight seat for the gasket.

.3 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Apply a thin coat of Victaulic Lubricant to gasket lips and outside of gasket.

.4 Place gasket over pipe end, being sure lip does not overhang pipe end.

.5 Align and bring two pipe ends together and slide gasket into position centered between the grooves on each pipe. No portion of the gasket shall extend into the groove on either pipe.

.6 Loosely assemble all segments leaving one nut and bolt off to allow for "swing-over" feature.

.7 With one nut and one bolt removed, use "swing-over" feature to position housings over gasket and into position into the grooves on both pipes.

.8 Remaining bolt shall be inserted. Bolt track head must engage into housing recess.

.9 Nuts shall be tightened alternately and equally and must maintain metal-to-metal contact at the angle bolt-pads. Tighten securely to assure a rigid joint.

3.4 "REDUCING" COUPLING INSTALLATION

.1 Refer to the latest Victaulic installation instructions.

.2 Pipe must be free from indentation, projections, or roll marks on exterior from the end to the groove, to assure a leak tight seat for the gasket.

.3 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Gasket must be thoroughly lubricated.

.4 Place large opening of the gasket over the larger pipe ends until the Assembly Washer touches the pipe end.

.5 Align the pipe centerlines and insert the smaller pipe end in the gasket. Assembly washer provided by Victaulic shall be used.

.6 Coupling housings shall be positioned over the gasket into the groove on each pipe.

.7 Insert bolts and apply nuts.

.8 Nuts must be tightened alternately and equal until housing bolt pads are firmly together – metal-to-metal.

3.5 "OUTLET" COUPLING INSTALLATION

.1 Refer to the latest Victaulic installation instructions.

.2 Pipe must be free from indentation, projections, or roll marks on exterior from the end to the groove, to assure a leak tight seat for the gasket.

.3 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Gasket must be thoroughly lubricated.

.4 Gasket shall be placed on one pipe end so the lips on one side cover the area between the pipe end and the groove. The gasket must not overlap the groove. The pipe ends shall be d to touch the reinforcement ribs inside the gasket.

.5 Bring mating pipe or fitting into position and insert into gasket. The gasket shall not overlap the groove, but fully cover the pipe end.

.6 Housings shall be placed over the gasket and the housing keys must engage into the grooves. Ample lubricant shall be applied to the gasket outlet neck and the upper housing interior.

.7 Insert bolts and apply nuts.

.8 Nuts must be tightened alternately and equally until housing bolt pads are firmly together – metal-to-metal.

3.6 VICTAULIC "FLANGE ADAPTOR" INSTALLATION

.1 Refer to the latest Victaulic installation instructions.

.2 Pipe must be free from indentation, projections, or roll marks on exterior from the end to the groove, to assure a leak tight seat for the gasket.

.3 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade.

.4 Victaulic Flange adaptor shall be opened fully and hinged flange shall be placed around the grooved pipe end with the circular key section locating into the groove.

.5 Standard bolt shall inserted through the mating holes of the Vic-Flange adaptor to secure firmly in the groove.

.6 Gasket shall be fully lubricated and pressed into the cavity between the pipe O.D. and flange recess.

.7 Standard flange bolt shall be place in the hinge hole (opposite the lock bolt) and the bolt assembly shall be directed to mate with the adjoining flange. Remaining flange bolts shall be added and tightened evenly until faces contact firmly.

.8 Where Vic-Flange adaptors do not mate to a hard smooth surface, Victaulic Flange Washers must be used.

3.7 MECHANICAL-T OUTLET INSTALLATION

.1 Refer to the latest Victaulic installation instructions.

.2 Holes must be drilled.

.3 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade.

.4 In preparation for assembly, one nut and bolt shall be removed from the housing. The other nut and bolt shall be loosened until it is flush with the nut and bolt. Remove the tape and lift the gasket from the mechanical-T outlet.

.5 Victaulic lubricant shall be applied to all surfaces of the gasket and the gasket shall be properly repositioned into the housing using alignment tabs.

.6 When assembling the coupling, the lower housing shall be rotated 90 degrees away from the upper housing. Place the upper, or outlet section on to the face of the pipe in line with the outlet hole. The lower section shall then be rotated around the pipe to close the two halves. The locating collar must be in the outlet hole.

.7 Insert bolt and apply nut. Oval neck must engage in recess of the housing.

.8 Nuts shall be tightened alternately and equally until the housing is in complete surface contact in the gasket pocket area and the assembly is rigid.

.9 Where mechanical-T are used as transition pieces between two runs, they must be assembled onto the runs before the branch connections are made.

3.8 VIC-LET STRAPLESS OUTLET & VIC-O-WELL STRAPLESS THERMOMETER & PRESSURE GAUGE INSTALLATION

.1 Refer to the latest Victaulic installation instructions.

.2 Holes must be drilled.

.3 Do not use for branch piping connections where size may not be available. Use first available size and reducer.

.4 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Victaulic lubricant shall be applied to exposed gasket sealing lip.

.5 Vic-Let outlet toe shall align with pipe. Tilt toe into the hole and drop into the pipe. The Vic-Let outlet must be positioned with the heel inside the pipe.

.6 Collar shall be held in position while nut is being hand tightened. Nut shall then be wrench tightened until collar deforms to contact pipe all around. Maintain collar/gasket alignment to prevent gasket pinching. Do not exceed 200 ft. lbs. Vic-Let outlet shall not be reused after initial installation.

3.9 ROUST-A-BOUT PLAIN END PIPE COUPLING INSTALLATION

.1 Refer to the latest Victaulic installation instructions.

.2 Pipe shall be marked as required.

.3 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Apply a thin coat of Victaulic Lubricant to gasket lips and outside of gasket.

.4 Place gasket over pipe end, being sure lip does not overhang pipe end.

.5 The pipe shall be butt and held in position while slide the gasket back into position. The gasket must be centered between the marks.

.6 Housings shall be placed over the gasket.

.7 Insert bolts and apply nuts.

.8 Nuts must be tightened alternately and equally to standard torque specifications as published by Victaulic. Segments must be assembled with equal gaps between the bolt pads.

3.10 VALVE INSTALLATION

.1 Install valves in upright position with stem above horizontal.

.2 Install butterfly valves on chilled water and condenser water lines only.

.3 Install butterfly or ball valves at branch take-offs and to isolate each piece of equipment, and as indicated.

.4 Install globe valves for balancing and in by-pass around control valves as indicated.

.5 Provide silent check valves on discharge of pumps and in vertical pipes with downward flow and as indicated.

.6 Provide swing check valves in horizontal lines as indicated.

.7 Install chain operators on valves NPS 65 mm (2 1/2") and over where installed more than 2400 mm (96") above floor in Boiler Rooms and Mechanical Equipment Rooms.

.8 Provide ball valves for glycol service.

3.11 AIR VENTS

.1 Install at high points of systems.

.2 Install isolating ball valve on automatic air vent inlet.

3.12 CIRCUIT BALANCING VALVES

.1 Install flow measuring stations and flow balancing valves as indicated.

.1 On return side of all heating devices (convectors, panels, force flows, radiation, coils, etc).

.2 On return side of all water or glycol cooling coils.

.3 On return side of all reverse return piping loops and/or branch circuits.

.2 Install to manufacturers requirements.

.3 Tape joints in prefabricated insulation on valves installed in chilled water mains.

.4 Refer to Testing Adjusting and Balancing Section for applicable procedures.

3.13 FLUSHING AND CLEANING

.1 Refer to Water Treatment section.

3.14 FILLING OF SYSTEM

.1 Refill system with clean water adding water treatment as specified.

3.15 TESTING

.1 Test system in accordance with Mechanical General Requirements Section.

.2 For glycol systems, retest with propylene glycol to ASTM E202, inhibited, for use in building system after cleaning. Repair any leaking joints, fittings or valves.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ANSI/ASME B16.22, Wrought Copper Alloy and Copper Alloy Solder - Joint Pressure Fittings: Classes 150, 300, 600, 900, 1500, and 2500.

.3 ANSI/ASME B16.24, Cast Copper Pipe Flanges and Flanged Fittings.

.4 ANSI/ASME B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.

.5 ANSI/ASME B31.5, Refrigeration Piping and Heating Transfer Components.

.6 ASTM A307, Specification for Carbon Steel Bolts and Studs, 413.5 mPa (60,000 psi) Tensile Strength.

.7 ASTM B280, Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

.8 CSA B52, Mechanical Refrigeration Code.

.9 EPS 1/RA/2, Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

Part 2 Products

2.1 TUBING

.1 Processed for refrigeration installations, deoxidized, dehydrated and sealed.

.1 Hard copper: to ASTM B280, type ACR-B.

2.2 FITTINGS

.1 Service: design pressure 2070 kPa (300 psi) and temperature 121°C (250°F).

.2 Brazed:

.1 Fittings: wrought copper to ANSI/ASME B16.22.

.2 Joints: silver solder, 45% Ag-15% Cu or copper-phosphorous, 95% Cu-5%P and non-corrosive flux.

.3 Flanged:

.1 Bronze or brass, to ANSI/ASME B16.24, Class 150 and Class 300.

.2 Gaskets: suitable for service.

.3 Bolts, nuts and washers: to ASTM A307, heavy series.

.4 Flared:

.1 Bronze or brass, for refrigeration, to ANSI/ASME 16.26.

2.3 PIPE SLEEVES

.1 Hard copper or steel, sized to provide 6 mm (1/4") clearance all around between sleeve and uninsulated pipe or between sleeve and insulation.

2.4 VALVES

.1 22 mm (7/8") and under: Class 500, 3.5 MPa (500 psi), globe or angle non-directional type, diaphragm, packless type, with forged brass body and bonnet, moistureproof seal for below freezing applications, brazed connections.

.2 Over 22 mm (7/8"): Class 375, 2.5 MPa (375 psi), globe or angle type, diaphragm, packless type, back-seating, cap seal, with cast bronze body and bonnet, moistureproof seal for below freezing applications, brazed connections.

2.5 FILTER-DRIER

.1 On lines 20 mm (3/4") outside diameter and larger, filter-drier shall be replaceable core type with Schraeder type valve.

.2 On lines smaller than 20 mm (3/4") outside diameter, filter-drier shall be sealed type using flared copper fittings.

.3 Size shall be full line size.

.4 Approved manufacturers:

.1 Mueller

.2 Parker

.3 Sporlan

.4 Virginia

2.6 SIGHT GLASS

.1 Combination moisture and liquid indicator with protection cap.

.2 Sight glass shall be full line size.

.3 Sight glass connections shall be solid copper or brass, no copper-coated steel sight glasses allowed.

.4 Approved manufacturers:

.1 Mueller

.2 Henry

.3 Parker

.4 Superior

2.7 SUCTION LINE TRAP

.1 Manufactured standard one-piece traps.

2.8 EXPANSION VALVES

.1 For pressure type distributors, externally equalized with stainless steel diaphragm, and same refrigerant in thermostatic elements as in system.

.2 Size valves to provide full rated capacity of cooling coil served. Co-ordinate selection with evaporator coil and condensing unit.

.3 Approved manufacturers:

.1 Henry

.2 Mueller

.3 Parker

.4 Sporlan

2.9 FLEXIBLE CONNECTORS

.1 Designed for refrigerant service with bronze seamless corrugated hose and bronze braiding.

.2 Approved manufacturers:

Anaconda “Vibration Eliminators” by Anamet

Vibration Absorber Model VAF by Packless Industries

Vibration Absorbers by Superior Valve Co

Style “BF” Spring-flex freon connectors by Vibration Mountings.

2.10 PIPING SUPPORT ASSEMBLY

.1 All channel members shall be fabricated from structural grade steel conforming to one of the following ASTM specifications: A1011/A1011M, A653/A653M.

.2 All fittings shall be fabricated from steel conforming to one of the following ASTM specifications: A575, A36/A36M or A635/A635M.

.3 Electro galvanized cush clamps with shoulder bolt and molded thermoplastic cushion, size to suit pipe.

.4 Acceptable materials:

.1 Unistrut

.2 Or equal

Part 3 Execution

3.1 GENERAL

.1 Hard copper to be used. Throughout the project, the use of annealed copper shall not be used without approval of the consultant.

.2 Install in accordance with CSA B52, EPS 1/RA/2 and ANSI/ASME B31.5.

.3 Connect to equipment with isolating valves and unions.

.4 Provide space for servicing, disassembly and removal of equipment and components all as recommended by manufacturer.

.5 Protect all openings in piping against entry of foreign material.

.6 Provide all necessary equipment including thermal expansion valve, sight glass, solenoid valve, filter dryer, etc., for a complete installed system. Pipe system as per manufacturer's recommendation and requirements.

.7 Provide number of refrigerant circuits and appropriate corresponding piping as per manufacturer's recommendations and requirements.

3.2 BRAZING PROCEDURES

.1 Bleed inert gas into pipe during brazing.

.2 Remove valve internal parts, solenoid valve coils, sight glass.

.3 Do not apply heat near expansion valve and bulb.

3.3 PIPING INSTALLATION

.1 General:

- .1 Hard drawn copper tubing: do not bend. Minimize use of fittings.
- .2 Pitch at least 1:240 down in direction of flow to prevent oil return to compressor during operation.
- .3 Provide trap at base of risers greater than 2.4m (8') high and at each 7.6m (25'-0") thereafter.
- .4 Provide inverted deep trap at top of each riser.
- .5 Provide double risers for compressors having capacity modulation.
  - .1 Large riser: install traps as specified above.
  - .2 Small riser: size for 5.1 m/s (1000 ft/min) at minimum load. Connect upstream of traps on large riser.

3.4 PRESSURE AND LEAK TESTING

.1 Close valves on factory charged equipment and other equipment not designed for test pressures.

.2 Leak test to CSA B52 before evacuation to 2 MPa (290 psi) and 1 MPa (145 psi) on high and low sides respectively.

.3 Test Procedure: Build pressure up to 35 kPa (5 psi) with refrigerant gas on high and low sides. Supplement with nitrogen to required test pressure. Test for leaks with electronic or halide detector. Repair leaks and repeat tests.

3.5 DEHYDRATION AND CHARGING

.1 Close service valves on factory charged equipment.

.2 Ambient temperatures to be at least 13°C (55°F) for at least 12 h before and during dehydration.

.3 Use copper lines of largest practical size to reduce evacuation time.

.4 Use 2-stage vacuum pump with gas ballast on 2nd stage capable of pulling 5 Pa (0.02" WC) absolute and filled with dehydrated oil.

.5 Measure system pressure with vacuum gauge. Take readings with valve between vacuum pump and system closed.

.6 Triple evacuate all system components containing gases other than correct refrigerant or having lost holding charge as follows:

.1 Twice to 14 Pa (0.056" WC) absolute and hold for 4 h.

.2 Break vacuum with refrigerant to 14 kPa (0.056" WC).

.3 Final to 5 Pa (0.02" WC) absolute and hold for at least 12 h.

.4 Isolate pump from system, record vacuum and time readings until stabilization of vacuum.

.5 Submit all test results to Consultant.

.7 Charging:

.1 Charge system through filter-drier and charging valve on high side. Low side charging not permitted.

.2 With compressors off, charge only amount necessary for proper operation of system. If system pressures equalize before system is fully charged, close charging valve and start up. With unit operating, add remainder of charge to system.

.3 Re-purge charging line if refrigerant container is changed during charging process.

.8 Checks:

.1 Make all checks and measurements as per manufacturer's operation and maintenance instructions.

.2 Record and report all measurements to Consultant.

3.6 INSTRUCTIONS

.1 Post instructions in frame with glass cover in accordance with Operation and Maintenance Manual Section and CSA B52.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Plumbing Specialties and Accessories.

.2 Hydronic Systems – Steel.

1.2 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 American Society of Mechanical Engineers (ASME).

.3 ANSI/ASME Boiler and Pressure Vessel Code, Section VI.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements.

1.4 CLOSEOUT SUBMITTALS

.1 Submit operation and maintenance data for incorporation into manual specified in general requirements

.2 Include following:

.1 Log sheets as recommended by manufacturer.

.2 Test reports.

Part 2 Products

2.1 MANUFACTURER

.1 Equipment, chemicals, service by one supplier.

.2 Acceptable manufacturer:

.1 Aquarian Chemicals (905-825-3711) No alternates.

2.2 WATER TREATMENT FOR HYDRONIC SYSTEMS

.1 Micron filter for each pot feeder:

.1 Capacity 2% of pump recirculating rate at operating pressure.

.2 Six (6) sets of filter cartridges for each type, size of micron filter.

.2 Balancing valve set for 2% pump capacity.

2.3 CHEMICALS

.1 Provide 1 year’s supply.

2.4 TEST EQUIPMENT

.1 Provide one set of test equipment for each system to verify performance.

.2 Complete with carrying case, reagents for chemicals, all specialized or supplementary equipment.

2.5 CLEANING CHEMICALS

.1 Provide as required to make system clean.

.2 Cleaner chemical: compatible and of the same manufacturer of the water treatment supplier.

2.6 RECORD MANAGEMENT

.1 Provide cards and card holder mounted on wall adjacent to each pot feeder.

Part 3 Execution

3.1 INSTALLATION

.1 Install HVAC water treatment systems in accordance with ASME Boiler Code Section VII, and requirements and standards of authorities having jurisdiction, except where specified otherwise.

.2 Ensure adequate clearances to permit performance of servicing and maintenance of equipment.

3.2 CHEMICAL FEED PIPING

.1 Install crosses at all changes in direction. Install plugs in all unused connections.

3.3 WATER TREATMENT SERVICES

.1 After entire new and existing system is cleaned as specified elsewhere, provide monthly water treatment monitoring and consulting services for period of one year after system start-up. Provide written report to consultant after each visit. Service to include:

.1 Initial water analysis and treatment recommendations.

.2 System start-up assistance.

.3 On site system testing and recording of treated hydronic system.

.4 Operating staff training.

.5 Visit plant every 7 days during first month of operation and as required until system stabilizes and advise consultant in writing on treatment system performance.

.6 Provide monthly visits with reports after system has stabilized to the satisfaction of the owner.

.7 Provide necessary monthly recording charts and log sheets for one year operation.

.8 Provide necessary laboratory and technical assistance.

.9 Instructions and advice to operating staff to be clear, concise and in writing.

3.4 START-UP

.1 Start up water treatment systems in accordance with manufacturer's instructions.

3.5 SYSTEM COMMISSIONING AND TRAINING

.1 Commissioning and training shall be provided by installing water treatment sub-contractor and water treatment supplier.

.2 Timing:

.1 After start-up deficiencies rectified.

.2 After start-up and before TAB of connected systems.

.3 Pre-commissioning Inspections:

.1 Verify:

.1 Presence of test equipment, reagents, chemicals, details of specific tests to be performed, operating instructions.

.2 Suitability of log book.

.3 Currency and accuracy of initial water analysis.

.4 Required quality of treated water.

.4 Commissioning procedures - applicable to all Water Treatment Systems:

.1 Establish, adjust as necessary and record all automatic controls and chemical feed rates.

.2 Monitor performance continuously during commissioning of all connected systems and until acceptance of project.

.3 Establish test intervals, regeneration intervals.

.4 Record on approved report forms all commissioning procedures, test procedures, dates, times, quantities of chemicals added, raw water analysis, treated water analysis, test results, instrument readings, adjustments made, results obtained.

.5 Establish, monitor and adjust automatic controls and chemical feed rates as necessary.

.6 Visit project at monthly intervals after commissioning is satisfactorily completed to verify that performance remains as set during commissioning (more often as required until system stabilizes at required level of performance).

.7 Advise Engineer in writing on all matters regarding installed water treatment systems.

.5 Commissioning procedures - Closed Circuit Hydronic Systems:

.1 Analyse water in system.

.2 Based upon an assumed rate of loss approved by Engineer, establish rate of chemical feed.

.3 Record types, quantities of chemicals applied.

.4 Provide written verification of glycol solution concentration.

.6 Training:

.1 Commission systems, perform tests in presence of, and using assistance of, assigned O&M personnel.

.2 Train O&M personnel in softener regeneration procedures.

.7 Certificates:

.1 Upon completion, furnish certificates confirming satisfactory installation and performance.

.8 Commissioning Reports:

.1 To include system schematics, test results, test certificates, raw and treated water analyses, design criteria, all other data required by Consultant.

.9 Commissioning activities during Warranty Period:

.1 Check out water treatment systems on regular basis and submit written report to Consultant.

3.6 CLEANING OF MECHANICAL SYSTEM

.1 Coordinate cleaning of mechanical systems with mechanical contractor.

.2 Provide copy of recommended cleaning procedures and chemicals for approval by Consultant.

.3 Procedure:

.1 Flushing and cleaning should only take place after successful piping pressure testing.

.2 Terminal device (reheat coils, heat pumps, perimeter radiation, heat exchangers etc.), air handling unit coils and their associated control and balancing valves should be bypassed during the preliminary flushing and cleaning process.

.3 Instruments such as flow meters, flow metering valves and orifice plates should only be installed after flushing and cleaning.

.4 Timing:

.1 The overall construction schedule identifies piping flushing and cleaning with realistic time allotments.

.2 The mechanical contractor is required to provide a detailed report outlining the processes and procedures for flushing and cleaning per piping system at least 4 to 6 weeks in advance of work.

.3 As a minimum, at least one piping flushing and cleaning procedure shall be witnessed, by the consultant and/or commissioning agent.

.5 The mechanical contractor shall to utilize a qualified water treatment specialist to supervise the flushing and cleaning process and provide the certified water analysis report certifying that the piping systems are clean.

.6 Coordinate flushing and cleaning of mechanical systems with HVAC water treatment contractor.

.7 Flush and clean new piping system in presence of Consultant.

.8 Flush after pressure test for a minimum of 4 hrs.

.9 Fill system with solution of water and non-foaming, phosphate-free detergent 3% solution by weight. Circulate for minimum of 8 hrs.

.10 Thoroughly flush all new mechanical systems and equipment with approved cleaning chemicals designed to remove deposition from construction such as pipe dope, oils, loose mill scale and other extraneous materials. Chemicals to inhibit corrosion of various system materials and be safe to handle and use.

.11 During circulation of cleaning solution, periodically examine and clean filters and screens and monitor changes in pressure drop across equipment.

.12 Refill system with clean water. Circulate for at least 2 hours. Clean out strainer screens/baskets regularly. Then drain.

.13 Drainage to include drain valves, dirt pockets, strainers, every low point in system.

.14 Drain and flush systems until alkalinity of rinse water is equal to make-up water. Refill with clean water treated to prevent scale and corrosion during system operation.

.15 Re-install strainer screens/baskets only after obtaining Consultant's approval and approval from HVAC water treatment contractor and board chemical treatment technician.

.16 Repeat system drain and flush as often as necessary to have a clean system.

.17 Disposal of cleaning solutions to be approved by authority having jurisdiction.

.18 Isolate new piping system from existing system as required for system cleaning.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.

.3 SMACNA HVAC Duct Leakage Test Manual.

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

.5 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.

.6 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section general requirements.

.2 Indicate following:

- .1 Sealants
- .2 Tape
- .3 Proprietary Joints
- .4 Fittings

1.3 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 DUCTWORK

.1 Galvanized Steel:

- .1 Galvanized steel with Z90 designation zinc coating lock forming quality: to ASTM A653/A653M.

.2 Thickness:

Size Type	Class A Gauge	Class B Gauge	Class C Gauge
Square and Rectangular			
Up to 600 mm (24”)	22	24	24
625 mm to 1000 mm (25” to 40”)	20	22	24
1025 mm to 1800 mm (41” to 72”)	18	20	22
1825 mm to 2400 mm (73” to 96")	16	18	20
2450 mm and over (97")	16	16	16
Round and Oval			
Up to 300 mm (12”)	24	24	24
325 mm to 600 mm (13” to 24”)	22	24	24
625 mm to 900 mm (25" to 36")	20	22	24
925 mm to 1200 mm (37” to 48”)	18	20	22
1225 mm (49”) and over	18	18	20

2.2 DUCT CONSTRUCTION

.1 Round and oval:

.1 Ducts: factory fabricated, spiral wound, with matching fittings and specials to SMACNA.

.2 Transverse joints up to 900 mm (36"): slip type with tape and sealants.

.3 Transverse joints over 900 mm (36"): Ductmate or Exanno Nexas Duct System.

.2 Square and rectangular:

.1 Ducts: to SMACNA.

.2 Transverse joints, longest side:

up to and including 750 mm (30"): SMACNA proprietary duct joints.

.3 Ducts with sides over 750 mm (30") to 1200 mm (48"), transverse duct joint system by Ductmate/25, Nexus, or WDCI (Lite) (SMACNA ”E” or “G” Type connection). Weld all corners.

.1 Acceptable materials:

.1 Ductmate Canada Ltd.

.2 Nexus, Exanno Corp.

.3 WDCI

.4 Ducts 1200 mm (48") and larger, Ductmate/35, Nexus, or WDCI (heavy) (SMACNA “J” Type connection). Weld all corners.

.1 Acceptable materials:

.1 Ductmate Canada Ltd.

.2 Nexus, Exanno Corp.

.3 WDCII.

2.3 FITTINGS

.1 Fabrication: to SMACNA.

.2 Radiused elbows:

.1 Rectangular: standard radius and or short radius with single thickness turning vanes Centreline radius: 1.5 times width of duct.

.2 Round:

.1 In exposed areas one-piece smooth radius, 1.5 times diameter.

.2 In concealed areas 3-piece adjustable, 1.5 times diameter.

.3 Mitred elbows, rectangular:

.1 To 400 mm (16"): with double thickness turning vanes.

.2 Over 400 mm (16"): with double thickness turning vanes.

.4 Branches:

.1 Rectangular main and branch: with 45º entry on branch.

.2 Round main and branch: enter main duct at 45º with conical connection.

.3 Provide volume control damper in branch duct near connection to main duct.

.4 Main duct branches: with splitter damper.

.5 Diffuser connection to main:

.1 90º round spin in collars with balancing damper and locking quadrant.

.6 Transitions:

.1 Diverging: 20º maximum included angle.

.2 Converging: 30º maximum included angle.

.7 Offsets:

.1 Full short radiused elbows.

.8 Obstruction deflectors: maintain full cross-sectional area.

2.4 SEAL CLASSIFICATION

.1 Classification as follows:

Maximum Pressure Pa (" w.c.)	SMACNA Seal Class
2500 (10")	A
1500 (6")	A
1000 (4")	A
750 (3")	A
500 (2")	B
250 (1")	B
125 (0.5")	C

.2 Seal classification:

.1 Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.

.2 Class B: longitudinal seams, transverse joints and connections made airtight with sealant.

.3 Class C: transverse joints and connections made air tight with gaskets, or sealant or combination thereof. Longitudinal seams sealed with foil tape or sealant.

2.5 SEALANT

.1 Sealant: oil resistant, polymer type flame resistant duct sealant. Temperature range of -30°C (-22°F) to plus 93°C (199°F).

.1 Acceptable materials:

.1 Duro Dyne S-2

.2 Foster

2.6 TAPE

.1 Tape: polyvinyl treated, open weave fiberglass tape, 50 mm (2") wide.

.1 Acceptable material:

.1 Duro Dyne FT-2

2.7 DUCT LEAKAGE

.1 In accordance with SMACNA HVAC Duct Leakage Test Manual.

2.8 FIRESTOPPING

.1 40 mm x 40 mm x 3 mm (1½" x 1½" x 16ga) retaining angles all around duct, on both sides of fire separation.

.2 Firestopping material and installation must not distort duct.

.3 All ductwork passing through partition walls shall be firestopped.

2.9 HANGERS AND SUPPORTS

.1 Band hangers: use on round and oval ducts only up to 500 mm (20") diameter, of same material as duct but next sheet metal thickness heavier than duct.

.2 Trapeze hangers: ducts over 500 mm (20") diameter or longest side, to ASHRAE and SMACNA.

.3 Hangers: galvanized steel angle with black steel rods to ASHRAE and SMACNA following table:

Duct Size mm (")	Angle Size mm (")	Rod Size mm (")
up to 750 (30)	25 x 25 x 3 (1 x 1 x 1/8)	6 (1/4)
>750 to 1050 (>30 to 42)	40 x 40 x 3 (1½ x 1½ x 1/8)	6 (1/4)
>1050 to 1500 (>42 to 60)	40 x 40 x 3 (1½ x 1½ x 1/8)	10 (3/8)
>1500 to 2100 (>60 x 84)	50 x 50 x 3 (2 x 2 x 1/8)	10 (3/8
>2100 to 2400 (>84 x 96)	50 x 50 x 5 (2 x 2 x 1/8)	10 (3/8)
>2400 (96) and over	50 x 50 x 6 (2 x 2 x ¼)	10 (3/8)

.4 Upper hanger attachments:

.1 For concrete: manufactured concrete inserts.

.1 Acceptable material:

.1 Myatt fig. 485

.2 For steel joist: manufactured joist clamp or steel plate washer.

.1 Acceptable material:

.1 Grinnell fig. 61 or 60

.3 For steel beams: manufactured beam clamps:

.1 Acceptable material:

.1 Grinnell Fig. 60

Part 3 Execution

3.1 GENERAL

.1 The following systems shall conform to these requirements:

System	Class	Material
HVAC Supply and Return General Exhaust Ventilation Plenum Exhaust Plenum	B B B B	Galvanized steel Galvanized steel Galvanized steel Galvanized steel
Individual Exhaust	C	Galvanized steel

.2 Do work in accordance with ASHRAE and SMACNA.

.3 Do not break continuity of insulation vapour barrier with hangers or rods.

.4 Support risers in accordance with ASHRAE and SMACNA.

.5 Install breakaway joints in ductwork on each side of fire separation.

.6 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.

.7 Manufacture duct in lengths to accommodate installation of acoustic duct lining.

3.2 HANGERS

.1 Strap hangers: install in accordance with SMACNA.

.2 Angle hangers: complete with locking nuts and washers.

.3 Hanger spacing: in accordance with ASHRAE, SMACNA and as follows:

Duct Size mm (")	Spacing mm (")
to 1500 (60")	3000 (120")
over 1500 (60")	2500 (100")

.4 Do not support ductwork over 250 mm x 250 mm (10" x 10") from roof deck.

3.3 SEALING

.1 Apply sealant to outside of joint to manufacturer's recommendations.

.2 Bed tape in sealant and recoat with minimum of 1 coat of sealant to manufacturers recommendations.

3.4 LEAKAGE TESTS

.1 Coordinate leakage testing with TAB contractor. TAB contractor will be responsible for all duct testing.

.2 Duct to be tested in accordance with SMACNA HVAC Duct Leakage Test Manual.

.3 Leakage tests to be done in sections.

.4 Trial leakage tests to be performed as instructed to demonstrate workmanship.

.5 Install no additional ductwork until trial test has been passed.

.6 Test section to be minimum of 15 m (50'-0") long with not less then 3 branch takeoffs and two 90º elbows. Maximum test length and area to be determined by BAS testing equipment. Allow for twelve (12) tests.

.7 Complete test before insulation or concealment.

.8 Provide all necessary end caps and fittings as required for the TAB contractor. Remove same after successful completion of duct test.

.9 Pressure test ductwork to 1½ times operating pressure (minimum pressure 500 Pa (2" wc) all systems).

3.5 CLEANING

.1 Keep ducts clear from dust and debris

.2 Keep duct liner clean from dust, debris, and moisture.

.3 At completion of project vacuum ducts if dirt or dust is present.

.4 Where new systems connect into existing systems the existing systems shall be cleaned and vacuumed prior to reconnection.

.5 Ensure all systems are clean prior to start up.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.

.3 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.

.4 ANSI/NFPA 96, Ventilation Control and Fire Protection of Commercial Cooking Operations.

.5 CSA B228.1, Pipes, Ducts and Fittings for Residential Type Air Conditioning.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

.1 Flexible connections.

.2 Duct access doors.

.3 Turning vanes.

.4 Instrument test ports.

1.3 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 GENERAL

.1 Manufacture in accordance with CSA B228.1.

2.2 FLEXIBLE CONNECTIONS

.1 Frame: galvanized sheet metal frame with fabric clenched by means of double locked seams.

.2 Material:

.1 Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at -40°C (-40°F) to plus 90°C (194°F), density of 1.3 kg/m.

2.3 ACCESS DOORS IN DUCTS

.1 Non-insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm (25 gauge) thick complete with sheet metal angle frame.

.2 Insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm (24 gauge) thick complete with sheet metal angle frame and 25 mm (1") thick rigid glass fibre insulation.

.3 Gaskets: neoprene

.4 Hardware:

.1 Up to 300 mm (12"): 2 sash locks

.2 301 mm to 450 mm (13" to 18"): 4 sash locks Complete with safety chain.

.3 451 mm to 1000 mm (19" to 40"): piano hinge and minimum 2 sash locks.

.4 Doors over 1000 mm (40"): piano hinge and 2 handles operable from both sides.

.5 Hold open devices.

.5 Acceptable materials:
Nailor
E. H. Price
Titus

2.4 TURNING VANES

.1 Factory or shop fabricated double thickness, to recommendations of SMACNA and as indicated.

.2 Acceptable materials:
Duro Dyne
Ductmate

2.5 INSTRUMENT TEST PORTS

.1 1.6 mm (16 gauge) thick steel zinc plated after manufacture.

.2 Cam lock handles with neoprene expansion plug and handle chain.

.3 28 mm (1 1/8") minimum inside diameter. Length to suit insulation thickness.

.4 Neoprene mounting gasket.

.5 Acceptable material:
Duro Dyne IP1 or IP2
Duct mate

Part 3 Execution

3.1 INSTALLATION

.1 Flexible connections:

.1 Install in following locations:

.1 Inlets and outlets to supply air units and fans. (Unless internally isolated)

.2 Inlets and outlets of exhaust and return air fans.

.3 As indicated.

.2 Length of connection: 100 mm (4").

.3 Minimum distance between metal parts when system in operation: 75 mm (3").

.4 Install in accordance with recommendations of SMACNA.

.5 When fan is running:

.1 Ducting on each side of flexible connection to be in alignment.

.2 Ensure slack material in flexible connection.

.2 Access doors and viewing panels:

.1 Size:

.1 600 mm x 600 mm (24" x 24") for person size entry.

.2 600 mm x 1000 mm (24" x 40") for servicing entry.

.3 300 mm x 300 mm (12" x 12") for viewing.

.4 As indicated.

.2 Location:

.1 At fire and smoke dampers.

.2 At fire dampers.

.3 At control dampers.

.4 At devices requiring maintenance.

.5 At locations required by code.

.6 At inlet and outlet of reheat coils.

.7 Elsewhere as indicated.

.8 Inlet and outlet of duct mounted coils.

.3 Instrument test ports.

.1 General:

.1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.2 Locate to permit easy manipulation of instruments

.3 Install insulation port extensions as required.

.4 Locations.

.1 For traverse readings:

.1 At ducted inlets to roof and wall exhausters.

.2 At inlets and outlets of other fan systems.

.3 At main and sub-main ducts.

.4 And as indicated.

.2 For temperature readings:

.1 At outside air intakes.

.2 In mixed air applications in locations as approved by Consultant.

.3 At inlet and outlet of coils.

.4 Downstream of junctions of two converging air streams of different temperatures.

.5 And as indicated.

.4 Turning vanes:

.1 Install in accordance with recommendations of SMACNA and as indicated.

.2 Install on supply ducts only.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following: performance data.

Part 2 Products

2.1 GENERAL

.1 Manufacture to SMACNA standards.

2.2 SPLITTER DAMPERS

.1 Of same material as duct but one sheet metal thickness heavier, with appropriate stiffening.

.2 Double thickness construction.

.3 Control rod with locking device and position indicator.

.4 Rod configuration to prevent end from entering duct.

.5 Pivot: piano hinge.

.6 Folded leading edge.

2.3 SINGLE BLADE DAMPERS

.1 Of same material as duct, but one sheet metal thickness heavier. V-groove stiffened, minimum 1.6 mm (16 gauge).

.2 Size and configuration to recommendations of SMACNA, except maximum height 100 mm (4").

.3 Shaft extension to accommodate insulation thickness and locking quadrant.

.4 Inside and outside nylon end bearings.

.5 Channel frame of same material as adjacent duct, complete with angle stop.

2.4 MULTI-BLADED DAMPERS

.1 Factory manufactured of material compatible with duct.

.2 Opposed blade: configuration, metal thickness and construction to recommendations of SMACNA.

.3 Maximum blade height:

.1 50 mm (2") up to 375 mm (15") high duct.

.2 100 mm (4") max 400 mm (16") high duct and over.

.4 Bearings: self-lubricating nylon.

.5 Linkage: shaft extension with locking quadrant.

.6 Channel frame of same material as adjacent duct, complete with angle stop.

.7 Shaft extension to accommodate insulation thickness and locking quadrants.

.8 Acceptable materials:

.1 Duro Dyne

.2 E.H. Price

.3 Nailor

.4 T.A. Morrison

.5 Tamco

.6 Ruskin

.7 Ventex/Alumavent

.8 United Enertech

2.5 LOCKING QUADRANTS

.1 6 mm (1/4") dial regulator with square bearing shaft.

.1 18 gauge oval frame, cadmium plated, clearly shows damper position.

.2 18 gauge formed handle for easy adjustment.

.3 Bolt and wing nut lock damper securely.

.4 Offset mounting holes avoid interference with damper movement and mechanical fastening to duct.

.2 9 mm (3/8") and larger: clamp quadrant with square bearing shaft.

.1 Accommodates and securely locks square rod, bearing fitting and adaptor pins.

.2 Heavily ribbed 16 gauge steel frame, 3 mm (1/8") thick formed steel handle, cadmium-plated.

.3 By tightening nut, bearing is securely locked in handle, preventing slippage and rattle.

.4 Neoprene and steel washer assembly seals bearing opening to eliminate air-leakage.

.5 Screw holes for mechanically fastening to ductwork.

.3 High pressure system locking quadrant:

.1 Airtight, rattle-proof regulator, designed for ZERO leakage at high pressure. Use for applications up to 500°F constant temperature.

.2 Handle design for easy recognition of damper position.

.3 Heavy-gauge, zinc-plated steel, 2 high temperature rubber seals and washers, end bearing support, and 2 end bearings. Pressure loss and damper rattle in ductwork has been a constant annoyance for as long as HVAC ductwork has been installed. Now, a truly air-tight, rattle-proof regulator is available. The SPEC-SEAL regulator utilizes a special high-temperature rubber seal to eliminate leakage and rattle even at many times the pressure found in high pressure.

.4 Soft, comfortable grip handle with a highly-visible, plastic cover which indicates the damper position.

.5 Handle to accommodate 9 mm (3/8") or 12 mm (1/2") to match damper shaft size, square and round bearing shafts.

.4 Acceptable manufacturers:
Duro Dyne
Ductmate
Pottorff

2.6 VOLUME EXTRACTORS

.1 Fully adjustable gang operated blade volume extractor.

.2 Cold rolled steel construction, 25 mm (1") blade spacing with matte black finish.

.3 Provide Type 1 manual adjusting operating lever.

.4 Acceptable Material
EH Price AE-1
Krueger EX8/EX88
Or equal approved by consultant

Part 3 Execution

3.1 INSTALLATION

.1 Install where indicated.

.2 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.3 For supply, return and exhaust systems, locate balancing dampers in each branch duct.

.1 Single blade dampers up to 200 mm (8").

.2 Multi-blade dampers over 200 mm (8").

.4 Runouts to registers and diffusers: install single blade damper located as close as possible to main ducts.

.5 All dampers to be vibration free.

.6 Leave all dampers in open position for T.A.B.

.7 Fasten locking quadrants to ductwork and shaft.

.8 Place locking quadrants on standoffs where ductwork insulated.

.9 Lock down quadrant arm in the open position.

3.2 VOLUME EXTRACTOR

.1 Install at branch take off connections where indicated.

.2 Secure lever adjustment rod to inside duct collar after final adjustments.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.

.3 CAN/ULC-S112, Standard Method of Fire Test of Fire Damper Assemblies.

.4 CAN/ULC-S112.1, Standard Method of Fire Test of Ceiling Firestop Flap Assemblies.

.5 ULC-S505, Fusible Links for Fire Protection Service.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

.1 Fire dampers.

.2 Operators.

.3 Fusible links.

1.3 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

1.4 MAINTENANCE MATERIALS

.1 Provide following:

.1 6 fusible links of each type.

1.5 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 FIRE DAMPERS (DYNAMIC)

.1 Multi blade or roll type, fire damper suitable for HVAC system velocities up to 2000 fpm (610 m/mm), dual direction air flow, max 4" wg pressure.

.2 Mild steel, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.

.3 Top hinged: offset single damper, round or square; multi-blade hinged or interlocking type; guillotine type; sized to maintain full duct cross section.

.4 Stainless closure spring to positively close damper upon fusible link release, for horizontal or vertical orientations.

.5 Linkage concealed in frame.

.6 40 mm x 40 mm x 3 mm (1½" x 1½" x 16ga) retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.

.7 Fire damper assemblies and type to meet requirements of provincial fire authority and authority having jurisdiction.

.8 Acceptable materials:

.1 Ruskin

.2 Nailor

.3 National Controlled Air (NCA)

.4 T.A. Morrison

.5 Tamco

.6 Greenheck

.7 Ventex/Alumavent

2.2 MULTIBLADE DAMPERS (DYNAMIC OR STATIC)

.1 Provide and install multiblade dampers where roll type fire dampers do not have a ULC listing for the size of the penetration through the assembly.

.2 Multi blade type fire dampers shall be suitable for HVAC system velocities up to 2000 fpm (610 m/mm), dual direction air flow, max 4" wg pressure.

.3 Damper shall be labelled for dynamic or static systems as appropriate for the installed location.

.4 Frame shall be constructed on 16 ga (1.6) steel hat channel with mitered corners reinforced with die-formed corner gussets for strength.

.5 Damper blades shall be 14 ga (2.0) equivalent steel formed double skin, airfoil design.

.6 Damper shall be of opposed blade configuration with an interlocking blade design. Blade seals are not acceptable.

.7 Blade axels shall be double bolted at each end of the blade to provide positive locking connection.

.8 Bearings shall be sintered stainless steel type.

.9 Blade linkage shall be zero-maintenance, concealed in frame and out of the air stream.

.10 Each damper shall be complete with a UL listed fusible link that will cause the damper to close and lock in closed position by means of an over centre/knee lock linkage for assured closure.

.11 Each damper shall be provided with an internal manual locking quadrant(s) for setting and locking of blades in desired position.

.12 Provide a steel sleeve of appropriate gauge and length for the assembly being penetrated.

.13 Provide a 40 mm x 40 mm x 3 mm (1½" x 1½" x 16ga) retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.

.14 Fire damper assemblies and type to meet requirements of provincial fire authority and authority having jurisdiction.

.15 Acceptable materials:

.1 Ruskin
.2 Nailor
.3 E.H. Price
.4 T.A. Morrison
.5 Tamco
.6 Greenheck
.7 Ventex/Alumavent
.8 Pottorff

Part 3 Execution

3.1 INSTALLATION

.1 Provide where indicated and at all fire rated partitions indicated, on architectural drawing.

.2 Install in accordance with ANSI/NFPA 90A and in accordance with conditions of ULC listing.

.3 Maintain integrity of fire separation.

.4 After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.

.5 Install access door adjacent to each damper.

.6 Coordinate with installer of firestopping.

.7 Static fire dampers: Only on transfer air ducts where ductwork is not connected to a fan/blower.

.8 Dynamic fire dampers: In all duct work where air is moved by a fan/blower.

END OF SECTION

Part 1 General

1.1 CODES AND STANDARDS

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.

.3 CAN/ULC-S112, Standard Method of Fire Test of Fire Damper Assemblies.

.4 CAN/ULC-S112.1, Standard Method of Fire Test of Ceiling Firestop Flap Assemblies.

.5 ULC-S505, Fusible Links for Fire Protection Service.

.6 CAN/ULC-S524, Installation of Fire Alarm Systems

.7 CAN/ULC-S1001.11, Integrated Systems Testing of Fire Protection and Life Safety Systems.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements indicating the following:

.1 Damper type

.2 Operators

.3 Fusible links

.4 Smoke detectors

.5 Power requirements

.6 Size, orientation, construction

1.3 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

1.4 MAINTENANCE MATERIALS

.1 Provide following:

.1 6 fusible links of each type.

1.5 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 COMBINATION FIRE AND SMOKE DAMPERS

.1 Provide a complete system, consisting of the damper, damper actuator, smoke detector with duct sampling tube, sleeve and all other components necessary for a complete and operable system. **The assembly shall be factory assembled as a single unit.** Field assembly shall be permitted at contractor discretion provided all listings are maintained and the installation follows all manufacturer installation guidelines.

.2 Damper

- .1 Damper shall be ULC listed and labelled
- .2 Both damper and damper actuator to be ULC listed and labelled.
- .3 Normally closed smoke/seal: folding blade type. Blade edge seals of flexible stainless steel shall provide required constant sealing pressure. Stainless steel negator springs with locking devices shall ensure positive closure for units.
- .4 Damper shall have Class I leakage rating.
- .5 Suitable for horizontal or vertical installations.
- .6 Damper Material: Damper material shall match ductwork it is installed in (i.e., stainless steel in laboratory). Refer to specification section 23 31 13 Metal Ducts.

.3 Actuator/Link

- .1 Actuator shall be ULC listed and labelled
- .2 Motorized actuator: 2-position, spring return, normally open with power on. When power is interrupted damper shall close automatically. Upon return of power, damper shall automatically reset open. Actuators are to be located outside of airstream, unless otherwise specified or shown on drawings.
- .3 Exterior visualization of damper position.
- .4 Damper actuator end switches for monitoring damper position by the BAS.
- .5 Combined actuator: electrical control system actuated from smoke sensor or smoke detection system and from fusible link.
- .6 Fusible link, or electric re-settable link (ERL).
- .7 Electric fire sensor capable of remote openable control is to be provided in place of fusible link where specifically indicated in project documents.
- .8 Where ERL or electric fire sensor is used in place of fusible link, this device shall fail closed upon power failure.
- .9 Actuator may be mounted in duct in areas of renovation work when ductwork is over 450mm (18”) wide.
- .10 Where the FSD is mounted immediately behind a sidewall grille the actuator shall be mounted inside the ductwork to avoid an additional access door beside the grille.

.4 Factory sleeve.

- .1 Type and style: matching application.

.5 Operating Temperature: 0° Celsius to 99° Celsius ambient temperature rating for 300 fpm to 4000 fpm air velocity.

.6 Smoke Detector:

.1 ULC approved photoelectric duct smoke detector;

.2 Operates from 300 to 3000 ft/min air velocity (fan systems), -4 to 158°F temperature, and 0 to 95% non-condensing humidity;

.3 Operates from 100 to 4000 ft/min air velocity, -4 to 158°F temperature and 0 – 95% non-condensing humidity (transfer ducts)

.4 Test/reset button with LED display;

.5 The detector housing shall be ULC listed specifically for use in air handling systems; capable of local testing via magnetic switch and test button; duct mounted smoke detector with sampling tube, housing

.6 The detector shall incorporate separate 2.0A 30VDC Alarm and Supervisory contacts. Alarm contacts shall be normally open (N.O.) in which closed contacts will indicate an alarm condition to the fire alarm panel. Supervisory contacts shall be normally closed (N.C.) in which open contacts will indicate a trouble condition to the fire alarm panel.

.7 Sensor may be mounted in duct in areas of renovation work when ductwork is over 450mm (18”) wide.

.8 Where the FSD is mounted immediately behind a sidewall grille the smoke detector shall be mounted inside the ductwork to avoid an additional access door beside the grille.

.7 Damper assembly to operate at 120V with single point power connection.

.8 Large damper sizes can be provided in multiple sections. Field assembly is acceptable following manufacturer’s installation guidelines.

.9 Fire rating to match wall assembly i.e. 1 hour/1 ½ hour/2 hour/ 3 hour.

.10 Size: as indicated on drawings.

.11 Acceptable materials:
E H Price
NCA Ltd.
Nailor Industries Inc.
Ruskin
Alumavent
United Enertech
Pottorff
Safeair-Dowco (stainless steel)
Pottorff

Part 3 Execution

3.1 INSTALLATION

.1 Provide smoke dampers where indicated and at all duct penetrations through smoke barrier partitions indicated on architectural drawings.

.2 Provide combination fire and smoke dampers where indicated and at all duct penetrations through fire rated smoke barrier partitions indicated on architectural drawings. To provide separated fire dampers and smoke dampers, obtain approval from the consultant for the alternate arrangement.

.3 Install in accordance with ANSI/NFPA 90A, in accordance with conditions of ULC listing and manufacturer's recommendation.

.4 Maintain integrity of smoke separation and fire rating.

.5 After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.

.6 Install access door adjacent to each damper and smoke detector.

.7 Front grille access for through wall dampers that terminate in a grille is acceptable.

.8 Provide proper firestopping and duct seal to fire barrier wall.

.9 Confirm proper operation and test sheets.

.10 Should contractor provide separated devices mount smoke detector downstream of damper and within 1.5 m (5 ft) of damper.

.11 Ensure access doors/panels, fusible links, damper actuators and sensors are easily observed and accessible.

3.2 WIRING

.1 All fire alarm wiring shall be 1 hour rated and in conduit or as per electrical fire alarm wiring requirement.

.2 When the building has a BAS contractor, the BAS contractor can be used to provide the 120V power wiring.

3.3 DAMPER POSITION MONITORING

.1 In all cases the BAS contractor shall monitor the damper actuator end switches i.e. "closed position and open position".

3.4 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools, and equipment.

3.5 INTEGRATED LIFE SAFETY SYSTEMS TESTING

.1 Obtain the integrated Life Safety Systems agent used by the electrical contractor to perform crossover testing, commission, and confirm proper operation of all operating smoke dampers, and associated Life Safety Systems, i.e. fire alarm.

.2 Provide written confirmation as part of the Integrated Life Safety Systems Test report.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 This section applies to operating dampers not specified in Controls Section.

1.2 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

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

1.3 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

.1 Performance data.

1.4 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

1.5 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency.

Part 2 Products

2.1 MOTORIZED DAMPERS

.1 Opposed blade type.

.2 Extruded aluminum, interlocking blades, complete with extruded vinyl seals, spring stainless steel side seals, extruded aluminum frame.

.3 Pressure fit self-lubricated bronze bearings.

.4 Linkage: plated steel tie rods, brass pivots and plated steel brackets, complete with plated steel control rod.

.5 Operator: Refer to BAS Section.

.6 Performance:

.1 Leakage: in closed position to be less than 2% of rated air flow at 250 Pa (1" w.c.) differential across damper.

.2 Pressure drop: at full open position to be less than 10 Pa (0.04" w.c.) differential across damper.

.7 Insulated aluminum dampers:

.1 Frames: insulated with extruded polystyrene foam with R factor of 5.0.

.2 Blades: constructed from aluminum extrusions with internal hollows insulated with polyurethane or polystyrene foam, R factor of 5.0.

.3 Use on services to the exterior.

.8 Acceptable materials:
Honeywell
Johnson
T. A. Morrison
E.H. Price
Tamco
Ruskin
Nailor
Henderson Industrial
Ventex/Alumavent
Pottorff

2.2 DISC TYPE DAMPERS

.1 Frame: brake formed, welded, 1.6 mm (16 gauge) thick, Type Z90 galvanized steel to ASTM A653/A653M.

.2 Disc: spin formed, 1.6 mm (16 gauge) thick, Type Z90 galvanized steel to ASTM A653/A653M.

.3 Gasket: extruded neoprene, field replaceable, with 10 year warranty.

.4 Bearings: roller self lubricated and sealed.

.5 Operator: compatible with damper, linear stroke operator, spring loaded actuator, zinc-aluminum foundry alloy casting cam follower.

.6 Performance:

.1 Leakage: in closed position to be less than 0.001% of rated air flow at 100 kPa (15 psi) pressure differential across damper.

.2 Pressure drop: at full open position to be less than 100 kPa (15 psi) differential across damper.

.7 Acceptable material:
Duro Dyne
Henderson Industrial
Pottorff

2.3 BACK DRAFT DAMPERS

.1 Automatic gravity operated, multi leaf, aluminum construction with nylon bearings, centre pivoted or counterweighted, as indicated.

.2 Acceptable materials:

T.A. Morrison
Tamco Series 7000
Ruskin
Nailor
E.H. Price
Henderson Industrial
Ventex/Alumavent
Pottorff

Part 3 Execution

3.1 INSTALLATION

.1 Install where indicated.

.2 Install in accordance with recommendations of SMACNA and manufacturer's instructions.

.3 Seal multiple damper modules with silicon sealant.

.4 Install access door adjacent to each damper. See Duct Accessories Section.

.5 Insulated dampers on all outside air intake and exhaust damper.

.6 Non-insulated dampers on all interior motorized dampers not exposed to outside air.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 CAN/ULC-S110, Standard Methods of Test for Air Ducts.

.3 UL 181, Factory Made Air Ducts and Air Connectors.

.4 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.

.5 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.

.6 SMACNA HVAC Duct Construction Standards - Metal and Flexible.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

- .1 Thermal properties.
- .2 Friction loss.
- .3 Acoustical loss.
- .4 Leakage.
- .5 Fire rating.

1.3 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 GENERAL

.1 Factory fabricated to CAN/ULC S110.

.2 Pressure drop coefficients listed below are based on relative sheet metal duct pressure drop coefficient of 1.00.

.3 Flame spread rating not to exceed 25. Smoke developed rating not to exceed 50.

2.2 METALLIC –INSULATED

.1 Spiral wound flexible aluminum with factory applied, 25 mm (1") thick flexible glass fibre thermal insulation with vapour barrier and vinyl jacket, Class 1 duct material.

.2 Performance:

- .1 Factory tested to 2.5 kPa (10" w.c.) without leakage.
- .2 Maximum relative pressure drop coefficient: 3.
- .3 Operating pressure: 300 mm (12”).

.3 Acceptable materials:

.1 Flexmaster T/L – VT

.2 Ductmate

2.3 METALLIC – UNINSULATED

.1 Spiral wound flexible aluminum, Class 1 duct material.

.2 Performance:

.1 Factory tested to 2.5 kPa (10" w.c.) without leakage.

.2 Maximum relative pressure drop coefficient: 3.

.3 Operating pressure: 300 mm (12”).

.3 Acceptable materials:

.1 Flexmaster T/L

.2 Ductmate

Part 3 Execution

3.1 DUCT INSTALLATION

.1 Install in accordance with: SMACNA.

.2 Maximum length of flexible duct: 1.8 m (6' 0").

.3 Minimum length of acoustical ductwork; 1.5 m (5' 0") with minimum of 1 bend.

.4 Provide support at centre of flexible duct with 25 mm (1") wide galvanized hanger.

.5 Insulated flexible ductwork in areas where ceilings are not utilized as return air plenums.

.6 Uninsulated flexible ductwork in areas where ceilings are utilized as return air plenums.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.

.3 ASTM C553, Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.4 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.

.5 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

Part 2 Products

2.1 DUCT LINER

.1 General:

- .1 Rigid fibrous glass duct liner: air stream side faced with mat facing.
- .2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50 when tested in accordance with CAN/ULC-S102.
- .3 Acceptable material:
  - .1 Johns Manville, Permacote Linacoustic R-300
  - .2 Owen Corning

.2 Rigid:

- .1 Use on flat surfaces.
- .2 25 mm (1") thick, to CGSB 51-GP-10M, fibrous glass rigid board duct liner.
- .3 Density: 36 kg/m² (7.4 lb/ft²).
- .4 Thermal resistance to be minimum 750 mm (30") C/W for 25 mm (1") thickness 1150 mm (45") C/W for 40 mm (1½") thickness when tested in accordance with ASTM C177, at 24°C (75°F) mean temperature.

2.2 ADHESIVE

.1 Meet requirements of ANSI/NFPA 90A and ANSI/NFPA 90B.

.2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50. Temperature range -29°C (-20°F) to 93°C (200°F).

.3 Acceptable material:

- .1 Duro Dyne 1A-22
- .2 Ductmate

2.3 FASTENERS

.1 Weld pins 2.0 mm (14 gauge) diameter, length to suit thickness of insulation. Metal retaining clips, 32 mm (1¼") square.

.2 Acceptable material:

.1 Duro Dyne

.2 Ductmate

2.4 JOINT TAPE

.1 Poly-Vinyl treated open weave fiberglass membrane 50 mm (2") wide.

.2 Acceptable materials:

.1 Duro Dyne FT2

.2 Ductmate

2.5 SEALER

.1 Meet requirements of ANSI/NFPA 90A and ANSI/NFPA 90B.

.2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50. Temperature range -68°C (-90F) to 93°C (200°F).

.3 Acceptable materials:

.1 Duro Dyne 1A-94

.2 Ductmate

Part 3 Execution

3.1 GENERAL

.1 Do work in accordance with recommendations of SMACNA duct liner standards as indicated in SMACNA HVAC Duct Construction Standards, Metal and Flexible, except as specified otherwise.

.2 Line inside of ducts where indicated.

.3 Duct dimensions, as indicated, are clear inside duct lining.

.4 Provide an interior of ductwork from fans from minimum distance of 3 m (10'-0").

3.2 DUCT LINER

.1 Install in accordance with manufacturer's recommendations, and as follows:

.1 Fasten to interior sheet metal surface with 100% coverage of adhesive.

.2 In addition to adhesive, install weld pins not less than 2 rows per surface and not more than 300 mm (12") on centres.

.2 Weld pins are to have cupped or beveled heads to prevent damage to lining surface.

.3 Store foam liners away from sunlight.

3.3 JOINTS

.1 Seal all butt joints, exposed edges, weld pin and clip penetrations and all damaged areas of liner with joint tape and sealer. Install joint tape in accordance with manufacturer's recommendations, and as follows:

.1 Bed tape in sealer.

.2 Apply 2 coats of sealer over tape.

.2 Replace damaged areas of liner at discretion of Consultant.

.3 Protect leading and trailing edges of each duct section with sheet metal nosing having 15 mm (1/2") overlap and fastened to duct.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 AMCA 99, Standards Handbook.

.3 ANSI/AMCA 210, Laboratory Methods of Testing Fans for Certified Aerodynamics Performance Rating.

.4 AMCA 300, Revised 1987, Reverberant Room Method for Sound Testing of Fans.

.5 AMCA 301, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

.6 ANSI/ASHRAE 51, Laboratory Methods of Testing Fans for Certified Aerodynamics Performance Rating.

.7 ANSI/NFPA 96 – Ventilation Control and Fire Protection of Commercial Cooking Operations.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements.

.2 Product data to include fan curves and sound rating data.

1.3 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into manual specified in general requirements.

1.4 CERTIFICATION OF RATINGS

.1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered from independent testing agency signifying adherence to codes and standards in force.

.2 Provide confirmation of testing.

Part 2 Products

2.1 FANS GENERAL

.1 Capacity: flow rate, total static pressure Pa, r/min, W (" w.c., r/min, bhp) model and size and sound ratings as indicated on schedule.

.2 Statically and dynamically balanced. Constructed in conformity with AMCA 99.

.3 Sound ratings: comply with AMCA 301, tested to AMCA 300.

.4 Performance ratings: based on tests performed in accordance with ANSI/AMCA 210, and ANSI/ASHRAE 51.

.5 Bearings: sealed lifetime of self aligning type with oil retaining, dust excluding seals and a certified minimum rated life of 80,000 100,000 h in accordance with AFBMA L10 life standard. Bearings to be rated and selected in accordance with AFBMA 9 and AFBMA 11.

.6 Acceptable materials:

.1 Penn-Barry
.2 Greenheck
.3 Cook
.4 Jenco (S & P)/Jenn
.5 Carnes
.6 Acme
.7 Zonex
.8 Twin-City
.9 Reversomatic
.10 Fantech
.11 Aerovent

.7 Provide factory mounted speed control for all direct drive motors.

2.2 ROOF EXHAUSTERS

.1 Centrifugal V belt or direct driven as indicated.

.1 Housing: spun aluminum complete with resilient mounted motor and fan.
.2 Impeller: aluminum non-overloading.
.3 Adjustable motor sheave
.4 15 mm (1/2") mesh 2.0 mm (79 mil) diameter aluminum birdscreen.
.5 Automatic gasketted aluminum backdraft dampers.
.6 Disconnect switch within fan housing.
.7 Continuous curb gaskets, cadium plated securing bolts and screw, and sound insulating.

.2 Roof curbs; of same manufacturer as fan and built to suit model specified.

.3 Size, type, and capacity: as indicated

.4 To NFPA 96 requirements where indicated.

2.3 CEILING DISCHARGE FANS

.1 Centrifugal direct drive, with plug in type electric motor suitable for ceiling installation, zinc coated rectangular metal housing.

.2 Sizes and capacity: as indicated.

.3 Toggle switch operated complete with integral electrical outlet box with plug-in type receptacle.

.4 Side duct outlet with integral backdraft damper, size as indicated.

.5 Wall cap complete with spring loaded backdraft damper with neoprene gasket.

.6 Silver anodized aluminum grille paint finish.

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

.2 Provide flexible duct connection at roofline.

.3 Provide backdraft damper at building exterior penetration.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

- .1 Capacity.
- .2 Throw and terminal velocity.
- .3 Noise criteria.
- .4 Pressure drop.
- .5 Neck velocity.

1.2 MAINTENANCE MATERIALS

.1 Include:

- .1 Keys for volume control adjustment.
- .2 Keys for air flow pattern adjustment.

1.3 MANUFACTURED ITEMS

.1 Grilles, registers and diffusers of same generic type to be product of one manufacturer.

1.4 CERTIFICATION OF RATINGS

.1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 GENERAL

.1 To meet capacity, pressure drop, terminal velocity, throw, noise level, neck velocity as indicated.

.2 Frames:

- .1 Full perimeter gaskets.
- .2 Plaster frames where set into plaster or gypsum board and as specified.
- .3 Concealed fasteners.

.3 Concealed operators.

.4 Colour and Finish: standard as directed by Consultant.

.5 Acceptable materials:

.1 Krueger
.2 E.H. Price
.3 Nailor
.4 Titus
.5 Carnes
.6 Seiho
.7 Metalaire

2.2 SUPPLY GRILLES AND REGISTERS

.1 General: with opposed blade dampers as indicated, concealed manual operator and gaskets.

.2 Type, size, and capacity: as indicated.

2.3 RETURN AND EXHAUST GRILLES

.1 General: with opposed blade dampers as indicated, concealed manual operator and gaskets and fire stop flap where indicated.

.2 Type, size, and capacity: as indicated.

2.4 DIFFUSERS

.1 General: volume control dampers with flow straightening devices and blank-off quadrants, as indicated and gaskets and fire stop flap and fire blanket where indicated.

.2 Type, size, and capacity: as indicated.

2.5 OPEN MESH SCREEN

.1 15 mm x 15 mm (½"x ½") open mesh screen fastened on 25 mm (1") border, screw fasten.

.2 On all open ends of ductwork and where indicated.

.3 Size: To match ductwork size.

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

.2 Install with flat head screws in countersunk holes where fastenings are visible.

.3 Bolt grilles, registers, and diffusers, in place

.4 Provide concealed safety chain on each grille, register and diffuser in gymnasium, similar game rooms, and on exposed diffusers, and elsewhere as indicated.

.5 Clean grilles upon completion.

.6 Paint ductwork beyond grilles, matte black where visible.

.7 Ensure all grilles, diffusers, etc. match opening sizes as indicated on the drawings and as fabricated on site by the contractor.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ASTM E90, Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions, and Elements.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

.1 Pressure drop.

.2 Face area.

.3 Free area.

.4 Colour and finish.

1.3 CERTIFICATION OF RATINGS

.1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

1.4 TEST REPORTS

.1 Submit certified data from independent laboratory substantiating acoustic and aerodynamic performance to ASTM E90.

Part 2 Products

2.1 ALUMINUM WALL CAPS

.1 Application: as noted on drawings.

.2 0.3 mm (16 gauge) aluminum wall sleeve sized as noted on plans.

.3 0.3 mm (16 gauge) sloping exterior wall cap with integral sides, base plate, and 25 mm (1") perimeter flange with 4-hole screw fasten. Fasteners at each corner.

.4 Bottom outlet with removable 15 mm x 15 mm (1/2") x (1/2") aluminum screen.

.5 Neoprene backdraft damper with aluminum crimp on bottom edge.

.6 Acceptable materials:

.1 Reversomatic

.2 Broan

.3 Ventex

.4 Shop fabricated (submit sample for approval).

Part 3 Execution

3.1 INSTALLATION

.1 In accordance with manufacturers and SMACNA recommendations.

.2 Reinforce and brace air vents, intakes and goosenecks as indicated.

.3 Anchor securely into opening.

.4 Seal with caulking all around to ensure weather tightness.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ASTM C553, Mineral Fiber Blanket, Thermal Insulation for Commercial and Industrial Applications.

.3 CSA B52, Mechanical Refrigeration Code.

.4 EPS 1/RA/2, Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general conditions.

.2 Indicate major components and accessories including sound power levels of units.

.3 Type of refrigerant used.

1.3 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into manual specified in general conditions.

1.4 WARRANTY

.1 Contractor hereby warrants refrigeration compressors for 5 years.

Part 2 Products

2.1 GENERAL

.1 System type:

.1 Air flow arrangement: horizontal

.2 Cooling: direct expansion

.3 Condensing: air cooled

2.2 OUTDOOR CONDENSING UNITS

.1 General: Factory-assembled, single piece, air-cooled condensing unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, compressor, refrigerant holding charge, and special features required prior to field start-up. Unit shall be rated in accordance with ARI Standard and be CSA approved.

.2 Unit Cabinet:

.1 Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a prepainted baked enamel finish.

.2 A heavy gage roll-formed perimeter base rail with forklift slots and lifting holes shall be provided to facilitate rigging.

.3 Fans:

.1 Condenser fans shall be direct driven, propeller-type, discharging air horizontally.

.2 Fan blades shall be balanced.

.3 Condenser fan discharge openings shall be equipped with PVC coated steel wire safety guards.

.4 Condenser fan and motor shaft shall be corrosion resistant.

.4 Compressor:

.1 Compressor shall be mounted on vibration isolators.

.2 Compressors shall include overload protection.

.5 Condenser Coil:

.1 Condenser coil shall be air-cooled and circuited for integral subcooler.

.2 Coil shall be constructed of aluminum fins (copper fins optional) mechanically bonded to internally grooved seamless copper tubes which are then cleaned, dehydrated, and sealed.

.6 Refrigeration Components:

.1 Refrigeration circuit components shall include liquid line service valve, suction line service valve, liquid filter drier, a full charge of compressor oil, and a holding charge of refrigerant.

.7 Controls and Safeties:

.1 Minimum control functions shall include:

.1 Control wire terminal blocks.

.2 Five-minute recycle protection to prevent compressor short-cycling.

.3 Compressor lockout on auto-reset safety until reset from thermostat.

.2 Minimum Safety devices which are equipped with automatic reset (after resetting first at thermostat), shall include:

.1 High discharge pressure cutout.

.2 Loss-of-charge cutout.

.8 Electrical Requirements: as indicated.

.9 Capacity: as indicated

.10 Provide the following: low-ambient cooling kit (cooling down to -30°C).

.11 Acceptable materials:

.1 Daikin

.2 Carrier

.3 Trane

.4 Lennox

2.3 INDOOR DX COOLING COIL

.1 General: **Existing, relocated**, horizontal direct-expansion cooling coil with casing and fan.

2.4 WALL HUNG FAN COIL UNIT

.1 Indoor, direct-expansion, wall mounted fan coil, complete with cooling coil, fan, fan motor, piping connectors, electrical controls, microprocessor control system, and integral temperature sensing. Unit shall be furnished with integral wall-mounting bracket and mounting hardware.

.2 Cabinet discharge and inlet grilles shall be attractively styled, high-impact polystyrene. Cabinet shall be fully insulated for improved thermal and acoustic performance.

.3 Fan shall be tangential direct-drive blower type with air intake at the upper front face of the unit and discharge at the bottom front. Automatic, motor-driven vertical air sweep shall be provided.

.4 Coil shall be copper tube with aluminum fins and galvanized steel tube sheets. Fins shall be bonded to the tubes by mechanical expansion. A drip pan under the coil shall have a drain connection for hose attachment to remove condensate. Condensate pan shall have internal trap and auxiliary drip pan under coil header.

.5 Motors shall be open drip-proof, permanently lubricated ball bearing with inherent overload protection. Fan motors shall be 3-speed.

.6 Controls shall consist of a microprocessor based control system which shall control space temperature, determine optimum fan speed, and run self diagnostics. The temperature control range shall be from 18°C to 29°C (64°F to 84°F). The unit shall have the following functions:

.1 An automatic restart after power failure at the same operating conditions as at failure.

.2 A timer function to provide a minimum 24-hour timer cycle for system Auto. Start/Stop.

.3 Temperature-sensing controls shall sense return-air temperature. Indoor-air high discharge temperature shutdown shall be provided.

.4 Indoor coil freeze protection.

.5 Wall mounted thermostat to enter set points and operating conditions.

.6 Auto Stop features shall have integral setback control.

.7 Automatic airsweep control to provide on or off activation of airsweep louvers.

.8 Diagnostics shall provide continuous checks of unit operation and warn of possible malfunctions. Error messages shall be displayed at the unit.

.9 Fan speed control shall be user-selectable: high, medium, low, or microprocessor automatic operation during all operating modes.

.10 A time delay shall prevent compressor restart in less than three minutes.

.7 Filter track with factory-supplied cleanable filters.

.8 Capacity:

.1 227 l/s (480 cfm), 5.3 kW (18.0 MBH), E.A.T. 31/24°C db/wb (88/75°F db/wb).

.2 208/1/60 0.66 MCA

.9 Acceptable materials:

.1 Carrier 40 QNB 018 (Both components can be ordered under Carrier Model #: 53QNB 018)

.2 Trane

.3 Lennox

2.5 REFRIGERANT

.1 Holding charge of refrigerant applied at factory.

Part 3 Execution

3.1 GENERAL

.1 Install as indicated, to manufacturers' recommendations.

.2 Manufacturer to certify installation.

.3 Run drain line from cooling coil condensate drain pan to terminate over nearest floor drain.

.4 Provide zero penetration roof stand (big-foot or equal) to elevate equipment minimum 450mm AFR. Roof stand shall indicate equipment weight and dimensions that it is designed to support. Roof stand shall be bolted to minimum 450x450 (18”x18”) paving stone on form insulation base under each foot. See also drawing details.

.5 Provide premanufactured lineset outlet box and roof curb for penetration of linesets through roof.

.6 Provide 100 mm x 100 mm x 20 mm (4" x 4" x 3/4") neoprene type vibration isolation for installation of condensing unit on roof stand.

3.2 EQUIPMENT

.1 Preparation and Start-Up

.1 Provide services of manufacturer’s authorized factory trained mechanic to set and adjust equipment for operation as specified.

.2 Provide results in operation and maintenance manuals.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 Conform to general provisions for mechanical division in General Requirements section.

1.2 SUBMITTAL

.1 Submit shop drawings and product data in accordance with general requirements,

.2 Indicate the following: complete specifications, wiring diagrams (showing all interconnections); weight; performance details.

.3 Provide data for inclusion in the Operating and Maintenance manuals in accordance with general requirements,

Part 2 Products

2.1 VERTICAL UNIT VENTILATOR

.1 Main cabinet shall be 14 gauge corrosion resistant steel, braced and reinforced for rigidity. The finish shall be baked enamel, in the manufacturer's standard color/ color as per the consultant's instruction. The cabinet shall be fully lined with 1" glassfiber, coated on the air side.

The unit shall have an upflow configuration unless noted otherwise.

Upflow units shall have air openings suitable for discharge into high-level duct.

.2 Color-matched raised base, of height to suit the floor to ceiling dimension. Units will not penetrate ceiling tile.

.3 Color-matched top extension for the cabinet, of size to suit the ceiling height.

.4 Top Acoustical Plenum shall be provided. Plenum height to be coordinated on site. Carry 20" high top freeblow plenum in tender. Plenum constructed of 14 ga metal and color matched using a powder coat finish and 1" thick glassfiber insulation. An internal perforated cone and sound baffles shall be installed for sound abatement. The plenum shall be equipped with double deflection supply air grilles color matched to the cabinet.

.5 Colour-matched 10" rear offset plenum shall be provided. Rear plenum shall include integral offset ducting up to exterior louver.

.6 The supply air fan shall be a direct double width, double inlet, centrifugal forward curve fan with an electrically commutated motor (ECM) mounted on rubber isolation grommets. Blowers shall be designed specifically for unit ventilator operation. ECM motors shall be programmed to meet the scheduled airflow at the specified external static pressure with additional speed taps for manual adjustment on site during balancing. Motors shall consist of a brushless, permanently lubricated ball bearing construction for maintenance free operation.

.7 Hot water coil shall have ½" copper tube of minimum wall thickness 0.016" and shall have aluminum fins. The coil supply and return headers shall be ¾" copper pipe, stubbed for sweat connection. The coil shall be factory pressure tested at not less than 350 p.s.i. A automatic air vent shall be factory installed and ball valves fitted / shipped loose for field installation. The coil capacity shall be as shown in the schedule.

.8 Direct Expansion coil shall have 3/8" copper tube and aluminum fins. The liquid line connection shall be 3/8" O.D. and the suction line ¾" O.D. The field connections shall be brazed. The coil capacity shall be as shown in the schedule. A suitable drain pan shall be provided. Pipe condensate to exterior wall grille.

.9 A capacity matched thermal expansion valve shall be factory installed at the evaporator coil. The refrigerant that shall be used in the system will be R410a. High and low pressure switches (auto reset low-pressure and manual reset high pressure) as well as a moisture indicated sight glass and service ports shall be factory installed. A suitable matched condensing coil shall be provided.

.10 Air Cooled Condensing Unit: not included under this scope of work.

.11 Outdoor and return air dampers shall be opposed blade type with airfoil section aluminum extruded blades. The dampers shall have neoprene blade tip and jamb seals. Leakage shall not exceed 4 c.f.m. per sq. ft. at 3" W.G. differential pressure, as determined by a recognized testing laboratory. Unit manufacturer to supply a modulating spring return damper actuator for proportional damper control.

.12 Economizer Operation: The unit shall have the capacity for 100% outdoor air when outdoor conditions allow. Provide power vent operation.

.13 Filters shall be of the manufacturer's standard washable type.

.14 Unit manufacturer shall provide an external wall louvre for the outdoor air intake. The louvre shall be of heavy gauge aluminum with 45 deg. Blades. The blade profile shall be designed to prevent water penetration. The louvre shall have ½" birdscreen attached to the inner face and shall have a minimum free area of 1.1 sq. ft. The finish on the louver shall be a custom color as selected by the consultant. Coordinate supply of louver with trade. Provision of louver is not required where louver is supplied separately by trade.

.15 Unit manufacturer shall provide a wall sleeve and shall be custom sized to suit the wall depth. The wall sleeve shall include air flow separators to prevent mixing of fresh air, condenser air intake and condenser air exhaust.

.16 All internal line voltage wiring shall be by the unit manufacturer.

- .1 A suitably rated unfused disconnect switch shall be factory installed within the unit.
- .2 A suitably rated remote circuit breaker shall be provided and installed by Electrical Division.

.17 Control items shall be furnished by the unit manufacturer and shall function as described in the Controls Specification.

- .1 Provide terminal strip ("digital-ready") for standard electric/mechanical controls per Energy Controls.
- .2 Controls shall be sequenced as per ASHRAE Cycle II or Cycle III to meet owner requirements.

.18 Accessories

.1 Face and bypass heating coil

.2 Rear pipe chase panel

.3 Wall Louvre

.19 Unit selection and Capacity: As indicated on schedule on drawings.

.20 Acceptable Manufacturers:

.1 Trane

.2 Daikin

.3 Temspec Inc.

.4 Engineered Air

.5 SystemAir

.6 Venmar

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

.2 Install equipment exposed to finished areas after walls and ceiling are finished and painted. Avoid damage.

.3 Protection: Provide finished cabinet units with protective covers during balance of construction.

.4 Unit Ventilators: Locate as indicated, level and shim units, and anchor to structure. Coordinate with existing wall louvre and radiation cabinet. Adjust existing adjacent surfaces as required for a complete finished installation.

.5 Hydronic Units: Install with shut-off valve on supply and lockshield balancing valve on return piping. If not easily accessible, extend vent to exterior surface of cabinet for easy servicing.

.6 Connect drain pan to condensate drain.

.7 The mechanical contractor shall charge the refrigeration system after installation and ensure that the cooling system is operating correctly.

3.2 START UP AND INSTRUCTION

.1 Unit Manufacturer shall provide start up and instruction to the owner.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Indicate:

.1 Equipment, capacity, piping, and connections.

.2 Dimensions, internal and external construction details, recommended method of installation with proposed structural steel support, sizes and location of mounting bolt holes.

.3 Special enclosures.

.3 Primer coat to be off white.

.4 All hydronic heating shall be by a single manufacturer.

1.2 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 DAMPERS

.1 Factory built, internal damper, complete with operator, at enclosure air outlet grille for each convection type heating unit not thermostatically controlled. Refer to schedules on drawings.

2.2 CAPACITY

.1 As indicated.

2.3 CABINET UNIT HEATERS (RECESSED IN WALL) (H-1)

.1 Cabinet: Recessed installation as indicated, 1.6 mm (16 gauge) thick steel with rounded exposed corners and edges, removable panels, glass fiber insulation and integral return air outlet and ducted supply air outlet, Arrangement 30.

.2 Finish with factory applied primer coat.

.3 Coils: aluminum fins mechanically bonded to copper tubes. Hydrostatically tested to 1 MPa (145 psi).

.4 Fans: centrifugal double width wheels, statically and dynamically balanced, direct driven, sleeve bearings, resilient mounted.

.5 Motor: multi-speed, tapped wound permanent split capacitor type with sleeve bearings, built-in thermal overload protection and resilient rubber isolation mounting.

.6 Filters: removable permanent washable type.

.7 Capacity and orientation as indicated.

.8 Control:

.1 3 speed switch with integral overloads in cabinet.

.2 Control thermostat: by BAS contractor

.9 Acceptable materials:

.1 Engineered Air CUH Series

.2 Slant Fin

.3 Sigma

.4 Dunham-Bush

2.4 FINNED TUBE RADIATION (H-2)

.1 Heating elements: NPS 32 mm (1 1/4") seamless copper tubing, 1.2 mm (18 gauge) minimum wall thickness, mechanically expanded into flanged collars of evenly spaced aluminum fins, 100 mm x 100 mm (4" x 4") nominal, 164 fins per meter (50 fins/ft) suitable for sweat fittings.

.2 Element hangers: cradle type providing unrestricted longitudinal movement on enclosure brackets. Space brackets 900 mm (36") centres maximum.

.3 Standard enclosures: 450 mm (18") high, 1.6 mm (16 gauge) thick steel complete with stamped grille, components for wall-to-wall or complete with die formed end caps having no knock-outs, with inside corners, outside corners, as indicated. Provide full length channel and sealer strip at top of wall edge. Height as indicated. Joints and filler pieces to be flush with cabinet. Support rigidly top and bottom, on wall mounted brackets. Joints and filler pieces to be clear of grilles located to provide easy access to valves and vents. Provide access doors for valves. Finish cabinet with factory applied baked primer coat. Enclosure height as indicated. Sloping top open bottom.

.4 Special enclosures: as indicated.

.5 Dimensions for enclosures: measure site conditions. Do not scale from drawing.

.6 Provide for noiseless expansion of all components.

.7 Expansion compensators: Flexonics at each section by mechanical contractor as specified elsewhere.

.8 Acceptable materials:

.1 Engineered Air WF-1A Series

.2 Slant Fin

.3 Sigma

2.5 FINNED TUBE RADIATION RELOCATED EXISTING (H-3)

.1 Heating elements: NPS 32 mm (1 1/4") seamless copper tubing, cut existing elements to suit new length indicated.

.2 Provide new element hangers: Space brackets 900 mm (36") centres maximum.

.3 Existing enclosures: 500 mm (20") high steel complete with stamped grille. Provide additional components as required for wall-to-wall installation or complete with die formed end caps having no knock-outs, with inside corners, outside corners, as required. Provide full length channel and sealer strip at top of wall edge. Joints and filler pieces to be flush with cabinet. Support rigidly top and bottom, on new wall mounted brackets. Joints and filler pieces to be clear of grilles located to provide easy access to valves and vents. Provide new access doors for valves. Clean existing cabinet prior to installation.

.4 Dimensions for enclosures: measure site conditions. Do not scale from drawing.

.5 Provide for noiseless expansion of all components.

.6 Expansion compensators: Flexonics at each section by mechanical contractor as specified elsewhere.

.7 Acceptable materials:

.1 Engineered Air

.2 Slant Fin

.3 Sigma

.4 Dunham-Bush

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

.2 Install in accordance with piping layout and reviewed shop drawings.

.3 Provide for pipe movement during normal operation.

.4 Maintain sufficient clearance to permit performance of service maintenance.

.5 Check final location with Consultant if different from that indicated prior to installation. Should deviations beyond allowable clearances arise, request and follow Consultant's directive.

.6 Valves

.1 Install valves with stems upright or horizontal unless approved otherwise.

.2 Install isolating gate valves on inlet and balancing valves on outlet of each unit.

.7 Venting:

.1 Install screwdriver vent on cabinet convector, terminating flush with surface of cabinet.

.2 Install standard air vent with cock on continuous finned tube radiation.

.8 Clean finned tubes and comb straight.

.9 Install flexible expansion compensators as indicated.

.10 Mount wall mounted convectors at 200 mm (8") above finish floor.

.11 Mount wall mounted radiation at 200 mm (8") above finish floor unless otherwise indicated.

.12 Thermostats on outside walls: mount on insulated backplates.

.13 On units fed from below floor provide factory manufactured piping shrouds on the exposed piping between base of the radiation cabinet and finished floor. Shroud shall be manufactured by the radiation manufacturer. Shroud shall match finish of the radiation cabinet.

.14 On fan forced units set discharge patterns and fan speeds to suit requirements prior to acceptance.

.15 Provide new filter media.

END OF SECTION

Part 1 General

1.1 GENERAL NOTE

.1 This Section is to be read in conjunction with Division 1, the General Conditions and the General Requirements of the Mechanical Trades, and the documents required by the BIDDING REQUIREMENTS and CONDITIONS OF THE CONTRACT sections.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1 Plumbing & Drainage

Ventilation & Air Conditioning
Testing & Balancing
Electrical

.2 Supply all necessary efforts to provide the project DDC Lon Works system as specified.

1.3 DESCRIPTION OF SYSTEM

.1 Provide an extension of the existing DCC control system for the packaged rooftop HVAC units, ERVs, exhaust fans, radiation, boiler plant, and other equipment indicated. Furnish and install all components, devices and control wiring for a fully integrated Energy Management and Environmental Control System incorporating Direct Digital Control (DDC), and equipment monitoring. The system shall control and monitor all air handling units, exhaust fans, and other equipment as specified in this section.

.2 The DDC System shall include the new DDC System to the latest Board standards. All controller Chipsets to latest release versions.

.3 The work shall include but is not limited to the following:

- .1 A local stand alone programmable building automation control (BAS) system for each system as indicated.
- .2 Split A/C unit control for all remote condensing units.
- .3 Radiation heating control.
- .4 Building low temperature alarm (all spaces with sensor).
- .5 All dampers, operators, etc, required under this contract.
- .6 All electric wiring, switches, relays, etc., for a complete operating system.
- .7 All wiring incidental to controls system.
- .8 System and equipment trending and scheduling.
- .9 System training.

.4 All the necessary controls, motors, control wiring, conduit, control panels, instrumentation, computer software, and network access units, for the specified system shall be provided under this section. The installed system shall incorporate electronic and digital control devices to perform the control sequences and programs outlined herein. Specific control sequence requirements are as detailed in subsequent sections of this specification and on the drawings.

.5 All electrical wiring, mechanical installations, and control sequences shall comply with local and provincial electrical and mechanical codes.

.6 It is the responsibility of the BAS contractor to provide dedicated 120 V power for the automation system from a spare breaker in the nearest electrical panel. Obtain all necessary ESA permits, inspections, and approvals for all power related work.

.7 Testing, debugging, confirmation of total system operation and owner training on the complete operation of the system and the computer software shall also be provided in this section.

1.4 SCOPE OF WORK

.1 The contractor shall supply, install, test, and commission a complete microprocessor based programmable HVAC control system including all system components as described further. The system shall include the necessary engineering, supervision, and programming for a completely operational system. Submit complete As-built information describing the operation/programming and installation/wiring of the new DDC system.

.2 Update existing software and graphics in the existing OWS located on site.

.3 Ensure that software is up to date in the existing PC located at the Board maintenance office on Dutton Drive in Waterloo, Ontario.

1.5 ASSOCIATED WORK SPECIFIED IN OTHER SECTIONS

.1 The contractor shall coordinate the installation of devices furnished in this section with the installing contractor by trade jurisdiction.

.2 Sheet Metal/Ventilating Contractor

Install all single and multiple section dampers, interconnecting linkages, blank-off plates, duct transitions, access doors, louvers and similar items as required for the system and/or as indicated on the drawings.

.3 Electrical Contractor

Install and connect electrical power to all motors, transformers and starters. A power supply will be available from the panel in the mechanical room for DDC system control panels.

1.6 MANUFACTURER

.1 Bids for the BAS contract will only be accepted from the following vendors/installers:

.1 Energy Controls and Mechanical Services Inc.
565 Trillium Drive, Unit 6
Kitchener, Ontario
N2R 1J4
Tel: (519) 893-2638

.2 All control equipment and materials shall be new and of the manufacturer's latest standard design that complies with the specification requirements.

1.7 SYSTEM ACCEPTANCE

.1 System commissioning and interface to facilities management network shall be performed by the Building Automation contractor.

.2 On project completion, the contractor shall issue a report to the consultant stating that the system is complete, that all hardware and software functions have been verified and that the system is operating in accordance with the specifications. A demonstration of complete system operation shall be made to the owner's authorised representative.

.3 Upon successful completion of the system demonstration, the owner's representative shall be requested to approve, in writing, the satisfactory operation of the DDC System, interface devices and accessories.

.4 The consultant shall verify through the owner's representatives that the entire system is complete and operating to the satisfaction of the owner before final acceptance is approved.

1.8 MAINTENANCE DATA AND SERVICE

.1 Provide maintenance data for controls and instrumentation for incorporation into maintenance manual.

.2 After acceptance, seasonally check and readjust control systems for change over. Make two (2) site trips. Notify Engineer of scheduled dates. Carry out any preventive maintenance required including parts and labour. Report to Engineer, in writing, results or resettings made.

.3 Provide as-built information in accordance with Division 01 and Division 20 requirements.

1.9 WARRANTY

.1 The Control Contractor shall guarantee the control system as specified to be free from defects in workmanship and material under normal use and service for a period of 12 months. Items found defective shall be replaced free of charge for a period of 12 months following written acceptance of the completed project contract by the Owner.

.2 Custom hardware and materials specific to this control system shall be similarly guaranteed for a period of 24 months.

.3 Service conducted on the system during the period of warranty shall be performed by the Contractor on-site. Any component serviced off-site shall be temporarily replaced with an identical device at no additional expense.

.4 Equipment guaranteed for a longer period by the OEM shall be replaced by the Contractor until the manufacturer's limit, on a labour only basis.

.5 Provide telephone support for the duration of the guarantee period accordingly. Submit a written procedure for the reporting of system malfunction by the Owner for required Contractor service. Provide telephone numbers, hour of use, and a 24/7 emergency response number for support.

1.10 SUBMITTALS

.1 Prior to the installation of any equipment, the contractor shall provide the engineer with six (6) copies of shop drawings and specifications for all devices and equipment used for the complete system installation.

.2 Upon completion of the installation and prior to acceptance and owner training, the contractor shall furnish the engineer with three (3) copies of installation and operation manuals for the complete system. Each manual shall include:

.1 "As Built" drawings, including plan layout, conduit runs, interconnection between devices, and panel wiring diagrams as finally installed.

.2 A complete application description, address location, sequence of operation and I/O summary for each controller installed in the system.

.3 System Architecture Schematics: Provide a complete drawing(s) which details all components of the monitoring and control system. Identify the individual type of controllers, communication buses and speeds, power sizes and distribution, etc. by location and name. Field devices need not be shown.

.4 Equipment Description: Provide technical specifications of all additional project equipment used in the system, including all field devices. Include manufacturer, model number, power requirements, accuracy, etc. Identify the information by point labels. Technical specifications will be presented in OEM Adobe “PDF” formats only.

.5 Provide a DDC system generated points list describing the type, function, and label of all control points for cross reference with specification points list and/or sequence of operation.

.6 Provide an Operator's Manual consisting of instructions, program listings and control sequences for the control system. Provide specific instructions, which explain the remote access procedure, all default and programmed DDC system and OWS software passwords, and supervisory control operation.

.7 Provide an OEM CD-ROM containing all product line documentation, manuals, release notes, controller firmware files, etc. Provide internet access to an OEM website which provides current file access to the items on the CD-ROM.

.8 Backup diskettes of all final data files, programs and computer software for the system, as accepted by the owner, for reloading into the site computer in the event of a system catastrophe or site computer memory failure. The contractor shall also keep one copy of backup diskettes for the system archived in a software storage vault at their business location.

.9 Shop drawings shall be approved before any materials are delivered or installed at the project site.

1.11 TESTING AND BALANCING

.1 During the system testing and balancing by an independent agency fully demonstrate the operation of all sensors, dampers, actuators, controls, valves, etc. This contractor shall be present during the testing and balancing and make adjustments as often as necessary to satisfy the testing and balancing agency.

Part 2 Products

2.1 MONITORING AND CONTROL SYSTEM (MCS)

.1 The MCS as specified shall include all necessary hardware, software programming, engineering, installation, calibration, sensors, controlling devices and wiring to provide a complete and functional DDC HVAC system.

.2 The MCS shall be a real-time based, multi-user, multi-tasking, computerized control system incorporating distributed direct digital control processing formats as specified. Mechanical and single loop digital controllers (SLDC) are prohibited.

.3 The MCS controllers shall consist of stand-alone, non-application specific (ASC) , microprocessor based panels which communicate on industry standard communications buses to central/remote display terminals. Provide a functional peer-peer "ECHELON" communications network at each site. Provide software and hardware as required to complete an Ethernet TCP/IP, PTP(RS232), and MS/TP(RS485) network protocol for the DDC system in "Echelon", ISO Standard. The operator's WorkStation software, DDC hardware control panels and products, shall communicate using the protocols and LAN/WAN IP standards as defined by the current ANSI/ASHRAE Echelon standard governed by SSPC 135 (www.Echelon.org).

Note: The basis for the Echelon communications is to exchange all data and alarms as points. The Echelon protocol shall exchange system points over the local/remote networks installed including the ethernet LAN/WAN. Echelon communications which use conversion devices, PC/software or Gateway/Bridge, for OEM protocols are not acceptable.

.4 The individual MCS controllers will be able to initiate all alarm reporting and selective data uploading to central/remote display terminals via LAN/WAN connections based on TCP/IP standards.

.5 A fail-safe control mode shall allow equipment to be protected if any controller is disabled or malfunctions.

2.2 CONTROLLERS

.1 The Direct Digital Control (DDC) panels shall have UPS backup and shall consist of the following:

.1 Each DDC controller shall utilize its own microprocessor and must be capable of stand-alone direct digital operation to perform custom program control, monitoring, alarm reporting, trending, and fail-safe control. Application specific controllers will not be accepted.

.2 Memory protection for a minimum of 24 hours by zero maintenance capacitor backup shall be provided after a loss of primary power for each DDC controller. This protection shall at a minimum include continuous real-time clock operation and automatic system restart upon power return. Outputs shall have the option of being set to “staggered start” upon power reset.

2.3 DDC SOFTWARE

.1 Provide an "Open-Protocol" based controls communication for the system integration of other control system hardware/software products via the "ECHELON" ISO standard.

The ECHELON protocol shall communicate all system data via the Ethernet LAN/WAN. DDC communications networks across routers between DDC panels via Echelon/IP shall be provided and demonstrated.

.2 Provide both a menu tree and command prompt type of operator's control software to include complete input/output data base entry, custom application programming, alarm definitions, data trending, report summaries, as a minimum.

The menu tree shall be custom programmed in order to restrict user configured control options based on a minimum of four levels of defined password protection.

.3 The default units of measurement shall be Metric SI, Imperial units are base optional.

.4 The control software concept shall be based on everything is a "point". Any input, output, controller, schedule, calendar, trend, alarm, program, controller or system option is a point that can be addressed. All points can be shared within common control applications, transferred over control networks, modified, printed, saved or deleted as required through operator terminals and in control programs.

.5 Universal Inputs/outputs. All universal point types shall be software configured by selecting sensor options in database creation and modification templates. All changes shall be possible while the system is on-line and operational. The configuration shall be done in a form so that the user is never required to be knowledgeable about the programming itself, only the system and applications.

.6 All numerical point values shall be displayed in integer format or floating point between -3.4*10 ^ 38 to 3.4*10 ^ 38, i.e. .00000123, 7.879E-12, 100. Selected engineering units shall accompany point values.

.7 All points can be printed in an "all-points" log or in selected groups (inputs, outputs, variables, etc.) by the user using "Wild-Card" conventions.

.8 All points will be programmed to alarm based on user defined input ranges for both digital change of state and analog point values.

.9 Provide the following control routines:

- Start/Stop by Schedule, Duty cycle, Optimization, Level, Electrical demand.
- Process Loop Control - P, PI, PID.
- Economizer Control of Free Outdoor Air Cooling.
- Boiler Plant Optimization. Adaptive Hot Water Reset.
- Equipment Trend Log, Run-Time Monitoring.
- Unitary Equipment Programs.

Custom control programs developed shall be added to the library of software routines.

.10 Provide the following Operators:

- Logical "NOT", "AND", "OR", "XOR". Minimum of three Expressions.
- Value Power "^". (i.e., 2^3 = 8)
- Addition "+", Subtraction "-".
- Multiplication "*", Division "/".
- Integer of a Division "\", Remainder of Division "MOD".
- Less Than "<", Greater Than ">".
- Less Than or Equal "<=", Greater Than or Equal ">=".
- Equal "=", Not Equal "<>".

.11 Provide a DDC based custom control strategy programming language based on a high level "Control" type code such as Basic. Assembler type or proprietary based programming languages will not be accepted. All programs shall use embedded comment statements to describe control sequences within the software program.

All the above functions must be accomplished via DDC software.

Editing Features

.1 Provide full screen editor to enable editing of the program source code down to character by character changes.

.2 Provide the capability in the editor of accepting programs from ASCII files that have been created on other text editors and word processors.

.3 If a point name is changed, all occurrences of that will point will automatically be changed, regardless of where the occurrence exists.

.4 Provide cutting and pasting functions within editor, such that sections of the code from one program can be easily cut and pasted into a different code on residing in another controller.

.5 Provide debug utility, which will indicate line of code containing structural or syntax error.

.6 If coding contains line number reference, provide automatic renumbering feature to sequentially renumber lines.

.7 Provide the capability to automatically view value and/or status of points used within the code without exiting editor.

.8 Provide at least TEN (10) unique local variables that can be declared for each individual code.

.12 Control software "Firmware" shall be the most recent version available and shall be upgraded with new versions, which become available within the warranty period.

2.4 LOCAL DISPLAY TERMINAL SOFTWARE

.1 Provide all type software required for monitoring, control, and programming of all system functions via command and graphics level modes. The software is to be modular in order to permit expansion or revision of the system. The software shall provide DDC system access and colour graphics operation from local PC.

.2 Software versions shall operate under the latest version of all the Microsoft Windows operating systems. The software versions shall be Windows compliant and permit multitasking operation. The software shall permit multiple "windows" to be simultaneously open for the DDC system, desktop, and other third party programs, i.e. "Netscape", “Microsoft Word” etc.

.3 Provide multiple-level system access protection on any DDC port to allow restricted control of system operations according to user capability. Provide six levels minimum for 32 system users.

.4 Control sequences are to be created in high-level code.

System alarms shall indicate the specific graphic for display in response to alarm recognition.
System points on all graphic displays shall include custom text files for on-line review by operators to describe specifics about the point.
The graphic displays shall use any type of DDC system point in quantities limited only by the usable display area of the monitor.
All DDC points shall be referenced in OEM/Echelon point ID format. Control points from other control systems shall be displayed directly in the graphics software application stipulated.
Explanation, creation, modification, programming of graphics shall be detailed in OEM manuals and in electronic “PDF” format.

Displays should permit:
- At least 30-local/network points minimum per page.
- Automatic updating every 10 seconds minimum.
- Alarm display and control conditions.
- Simple means of color printing.

Provide a display for:
- Main summary page. c/w project title, OAT conditions, other.
- Energy Data.

.5 The system shall trend and display either numerically or graphically any digital and analog system point with a value. Data files in standard formats for direct use with third-party spreadsheet software (Microsoft Excel) shall be included. Automatic upload of trend data by the system shall be included. The trend features including elapsed time period between logging, value accuracy, number of points, and engineering units shall be programmable. The DDC programs shall control the start/stop, snapshot, and reset of analog and digital trends.

A minimum of four points can be trended in one database.

.6 The system alarms shall be directed to the Remote Central Display Terminal for hard disk type record purposes. The alarm format shall be in ASCII format sent by Ethernet LAN/WAN and e-mail compatible formats. Alarm report printouts shall be obtained by request of a system operator.

2.5 GENERAL REQUIREMENTS FOR SENSORS AND FIELD DEVICES

.1 Actuation of control devices shall be electronic. Spring return fail-safe actuation shall be provided when loss of property and/or property damage is possible and where specified.

.2 All equipment, unless specified to contrary, shall be fully proportioning, modulating in operation.

.3 Space and duct sensors shall be electronic suitably located for specific application. Space sensing units shall be mounted 1500 mm from floor to centre for non-adjustable and 1200 mm from floor for adjustable unless otherwise noted or agreed to by the consultant.

.4 Sensors shall meet or exceed the specified standards.

.5 All sensors shall be capable of operating over the expected operating range and humidity.

2.6 MOTORIZED CONTROL DAMPERS

.1 Control dampers shall be the parallel or opposed blade type as below or as scheduled on drawings.

.1 Outdoor and/or return air mixing dampers and face and bypass (F & BP) dampers shall be parallel blade, arranged to direct air-streams toward each other.

.2 Other modulating dampers shall be the opposed blade type.

.3 Two-position shutoff dampers may be parallel or opposed blade type with blade and side seals.

.2 Damper frames shall be 13 gauge galvanized steel channel or 1/8 in. extruded aluminum with reinforced corner bracing.

.3 Damper blades shall not exceed 20 cm (8 in.) in width or 125 cm (48 in.) in length. Blades are to be suitable for medium velocity performance (10 m/s [2000 fpm]). Blades shall be not less than 16 gauge.

.4 Damper shaft bearings shall be as recommended by manufacturer for application, oil impregnated sintered bronze or better.

.5 All blade edges and top and bottom of the frame shall be provided with replaceable butyl rubber or neoprene seals. Side seals shall be spring-loaded stainless steel. The blade seals shall provide for a maximum leakage rate of 1% of total flow based on a approach velocity of 7.62 m/s (1500 ft/min) at 1000 Pa (4 in. w.g.) differential pressure. Provide air foil blades suitable for a wide-open face velocity of 7.5 m/s (1500 fpm).

.6 Individual damper sections shall not be larger than 125 cm x 150 cm (48 in. x 60 in.). Provide a minimum of one damper actuator per section.

.7 Modulating dampers shall provide a linear flow characteristic where possible.

.8 Dampers shall have exposed linkages.

2.7 CONTROL VALVES

.1 General:

.1 All automatic control valves shall be fully proportioning, unless specified otherwise. The valves shall be quiet in operation and fail safe in normally open position unless specified otherwise. All valves shall be capable of operating at varying rates of speed to correspond to the exact dictates of the controllers and variable load requirements. The valves shall be capable of operating in sequence with other valves and/or dampers when required by the sequence of operation. All control valves shall be suitable for the pressure conditions and shall close against the differential pressures involved.

.2 All control valves shall be sized by the control vendor and be guaranteed to accommodate the flow rates as scheduled.

.3 The valve seat differential pressure rating shall exceed the pump dynamic head design pressure.

.4 All control valve bodies shall be suitable for the static and dynamic pressures of the system. Control valve operators shall be sized to close against a differential pressure equal to the design pump head plus 10 percent.

.1 Design body pressure shall be determined by the adding the static pressure due to the height of the system plus the compression tank charge plus the maximum head of the system pump at cut off. Provide 10% design factor.

.5 The valve seat differential pressure rating shall exceed the pump dynamic head design pressure.

.6 Cold water, hot water and steam valves, throttling type, and bypass valves shall have equal percentage flow characteristics.

.7 All automatic control valves installed exposed to the elements shall be provided with electric actuators with operating characteristics and accessories as described in herein. Coordinate with electrical contractor for power availability and point of connection.

.8 All automatic control valves controlled by the BAS shall be furnished by the controls contractor unless noted otherwise in these documents.

.2 Controlled Media

.1 The control valve shall be suitable for chilled water to a minimum of 35°F (2°C) and hot water to a maximum temperature of 250°F (121°C). 3-way 1-1/2 inch and 2 inch valves shall be suitable for chilled water to a minimum of 35°F (2°C) and hot water to a maximum temperature of 230°F (110°C). The control valve shall be suitable for up to 50% ethylene or propylene glycol solutions where applicable.

.3 Threaded Valves, line size ½" to 2":

.1 Control valve bodies shall be constructed of forged brass according to ASTM B283 (C37700, CuZn39Pb2 or equivalent), and shall meet requirements of ANSI 250 and 600WOG pressure classes.

.2 Inlets and outlets shall be clearly marked on the valve bodies.

.3 Valve ball shall consist of nickel-plated brass, chrome-plated brass or stainless steel.

.4 End connections shall be NPT internally threaded according to ANSI B1.20.1.

.5 The control valve flow rate (Cv) shall meet the requirements of ANSI/ISA S75.02.

.6 The control valve shall have an equal percentage flow characteristic, according to ANSI/ISA S75.11. A single glass filled PTFE V port insert shall provide both the ball seal and shall establish the flow coefficient of the valve. The V port insert shall be retained by the valve body itself, not requiring additional retaining components. Flow coefficient adapters requiring a retainer clip, or installed after final assembly of the valve or as inserts in the ball shall not be allowed.

.7 2-way valves and the A-AB path on 3-way valves shall meet the requirements of ANSI Class IV (0.01% of rated Cv) seat leakage, or better, according to ANSI/FCI 70.2, at the specified close-off pressure. Bypass path (B-AB) on 3-way valves shall meet the requirements of ANSI Class III (0.1% of rated Cv) seat leakage, or better, according to ANSI/FCI 70.2.

.8 Chilled and Hot water valve shall have a blow-out proof stem with two EPDM (peroxide cured) O-rings. External stem retainers will not be allowed.

.9 Valve stem shall be made of brass or stainless steel.

.10 Valve shall have the ability to be manually operated in the event of a power failure.

.4 Flanged Valves, line size 2 1/2 " and greater

.1 Valves 2 1/2 in. and larger shall be cast iron ANSI Class 125 with guided plug and PTFE packing.

.5 Pressure Control Valves:

.1 Provide for all water systems where modulating water flow conditions are required to prevent excessive pump pressure build-up. Provide a valve for each closed loop water system. Valve to be globe type. Provide valves 2" and smaller with screwed end bodies and provide valves 2-1/2" and larger with flanged ends.

2.8 ELECTRONIC DAMPER AND VALVE ACTUATORS

.1 General

.1 Electric control shall be direct coupled actuators.

.2 Damper actuators shall be Brushless DC Motor Technology with stall protection, bi-directional, fail safe spring return, all metal housing, manual override, independently adjustable dual auxiliary switch.

.3 The actuator assembly shall include the necessary hardware and proper mounting and connection to a standard ½" diameter shaft or damper blade.

.4 Actuators shall be designed for mounting directly to the shaft without the need for connecting linkages.

.5 All actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered.

.6 All actuators having more than 100 lb-in torque output shall have a self-centering damper shaft clamp that guarantees concentric alignment of the actuator's output coupling with the damper shaft. The self-centering clamp shall have a pair of opposed "v" shaped toothed cradles; each having two rows of teeth to maximize holding strength. A single clamping bolt shall simultaneously drive both cradles into contact with the damper shaft.

.7 All actuators having more than a 100 lb-in torque output shall accept a 1" diameter shaft directly, without the need for auxiliary adapters.

.8 All actuators shall be designed and manufactured using ISO900 registered procedures, and shall be Listed under Standards UL873 and CSA22.2 No. 24-93 l.

.9 Provide visual scale indicating percent of travel.

.10 Provide feedback signal on all control valves over 2 inches and all damper actuators where specified.

.11 Actuators shall be UL and CSA listed.

.2 Electronic Valve Actuators

.1 The valves shall be provided with an actuator by the same manufacturer, factory installed.

.2 All actuators shall have visual position indication.

.3 No external programming device shall be required.

.4 Actuator shall be electric motor driving, microprocessor signal controlled.

.5 Electric Control Rangeability: 40:1

.6 Control Signal 0 to 10 VDC or 0 to 20 mA signal. 2 to 10 VDC or 4 to 20 mA operating range.

.7 Power 24 VAC, 50-60 Hz

.8 Fail Safe: Valves actuators shall position the valve in a fail safe position when the power supply is disrupted or the signal goes to 0. Fail-safe according to the following guidelines unless otherwise stated in the sequence of operations

.1 Power fail safe shall be via spring loaded mechanical means

.2 Any AHU hot water exposed to ventilation air shall fail open

.3 AHU Chilled water coils exposed to ventilation air in possible freezing conditions shall be fail open

.4 Terminal unit valves shall fail-in-place

.9 Fail in place valves on primary equipment such as chilled water systems, hot water systems and condenser water systems shall have a means to manually open the valve when power is not available, such as a hand wheel or a geared crank with a clutch.

.10 The actuator shall be designed with a current limiting motor protection. A release button (clutch) or handle on the actuator shall be provided to allow for manual override (except when actuator is spring return type).

.11 Actuator shall provide minimum torque required for proper valve close-off. The close-off differential pressure rating of the valve shall exceed the highest possible head pressure available at the pump plus 10%, and still be rated for a Class IV leakage.

.12 The actuator shall have the capability of adding auxiliary switches or feedback potentiometer if specified.

.13 All automatic control valves installed in locations exposed to the elements shall be provided with weather resistant housings and heaters for climates that reach below freezing.

.3 Electronic Damper Actuators

.1 Actuator shall be direct coupled (over the shaft), enabling it to be mounted directly to the damper shaft without the need for connecting linkage. The actuator-to-shaft clamp shall use a "V" bolt and "V" shaped, toothed cradle to attach to the damper shaft for maximum holding strength. Single bolt or set screw type fasteners are not acceptable.

.2 Damper operators shall be of the replaceable diaphragm piston type with external adjustable stops to limit the length of stroke in either direction. Operators shall be mounted on adjustable brackets. Operating arms shall have double yoke linkages and double set screws for fastening to damper shaft.

.3 Damper operators shall be selected to operate maximum damper loads of 2.6 m^2 (135 ft^2). Where damper sizes exceed this area rating, multiple damper operators shall be provided.

.4 Actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator. End switches to deactivate the actuator at the end of rotation or magnetic clutch are not acceptable.

.5 For power-failure/safety applications, a mechanical, spring return mechanism

2.9 DAMPER STATUS SWITCHES

.1 Damper status switches shall be a lever operated, activated by damper blade movement and mounted securely on damper frame.

.2 Damper switch shall have contact rating of 5 amperes at 120V AC and be CSA approved.

2.10 TEMPERATURE THERMOSTAT (DDC)

.1 Digital room sensors without LCD display, day / night override button, and setpoint slide adjustment to ±5°C adjustment and override options. The setpoint slide adjustment can be software limited by the automation system to limit the amount of room adjustment.

.1	Temperature monitoring range	+20/120°F -13° to 49°C)
.2	Output signal	Changing resistance
.3	Accuracy at Calibration point	±0.5°F (+/- 0.3°C)
.4	Set Point and Display Range	55° to 95° F (13° to 35°C)

.2 Provide metal guards on thermostat in common areas and gymnasiums. Common area thermostats shall not have temperature adjustment.

.3 Sensor to be 10k wire, thermistor style.

.4 Do no provide LCD display of space temperature.

.5 Sensor shall have integral CO2 sensor. Refer to CO2 sensor details for requirements.

2.11 FLUID TEMPERATURE SENSORS

.1 Immersion sensors shall be provided with a separable stainless steel well. Pressure rating of well is to be consistent with the system pressure in which it is to be installed. The well must withstand the flow velocities in the pipe.

.2 The sensor shall have the following characteristics:

.1	Range	Appropriate to application
.2	Output Signal	4 to 20 mA or resistive
.3	Accuracy	0.05% of maximum range, max 0.1 C

2.12 SEPARABLE BRASS THERMOWELLS

.1 These shall be provided with immersion type bulbs for installation by plumbing section. (Stainless steel shall be used for immersion in glycol solutions.) Wells shall be packed with thermal conductive grease to increase speed of response. Thermowells shall have ½" IPS threads to receive sensor, and be of suitable length for the pipe diameter.

2.13 AIR TEMPERATURE SENSORS

.1 Sensors shall be a minimum of 1.5m (5ft) in length per 1 square meter of duct cross section.

.2 All supply air sensors and mixed air sensors shall be 100 or 1000 OHM platinum, resistance temperature detector (RTD) type with a 7.5 m (25') averaging element. Each RTD may be provided with an industry standard, 4-20mA, transmitter mounted at the RTD as required.

.1	Temperature monitoring range	-7°C to 49°C (20°F to 120°F)
.2	Output signal	Changing resistance
.3	Accuracy at calibration point	± 0.3C (± 0.5F°)

.3 All return air sensors shall be RTD or thermistor type temperature detectors. The sensor probe shall have a minimum length of 450 mm (18"). Each RTD may be provided with an industry standard, 4-20mA, transmitter mounted at the RTD as required.

.1	Temperature and monitoring range	4°C to 66°C (40°F to 150°F).
.2	Output Signal	Changing Resistance
.3	Accuracy ant calibration point	0.3C (± 0.5F°)

.4 Outdoor air sensor shall be the PT-100 platinum 3 wire RTD type with a 4-20mA transmitter mounted at the sensor. The RTD shall be mounted in a weatherproof enclosure, the 4-20mA transmitter shall be mounted inside the building within an electrical box.

.1	Temperature and monitoring range	-18°C to 49°C (0°F to 120°F).
.2	Output Signal	Changing Resistance
.3	Accuracy at calibration point	± 0.3C (± 0.5F°) over a range of

.5 Sensors shall be provided with vented protective covers, mounted 1500 mm (60") from floor level.

2.14 LOW LIMIT THERMOSTATS

.1 Thermostats shall have 6000 mm vapour tension sensing element sensitive to a temperature below its setpoint over 300 mm of its length.

.2 Range shall be 1.7 to 7.2 degrees C.

.3 Switch shall be snap acting and rated for 16 amperes at 120 VAC or 8 amperes at 575 VAC as required.

.4 Thermostat shall have automatic reset feature.

.5 Provide one thermostat for each 1 sq. m of coil face area or part thereof.

.6 Thermostats shall be DPDT to facilitate monitoring by BMS.

.7 Mount sensing element rigidly and as close as possible to the downstream face of the coil being protected or where shown on schematic diagrams. Freeze controls shall have 6 m capillary arranged in ducts for best possible protection.

.8 Provide freeze stat for each 5.5 square meters of duct area where necessary, wired in series. Sensing element shall extend at least to two diagonally opposite corners of the coil.

2.15 C02 DETECTOR

.1 The sensor shall be the non-dispersive infrared style.

.2 The sensor shall meet the following operating characteristics

.1	Range	0 to 5000 ppm
.2	Output Signal	0 to 10 vDC or 4-20 mA
.3	Accuracy	+/- 50 ppm

.3 Outputs shall be configured using optional software package to provide advanced control strategies using CO_2.

.4 Sensor shall be self calibrating.

.5 Wall mounting or duct mounting, depending on application.

2.16 ELECTRICAL DEVICES

.1 Relays

.1 Control relays shall be UL listed plug-in type with dust cover and LED “energized” indicator. Contact rating, configuration, and coil voltage shall be suitable for application.

.2 Time delay relays shall be UL listed solid-state plug-in type with adjustable time delay. Delay shall be adjustable ±200% (minimum) from set point shown on plans. Contact rating, configuration, and coil voltage shall be suitable for application. Provide NEMA 1 enclosure when not installed in local control panel.

.2 Override timers.

.1 Override timers shall be spring-wound line voltage, UL Listed, with contact rating and configuration as required by application. Provide 0-to-6-hour calibrated dial unless otherwise specified. Timer shall be suitable for flush mounting on control panel face and located on local control panels or where shown.

.3 Current transmitters.

.1 AC current transmitters shall be the self-powered, combination split-core current transformer type with built-in rectifier and high-gain servo amplifier with 4 to 20 mA two-wire output. Unit ranges shall be 10 A, 20 A, 50 A, 100 A, 150 A, and 200 A full scale, with internal zero and span adjustment and +1 % full-scale accuracy at 500 ohm maximum burden.

.2 Transmitter shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA Recognized.

.3 Unit shall be split-core type for clamp-on installation on existing wiring.

.4 Current transformers.

.1 AC current transformers shall be UL/CSA Recognized and completely encased (except for terminals) in approved plastic material.

.2 Transformers shall be available in various current ratios and shall be selected for ±1 % accuracy at 5 A full-scale output.

.3 Transformers shall be fixed-core or split-core type for installation on new or existing wiring, respectively.

.4 Status inputs for motors (pumps and fans) shall use inductive coils to monitor current draw from one phase of power.

.5 Current transformers shall be selected and configured for appropriate amperage range, and shall have 0 to 5 Volt output.

.6 BMS shall use AI points to monitor current transformers.

.5 Voltage transmitters.

.1 AC voltage transmitters shall be self-powered single-loop (two-wire) type, 4 to 20 mA output with zero and span adjustment.

.2 Ranges shall include 100 to 130 VAC, 200 to 250 VAC, 250 to 330 VAC, and 400 to 600 VAC full-scale, adjustable, with ±1 % full-scale accuracy with 500 ohm maximum burden.

.3 Transmitters shall be UL/CSA Recognized at 600 VAC rating and meet or exceed ANSI/ISA S50.1 requirements.

.6 Voltage transformers.

.1 AC voltage transformers shall be UL/CSA Recognized, 600 VAC rated, complete with built-in fuse protection.

.2 Transformers shall be suitable for ambient temperatures of 4^0C to 55^0C (40^0F to 130^0F) and shall provide ±0.5% accuracy at 24 VAC and a 5 VA load.

.3 Windings (except for terminals) shall be completely enclosed with metal or plastic material.

.7 Power monitors.

.1 Power monitors shall be the three-phase type furnished with three-phase disconnect/shorting switch assembly, UL Listed voltage transformers, and UL Listed split-core current transformers.

.2 They shall provide a selectable rate pulse output for kWh reading and a 4 to 20mA output for kW reading. They shall operate with 5 A current inputs with a maximum error of ±2% at 1.0 power factor or ±2.5% at 0.5 power factor.

.8 Current switches.

.1 Current-operated switches shall be self-powered, solid-state with adjustable trip current. The switches shall be selected to match the current of the application and output requirements of the DDC system. Switch shall be complete with LED and have four turn adjustment.

Part 3 Execution

3.1 GENERAL

.1 The DDC controls project shall be performed in accordance with the general conditions of the contract. The contractor shall conduct all on-site work in conjunction with building operating staff to streamline the new system startup.

.2 The summary of input/output channels describe the DDC system points. It is the responsibility of the Contractor to ensure compatibility of the mechanical systems, devices, and actuators with the DDC system.

.3 All digital output control points located in unconditioned spaces shall be relocated to an accessible ventilated indoor location. All control devices, DDC panels, other shall be located inside the conditioned space of the building envelope.

.4 All DDC system equipment will become the property of the Owner.

3.2 LABELLING

.1 All control equipment is to be labelled with new similar lamicoid plates with a designation corresponding to the specific system point description/label. All lamicoids shall be mechanically fastened to surfaces. Submit samples to Owner for approval.

3.3 COMMISSIONING - DDC SYSTEMS

.1 Check the installation of each sensor, actuator, and controlled device.

.2 Verify and record in as built OEM drawings the wiring of each I/O sensor and device as installed.

.3 Calibrate each sensor as required.

.4 Manually operate each output for every system with a portable Display Terminal supplied by the contractor for commissioning.

.5 Tune each control loop and print the response of trends for hard copy record. Identify correct PID parameters on all print outs.

.6 Verify all start/stop operations, e.g. "schedule control", "Optimized control", "unoccupied mode" setback.

.7 Verify all custom control programs and alarm functions.

.8 Perform end-to-end checks from an operator terminal to all sensors and actuators to verify system communications and control via LAN/WAN.

.9 Verify all Echelon communications as specified and submit all point naming and identification values accordingly.

3.4 INSTALLATION

.1 Install systems and related controls in accordance with approved shop drawings and manufacturer's recommendations using factory-trained journeymen certified by the Province of Ontario.

.2 Locate thermostat, room sensors, etc., location as shown or as required.

.3 Secure approval for damper motor locations and supports. Submit detail of damper motor location and support for approval.

.4 Provide dampers, for installation by the sheet metal contractor on new and or existing dampers.

3.5 POINT DESCRIPTORS

.1 Adopt and utilize a consistent naming convention in order to identify points and facilitate wildcard calling of all points, systems, and programs.

3.6 SYSTEM OPERATION

.1 General

Where Optimum Start Stop (OSS) is specified, equipment shall start-up based on global outdoor temperature, space temperature, and system response to assure that comfort conditions are reached at scheduled occupancy time (occupancy schedules are defined under time programs) and operate in both heating and cooling cycles. In all cases, the optimum start program shall operate fully stand-alone in the local GPC.
OSS shall include a Night Cycle program applying to (heating cycle only) (both heating and cooling cycle) with the outdoor air dampers closed. The space temperature shall be used to determine the “fan on” and/or “supply heat” command to maintain a low limit of *50-55* degrees for the heating cycle and the “fan on” and “supply cooling” command to maintain 82 degrees for the cooling cycle.

Where an Economizer Cycle (EC) is specified, it shall automatically enable the economizer mode based upon an enthalpy comparison of outdoor air and return air of each AHU.

Provide two-speed control for units over 7½ tons (refer to schedule on drawings).

.2 Data Control (D/C) and Graphics Summary

All hardware, custom software, application software, graphics, etc., necessary to accomplish the control sequences and display the graphics specified shall be provided as part of this contract. Provide all controllers, inputs, outputs, valves, dampers, actuators and flow meters required to provide the control and graphic data described. Provide software setpoints required for display in logical groups and graphics.

Each digital output shall have a software-associated monitored input. Any time the monitored input does not track its associated command output within a programmable time interval, a “command failed” alarm shall be reported.

Where calculated points (such as CFM) are shown, they shall appear in their respective logical groups.

Unless otherwise specified or approved prior to bidding, the primary analog input and the analog output of each DDC loop shall be resident in a single remote panel containing the DDC algorithm and shall function independent of any primary or UC communication links. Secondary (reset type) analog inputs may be received from the primary network, but approved default values and/or procedures shall be substituted in the DDC algorithm for this secondary input if network communications fail or if the secondary input becomes erroneous or invalid.

.3 Application Requirements

.1 Software
The microprocessor-based control system shall rely on software for non-critical interlocks and time delays. Where required by the specifications, these functions shall be provided by separate thermostats, relays, and delay timers.

.2 Interlocks
Safety and other interlocks may require relays depending on the specific devices being used. Some devices may require a special power supply as shown in the wiring details. Safeties shall be hardwired into the control circuit and shall also be monitored by the BMCS.

.3 Sensors
Select duct insertion sensors to suit the application. For large ducts, use sensors with longer probe lengths. For heating and cooling coil freeze protection, use a long capillary type sensor. For mixed air and coil discharge temperature sensing, use averaging capillary type sensors.

.4 Valves
Ensure that actuators meet all the job requirements (i.e., control signal, close off, action, etc.). Control valves shall be selected to suit both the medium and the specified configuration (i.e., Straight-thru, 3-way, screwed, flanged, etc.).

.5 Damper Actuators

The total number of actuators may vary depending on the damper size. Consult the actuator’s application literature to determine sizing requirements and use no less than 30% of the minimum number of actuators recommended.

.4 Design Requirements

.1 Safeties: Smoke detector or high temperature interlocks will be hard-wired to the supply fan starter. These points will be assigned addresses in the DDC controller for alarm annunciation purposes only. AHU's with flows greater than 15,000 CFM will require a smoke detector or high temperature detector in the supply and return air ducts.

.2 Schedules: Time schedules will default to 6AM to 6PM, Monday through Friday.

.3 Actuators: Actuator output points will display as follows:

.1 0% = 2-way valve, closed.
.2 0% = 3-way valve, closed to the coil.
.3 0% = Mixed air dampers, full return air position.
.4 100% = 2-way valve, open.
.5 100% = 3-way valve, open to the coil.
.6 100% = Mixed air dampers, full fresh air.
.7 These requirements shall be the case no matter how the actuator is sequenced or whether it is a reverse or direct acting valve.

.4 Valves: Heating and cooling coil valves shall fail open to the coil. Mixed air dampers shall fail to the full return air position.

.5 Outdoor Sensors: Outdoor air temperatures and humidities (where applicable) are assumed to be Global points transferred to DDC controllers. If the BMCS system lacks global point capability, global points shall be replaced by hardware points connected to specific controllers; the I/O capacity of the controller being used must be checked to make sure the added points will fit in the controller and upgraded in point capacity if necessary.

3.7 ELECTRICAL

.1 Rules and Regulations: The entire installation shall conform to Division 16 and shall comply with the Canadian Electrical Code and all local and Provincial codes. The contractor shall obtain an ESA certificate for his work.

.2 Arrange for all the necessary inspections and approvals of built-up and modified control systems and relay panels by governing authorities. All electrical equipment, material, and its installation shall conform to the current requirements of the following authorities:

.1 C.S.A
.2 Ontario Hydro Safety Authority
.3 O.B.C. Building Codes / Fire Codes.

.3 All wiring shall conform to governing codes and shall be inspected by request of the contractor for approval. The contractor shall obtain and purchase all necessary permits as required.

.4 Wiring: All electric wiring in connection with this project shall be furnished and installed under this section.

.1 The Contractor shall be aware that cables carrying high currents run through ceiling and wall cavities. Signal interference or sensor inaccuracy or failure caused by existing cable runs shall be the responsibility of the Contractor and shall be covered under the warranty. The Contractor shall select sensors and use shielded cable or transmitters as necessary to prevent electrical interference with the control system operation.

.2 The Contractor shall coordinate fully the interconnection of factory assembled portions of system controls, field installed control systems and the electrical power system to provide a complete working installation.

.3 Power for control equipment shall not be taken from equipment motor leads. Power shall be from circuits dedicated for controls only.

.4 Transformers shall be sized for 150% of engineered capacity.

.5 All wires are to be numbered using wire labels at each end. These labels shall correspond to wire identification on the shop drawings and "as-built" drawings.

.5 Electrical Isolation of I/O Points: To prevent serious damage to the field panels from surges, or RFI electrically induced spikes, protection in the following form shall be provided, as a minimum:

.1 Digital outputs singularly or collectively shall be galvanically isolated from the main panel processor.

.2 Analog outputs shall be galvanically isolated from each other and the main panel processor.

.3 Digital inputs shall be galvanically isolated from the main panel processor.

.6 Panel Documentation: Mount an input/output layout sheet within each controller field panel. This sheet shall include the name of the points connected to each controller channel.

.7 Conduits and Wiremold: All exposed wiring, whether for power, sensors, actuators, or data communications, shall be in metallic conduit or wiremold in all finished areas. This includes all wiring runs in and around rooftop HVAC units. All conduits shall have a minimum inside diameter of 13mm.

.1 All conduits shall be installed out of the way in traffic areas, and parallel to the lines of the building. Flexible conduit may be used only in areas of vibration or expansion joints. All conduits shall be supported at least every 4 feet. Supports shall be located at each connector end of each conduit. High and low voltage wire shall not be run in the same conduit. Only wires of similar purpose shall be run in the same conduit; i.e. sensor or control, power, and communication wire shall be in separate conduit.

.2 The Contractor may use existing unused conduit from equipment that is no longer in service, if the opportunity arises during construction.

.3 Wiremold shall be a specified in Division 16. Colour shall be selected by the owner.

.8 Pull Boxes and Junction Boxes: Pull boxes shall be located at a minimum spacing of 30m. The contractor is responsible for getting approvals from the Owner for locating pull boxes.

Pull boxes shall comply with the Canadian Electrical Code. All boxes shall be clearly marked as part of the automated control system.

.9 Enclosures: All enclosures shall be mounted such that the doors can open fully without interference with new or existing equipment. Except where expressly permitted in writing by the Owner or Engineer, enclosures shall be mounted in easily accessible locations where a technician can clearly see and easily access all components inside without a stool or ladder.

.10 Power Protection: During the warranty period, the Contractor shall be responsible for parts and labour to repair or replace any system equipment damaged by power quality problems (spikes, sags, waveform anomalies, etc.). with that in mind, the Contractor shall provide appropriate power protection.

.11 All wiring shall conform to governing codes and shall be inspected by request of the contractor for approval. The contractor shall obtain and purchase all necessary permits as required.

.12 It is the responsibility of this contractor to provide dedicated 120 V, power from the spare breaker for the automation system from the nearest electrical panel.

3.8 CONTROL SYSTEM SOFTWARE

.1 Programming: The system shall have all programming tools built-in to allow extensions and/or modifications on-site. Upon completion it shall be possible to make a safety backup to the tape drive using a simple command or choice in a menu. When desired, it shall be possible to reload the same database using a similar command or menu choice.

.2 Shop Drawings: The Contractor shall provide to the Engineer complete schematic drawings for the entire control system for approval before work shall begin. This submittal shall be provided under this Division and include all control components purchased and installed for the project. Manufacturer's control terminals shall be indicated at each end of each wire. Upon completion of his work the controls contractor shall provide three sets of maintenance and operation manuals for distribution to the owner. Control wiring diagrams shall show all temperature controls, start/stop arrangement for each piece of equipment, equipment interlocks and any special connection information required for properly controlling the mechanical equipment.

.3 Manuals: The Contractor shall provide three copies of the manual for the operator terminal software. The Contractor shall also provide three copies of all manuals used by the programmer(s) in setting up the system. This includes general programming manuals and any equipment-specific programming manuals for hardware used on the project.

.4 Training: The Contractor shall provide four one-half day training sessions on-site and as soon as possible after system start up. The person providing the training shall be someone involved with the programming and completely familiar with the job. Exact training dates and times shall be arranged with the Owner.

.5 Start Up of Control Systems: Once the Contractor has completed all installation and programming, he will arrange to demonstrate the system operation to the Engineer and Owner. If there are any deficiencies at this point, they will be documented by the Engineer. That documentation will be sent to the Contractor, and the Contractor will proceed to rectify the deficiencies as quickly as possible. The Contractor will then arrange a second demonstration.

.1 This process will be repeated, if necessary, until the Owner, Contractor, and Engineer all agree that the system meets this specification fully and there are no more deficiencies requiring correction.

.2 When the Owner and Engineer have agreed that all deficiencies have been corrected, the Contractor shall:

.1 Submit three (3) printed copies of the “As Built Drawings”.

.3 At the completion of the startup, the Contractor shall submit to the Engineer a letter stating that he has made final calibrations and adjustments to the system and stating that the Owner's operating personnel have been instructed in its use or that instruction periods have been scheduled.

.4 The contractor shall work in conjunction with the owners’ commissioning agent after start up is complete until the entire system is commissioned and accepted by the owner.

3.9 SEQUENCES OF OPERATION

.1 SEQUENCE OF CONTROL

.1 General

.1 The control programs shall be modular and structured in order to provide specific control operation of all HVAC components indicated.

.2 All control programs shall provide a minimum of 20% spare memory for expansion.

.3 Each control program shall contain "REM" statements which explain the program operation.

.4 Each control program shall open with a list of the I/O points used and controlled in the program.

.2 DDC Sensors and Devices - are listed in the Points Summary that is part of this specification. Provide 5% spare I/O capacity.

Implement the following control program concepts in full, or partial as required, to provide complete HVAC equipment control. The programs shall perform all control strategies on the basis of protecting equipment operation, saving operational energy costs, and indicating alarm conditions.
Programs which increase the system energy consumption or cause equipment failures will be refused and resolved by the contractor accordingly at not additional cost to the Board.

.3 Where Optimum Start Stop (OSS) is specified, equipment shall start-up based on global outdoor temperature, space temperature, and system response to assure that comfort conditions are reached at scheduled occupancy time (occupancy schedules are defined under time programs), and operate in both heating and cooling cycles. In all cases, the optimum start program shall operate fully stand-alone in the local GPC.

OSS shall include a Night Cycle program applying to (heating cycle only) (both heating and cooling cycle) with the outdoor air dampers closed. The space temperature shall be used to determine the "fan on" and/or "supply heat" command to maintain a low limit of 50-55 degrees for the heating cycle and the "fan on" and "supply cooling" command to maintain 82 degrees for the cooling cycle.

.4 Where an Economizer Cycle (EC) is specified, it shall automatically enable the economizer mode based upon an enthalpy comparison of outdoor air and return air of each AHU.

.5 System Architecture: The control sequences will be performed by DDC controllers arranged as indicated in the following architecture diagram:

.2 HEATING CONTROL (MISCELLANEOUS WASHROOMS and SPACES WITH HEAT ONLY)

.1 Provide individual DDC space control (with TCV's) of miscellaneous rad heaters, convectors, unit heater, force flows complete with night setback program.

.3 BUILDING LOW TEMPERATURE

.1 All space sensors shall be capable of indicating building low temperature. Alarm building low temperatures at OWS.

Part 4 Sequence of Operation

4.1 GENERAL

.1 All setpoints shall be adjustable.

.2 Outdoor air temperature shall be broadcasted to all controllers.

.3 The control programs shall be modular and structured in order to provide specific control operation of all HVAC components indicated.

.4 All control programs shall provide a minimum of 20% spare memory for expansion.

.5 Each control program shall contain "REM" statements which explain the program operation.

.6 Each control program shall open with a list of the I/O points used and controlled in the program.

.7 Implement the following control program concepts in full, or partial as required, to provide complete HVAC equipment control. The programs shall perform all control strategies on the basis of protecting equipment operation, saving operational energy costs, and indicating alarm conditions. Programs which increase the system energy consumption or cause equipment failures will be refused and resolved by the contractor accordingly at not additional cost to the Board.

.8 All space sensors shall be capable of indicating building low temperature. Alarm building low temperatures at OWS.

.9 Provide individual DDC space control (with TCV's) of miscellaneous rad heaters, convectors, unit heater, force flows complete with night setback program.

4.2 MODES OF OPERATION

.1 Heating mode: Heating is enabled between October 15 and April 15 or if the outdoor air temperature is below 10°C. This heating mode is used in all controllers for the building. Wall fin radiation or convector hydronic heating shall be first source of heating. If space temperature is not satisfied than Unit ventilator hydronic heat or Rooftop Unit gas heat shall be second source of heating.

.2 Cooling Mode: Mechanical cooling is enabled if the outdoor air temperature is above 18°C.

.3 Carbon Dioxide Damper Override: In any air handling system with a return air or room air carbon dioxide sensor, it shall override the minimum position of the outdoor air damper during occupied mode. It shall override the minimum outdoor air damper between 0 and 40 % as the carbon dioxide varies between 1000 and 1200 ppm. All limit controls shall take priority to maintain safe supply air temperatures. An alarm shall be generated if the carbon dioxide level is higher than 1700 ppm or lower than 200 ppm.

.4 Occupancy mode shall be determined by a weekly schedule with an annual holiday schedule. Each system shall have this schedule but there shall be provision for operating under a general (to the building) schedule as well. An adjustable parameter shall be available to select the local or general schedule for each system.

.5 Lead/lag: Devices designed for lead lag operation shall operate in automatic lead/lag mode to equalize run time. If the lead unit fails the lag shall automatically start and an alarm shall be generated. The lead unit shall be advanced through the series of devices in sequence every Tuesday at noon.

.6 Where Optimum Start Stop (OSS) is specified, equipment shall start-up based on global outdoor temperature, space temperature, and system response to assure that comfort conditions are reached at scheduled occupancy time (occupancy schedules are defined under time programs), and operate in both heating and cooling cycles. In all cases, the optimum start program shall operate fully stand-alone in the local GPC.

OSS shall include a Night Cycle program applying to (heating cycle only) (both heating and cooling cycle) with the outdoor air dampers closed. The space temperature shall be used to determine the "fan on" and/or "supply heat" command to maintain a low limit of 50-55 degrees for the heating cycle and the "fan on" and "supply cooling" command to maintain 82 degrees for the cooling cycle.

.7 Where an Economizer Cycle (EC) is specified, it shall automatically enable the economizer mode based upon an enthalpy comparison of outdoor air and return air of each AHU.

4.3 EQUIPMENT SERVICES

.1 See the following description of equipment and systems that must be included in the control sequences.

.1 Four (4) new ducted unit ventilators with hydronic heating coil, DX cooling coil with remote condensing unit, O/A damper, R/A damper, E/A damper, supply air fan and return or exhaust air fan.

.1 VVT dampers downstream of two (2) of the unit ventilators for zone control in cooling.

.2 Hydronic heaters in all spaces with unit ventilators are to be first stage of heat in heating mode. Maintain supply air temperature at not less than room temperature in heating mode.

.3 Hydronic heaters to be used as first stage of zone control in heating for the unit ventilators that serve multiple zones.

.2 Two (2) new half-height, non-ducted, through wall unit ventilators with hydronic heating coil, DX cooling coil with remote condensing unit, O/A damper, and supply fan. These two unit ventilators in place of existing heating-only unit ventilators. All new controls.

.3 One new general exhaust fan for the library space to maintain space pressure.

.4 Multiple existing radiant heaters are disconnected and provided with new control valves and temperature sensors to suit renovation.

.5 CO2 sensors to be provided for all spaces where new ventilation is required.

4.4 Please note that this is not complete representation of all equipment's and system. Control's contractor to review all drawings and specification and provide complete controls and sequence.

END OF SECTION

Division 26 Common Requirements for Electrical

Division 28 Electronic Safety and Security

END OF SECTION

Part 1 General

1.1 GENERAL INSTRUCTIONS

.1 Comply with the General Conditions, Supplementary Conditions, and all of General Requirements, Mechanical and Electrical Divisions.

1.2 CASH ALLOWANCES (HST EXCLUDED)

.1 Refer to CCDC 2 – 2020, GC 4.1 - CASH ALLOWANCES.

.2 The Contract Price includes the allowances stated below, which allowances shall be expended as the Owner directs through the Consultant. The Consultant may direct the Contractor to bid work for which payment is made from an allowance.

.3 The Contract Price, and not the cash allowances, includes the Contractor's overhead and profit in connection with such cash allowances.

.4 Where the actual cost of the *Work* under any cash allowance is less that the amount of the allowance, the *Owner* shall be credited for the unexpended portion of the cash allowance, but not for the *Contractor's* overhead and profit on such amount.

.5 The value of the work performed under a cash allowance is eligible to be included in progress payments.

.6 Miscellaneous Work Cash Allowances (HST Excluded)

.1 Provide a cash allowance of $15,000.00 in the tender price for the following work, this allowance is in addition to the work noted on the drawings:

.1 Re-work of low voltage surface mount conduit in corridors.

1.3 FEES

.1 The contractor is to determine general inspection fees with Electrical Safety Authority and include as part of tender.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 This Section covers items common to Electrical Divisions.

.2 This section supplements requirements of Division 1.

.3 Furnish labour, materials, and equipment necessary for completion of work as described in contract documents.

1.2 INTENT

.1 Mention herein or indication on Drawings of articles, materials, operations, or methods requires: supply of each item mentioned or indicated, of quality, or subject to qualifications noted; installation according to conditions stated: and, performance of each operation prescribed with furnishing of necessary labour, equipment, and incidentals for electrical work.

.2 Where used, words “Section” and “Division” shall also include other Subcontractors engaged on site to perform work to make building and site complete in all respects.

.3 Where used, word “supply” shall mean furnishing to site in location required or directed complete with accessory parts.

.4 Where used, word “install” shall mean secured in place and connected up for operation as noted or directed.

.5 Where used, word “provide” shall mean supply and install as each is described above.

1.3 TENDERS

.1 Submit tender based on specified described equipment or Alternates listed.

.2 State in Tender, names of all Subcontractors proposed for work under this Division.

1.4 LIABILITY INSURANCE

.1 This contractor must maintain and produce at the request of the consultant proof of proper insurance to fully protect the Owner, the Consultant and the Contractor from any and all claims due to accidents, misfortunes, acts of God, etc.

1.5 DRAWINGS

.1 Electrical Drawings do not show structural and related details. Take information involving accurate measurement of building from building drawings, or at building. Make, without additional charge, any necessary changes or additions to runs of conduits and ducts to accommodate structural conditions. Location of conduits and other equipment may be altered by the Consultant without extra charge provided change is made before installation and does not necessitate major additional material.

.2 As work progresses and before installing fixtures and other fittings and equipment which may interfere with interior treatment and use of building, provide detail drawings or obtain directions for exact location of such equipment and fitments.

.3 Electrical drawings are diagrammatic. Where required work is not shown or only shown diagrammatically, install same at maximum height in space to conserve head room (minimum 2200 mm (88") clear) and interfere as little as possible with free use of space through which they can pass. Conceal wiring, conduits and ducts in furred spaces, ceilings and walls unless specifically shown otherwise. Install work close to structure so furring will be small as practical.

.4 Before commencing work, check and verify all sizes, locations, grades, elevations, levels and dimensions to ensure proper and correct installation. Verify existing/municipal services.

.5 Locate all electrical equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.

.6 In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install services so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose.

.7 Relocate equipment and/or material installed but not co-ordinated with work of other Sections as directed, without extra charge.

.8 Where drawings are done in metric and product not available in metric, the corresponding imperial trade size shall be utilized.

1.6 INTERFERENCE AND CO-ORDINATION DRAWINGS

.1 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the constructed spaces provided.

.2 Prepare drawings to indicate co-ordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are co-ordinated.

.3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.

.4 Upon consultant’s request submit copies of interference drawings to the consultant.

.5 Due to the nature of the building and the complexity of the building systems provide the following:

.1 Interference drawings, showing coordination of architectural, structural, mechanical, and electrical systems for the consultant’s review prior to fabrication.

.2 Detailed equipment room drawings clearly showing all distribution equipment.

.3 Detailed layout drawings clearly showing conduit/feeder runs 78mm diameter or larger, including hangers or tray.

.6 Provide CAD drawings (minimum file version AutoCAD 2013) in addition to hard copies.

1.7 QUALITY ASSURANCE

.1 The installations of the division must conform to the latest edition of the Electrical Safety Code as well as its supplemental bulletins and instructions. Provide materials and labour necessary to comply with rules, regulations, and ordinances.

.2 Complete underground systems in accordance with CSA C22.3 No. 7-94 except where specified otherwise.

.3 Abbreviations for electrical terms: to CSA Z85-1983.

.4 In case of differences between building codes, provincial laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Consultant in writing of such differences.

1.8 ALTERNATES AND SUBSTITUTIONS

.1 Throughout these sections are lists of "Alternate Equipment" manufacturers acceptable to Consultant if their product meets characteristics of specified described equipment.

.2 Each bidder may elect to use "Alternate Equipment" from lists of Alternates where listed. Include for any additional costs to suit Alternated used. Prices are not required in Tender for Alternates listed except where specifically noted as "Separate Price". Complete the Supplementary Tender Form.

.3 When two or more suppliers/manufacturers are named in the Bid Documents, only one supplier/manufacturer of the products named will be acceptable; however, it is the responsibility of this Division to ensure "Alternate Equipment" fits space allocated and gives performance specified. If an "Alternate Equipment" unit is proposed and does not fit space allotted nor equal specified product in Consultant's opinion, supply of specified described equipment will be required without change in Contract amount. Only manufacturers listed will be accepted for their product listing. All other manufacturers shall be quoted as substitution stating conditions and credit amount.

.4 If item of material specified is unobtainable, state in Tender proposed substitute and amount added or deducted for its use. Extra monies will not be paid for substitutions after Contract has been awarded.

1.9 EXAMINATION

.1 Site Reviews

.1 Examine premises to understand conditions, which may affect performance of work of this Division before submitting proposals for this work.

.2 No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

.2 Drawings:

.1 Electrical Drawings show general arrangement of fixtures, power devices, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.

.2 Consider Architectural, Mechanical, and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Electrical Drawings.

.3 Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories, which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

.3 Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

1.10 SEQUENCING AND SCHEDULING

.1 It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for installation of systems according to the true intent and meaning of Contract Documents. Anything not clear or in conflict will be explained by making application to Consultant. Should conditions arise where certain changes would be advisable, secure Consultant's approval of these changes before proceeding with work.

.2 Coordinate work of various trades in installing interrelated work. Before installation of electrical items, make proper provision to avoid interferences in a manner approved by Consultant. Changes required in work specified in these sections caused by neglect to do so shall be made at no cost to Owner.

.3 Arrange fixtures, conduit, ducts, and equipment to permit ready access to junction boxes, starters, motors, control components, and to clear openings of doors and access panels.

.4 Furnish and install inserts and supports required by these sections unless otherwise noted. Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions of the Work to Sections involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne by the electrical trade.

.5 Adjust locations of ducts, conduits, equipment, fixtures, etc, to accommodate work from interferences anticipated and encountered. Determine exact route and location of each conduit and duct prior to installation.

.1 Make offsets, transitions, and changes in direction of ducts, and electrical raceways as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.

.2 Supply and install pull boxes, etc, as required to effect these offsets, transitions, and changes in direction.

1.11 REQUEST FOR INFORMATION (RFI) PROCEDURES

.1 RFIs shall be submitted to the consultant minimum two (2) weeks prior to answer being required. Failure to submit and RFI in a timely manner will forfeit delay claims and schedule extension requests by the contractor.

.2 All RFIs will be submitted with the following information:

.1 RFI number

.2 Name of project

.3 Date of initiation

.4 Date response required by (minimum two (2) weeks)
.5 Subject
.6 Submitter's name
.7 Drawing/specification reference
.8 Photograph of the issue (if applicable)
.9 Description of the issue
.10 Contractor's proposed resolution

1.12 DRAW BREAKDOWN

.1 This Contractor MUST submit a breakdown of the tender price into classifications to the satisfaction of the Consultant, with the aggregate of the breakdown totaling the total contract amount. **Each item must be broken out into material and labour costs.** Progress claims, when submitted are to be itemized against each item of the draw breakdown. This shall be done in table form showing contract amount, amount this draw, total to date, % complete and balance.

.2 Breakdown shall be as follows:

.1 Permits and fees
.2 Mobilization#1 (maximum 1%)
.3 Mobilization#2 (maximum 1%)
.4 Demolition
.5 Panelboards and miscellaneous distribution equipment
.6 Branch conduits
.7 Branch wiring
.8 Lighting fixtures (interior)
.9 Emergency lighting
.10 Fire alarm system
.11 Auxiliary System rough-ins
.12 Starters, contactors and control devices
.13 Wiring for mechanical equipment
.14 Cash allowances (itemized)
.15 Commissioning and Integrated System Testing
.16 Commissioning (minimum 3%)
.17 Electrical contractor closeout requirements (minimum of 3% but not less than $3,500.00)

.3 The breakdown must be approved by the Consultant prior to submission of the first draw.

.4 Breakdowns not complying to the above will not be approved.

.5 Breakdown must indicate total contract amount.

.6 Mobilization amount may only be drawn when all required shop drawings have been reviewed by the consultant.

1.13 SHOP DRAWINGS AND PRODUCT DATA

.1 General

.1 Furnish complete catalog data for manufactured items of equipment to be used in the Work to Consultant for review within 14 days after award of Contract.

.2 Upon receipt of reviewed shop drawing, product is to be ordered immediately.

.3 Provide a complete list of shop drawings to be submitted prior to first submission.

.4 Before submitting to the Consultant, review all shop drawings to verify that the products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers, and similar data and that it has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The Contractor's review of each shop drawings shall be indicated by stamp, date and signature of a qualified and responsible person possessing by the appropriate authorization.

.5 If material or equipment is not as specified or submittal is not complete, it will be rejected by Consultant.

.6 Additional shop drawings required by the contractor for maintenance manuals, site copies etc., shall be photocopies of the "reviewed" shop drawings. All costs to provide additional copies of shop drawings shall be borne by the contractor.

.7 **Submit all shop drawings for the project as a package. Partial submittals will not be accepted**.

.8 Catalog data or shop drawings for equipment, which are noted as being reviewed by Consultant or his Engineer shall not supersede Contract Documents.

.9 Review comments of Consultant shall not relieve this Division from responsibility for deviations from Contract Documents unless Consultant's attention has been called to such deviations in writing at time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.

.10 Check work described by catalog data with Contract Documents for deviations and errors.

.11 Shop drawings and product data shall show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances. e.g. access door swing spaces.

.12 Shop drawings and product data shall be accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Manufacturer test data where requested.

.3 Manufacturer to certify as to current model production.

.4 Certification of compliance to applicable codes.

.13 State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information. List on catalog covers page numbers of submitted items. Underline applicable data.

.14 If a shop drawing is returned "reviewed as noted" this Contractor must provide written indication that the comments have been complied with.

.15 A partial list of shop drawings includes:

.1 Panelboards
.2 Fire alarm system Devices
.3 Luminaires
.4 Emergency battery units
.5 Starters, contactors and control devices
.6 Firestopping materials
.7 Hand dryers
.8 Wiring devices
.9 Lighting Controls
.10 Roof cone
.11 Integrated Life Safety System Testing Plan (ITP)

.2 Submissions shall be submitted electronically as per the following directions:

.1 Electronic Submissions:

.1 Electronically submitted shop drawings shall be prepared as follows:

.1 Use latest software to generate PDF files of submission sheets.
.2 Scanned legible PDF sheets are acceptable. Image files are not acceptable.
.3 PDF format shall be of sufficient resolution to clearly show the finest detail.
.4 PDF page size shall be standardized for printing to letter size (8.5"x11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11"x17".
.5 Submissions shall contain multiple files according to section names as they appear in Specification.
.6 File names shall include consultant project number and description of shop drawing section submitted.
.7 Each submission shall contain an index sheet listing the products submitted, indexed in the same order as they appear in the Specification. Include associated PDF file name for each section.
.8 On the shop drawing use an "electronic mark" to indicate what is being provided.
.9 Each file shall bear an electronic representation of the "company stamp" of the contractor. If not stamped the file submission will not be reviewed.

.2 Email submissions shall include subject line to clearly identify the consultants' project number and the description of the shop drawings submitted.

.3 Electronic attachments via email shall not exceed 10MB. For submissions larger than 10MB, multiple email messages shall be used. Denote related email messages by indicating "1 of 2" and "2 of 2" in email subject line for the case of two messages.

.4 Electronic attachments via web links (URL) shall directly reference PDF files. Provide necessary access credentials within link or as username/password clearly identified within body of email message.

.5 On site provide one copy of the "reviewed" shop drawings in a binder as noted above.

.6 Contractor to print copies of "reviewed" shop drawings and compile into maintenance manuals in accordance with requirements detailed in this section.

1.14 CARE, OPERATION AND START-UP

.1 Instruct Consultant and operating personnel in the operation, care and maintenance of equipment.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.15 VOLTAGE RATINGS

.1 Operating voltages: to CAN3-C235-83.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.16 PERMITS, FEES AND INSPECTION

.1 The contractor is required to include in his tender all required inspection costs by the Electrical Safety Authority. Permit application is the responsibility of the contractor.

.2 Reproduce drawings and specifications required by Electrical Safety Authority at no cost.

.3 Notify Consultant of changes required by Electrical Safety Authority prior to making changes.

.4 Furnish Certificates of Acceptance to Engineer from Electrical Safety Authority and other authorities having jurisdiction upon completion of work.

.5 This contractor must furnish any certificates required to indicate that the work completed conforms with laws and regulations of authorities having jurisdiction.

1.17 MATERIALS AND EQUIPMENT

.1 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Safety Authority.

.2 Factory assemble control panels and component assemblies.

1.18 ELECTRIC MOTORS, EQUIPMENT, AND CONTROLS

.1 Supplier and installer responsibility is indicated in the Equipment Wiring Schedule on electrical drawings.

.2 Control wiring and conduit is specified in the Electrical specifications except for conduit, wiring and connections below 50 V, which are related to control systems specified in the Mechanical specifications.

1.19 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint outdoor electrical equipment "equipment green" finish.

.2 Paint indoor switchgear and distribution enclosures light grey.

.2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.3 Clean and prime exposed non-galvanized hangers, racks, fastenings, and conduits etc. to prevent rusting.

1.20 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

.2 Nameplates:

.1 Lamicoid 3 mm (1/8") thick plastic engraving sheet, black face, white core, mechanically attached with self tapping screws.

NAMEPLATE SIZES

Size 1	9 mm x 50 mm (3/8" x 2")	1 line	3 mm (1/8") high letters
Size 2	12 mm x 70 mm (1/2" x 2 1/2")	1 line	5 mm (3/16”) high letters
Size 3	12 mm x 70 mm (1/2" x 2 1/2")	2 lines	3 mm (1/8") high letters
Size 4	20 mm x 90 mm (3/4" x 3 1/2")	1 line	9 mm (3/8") high letters
Size 5	20 mm x 90 mm (3/4" x 3 1/2")	2 lines	5 mm (3/16") high letters
Size 6	25 mm x 100 mm (1" x 4")	1 line	12 mm (1/2") high letters
Size 7	25 mm x 100 mm (1" x 4")	2 lines	6 mm (1/4”) high letters

.3 Wording on nameplates labels to be approved by Consultant prior to manufacture.

.4 Allow for average of twenty-five (25) letters per nameplate.

.5 Identification to be English.

.6 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.7 Nameplates for disconnects, starters and contactors must indicate equipment being controlled and voltage.

.8 Nameplates for transformers must indicate transformer label as indicated and capacity, primary, and secondary voltages.

1.21 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour code: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

1.22 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m (45') intervals.

.3 Colour bands must be 25 mm (1") wide.

	Prime
up to 208 V	yellow
209 to 600 V	white
Voice system	green
Data System	orange
Security	brown
Public address	black
Fire alarm	red

.4 This contractor must paint all system junction boxes and covers in conformance with the above schedule.

1.23 PROTECTION OF OPENINGS

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.24 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.25 MANUFACTURERS AND CSA LABELS

.1 All labels must be visible and legible after equipment is installed.

1.26 WARNING SIGNS

.1 To meet requirements of Electrical Safety Authority and Consultant.

.2 Provide porcelain enamel signs, with a minimum size of 175 mm x 250 mm (7" x 10").

1.27 LOCATION OF OUTLETS

.1 Do not install outlets back-to-back in wall; allow minimum 150 mm (6") horizontal clearance between boxes.

.2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3 m (10'), and information is given before installation.

.3 Locate light switches on latch side of doors. Locate disconnect devices in mechanical and elevator machine rooms on latch side of door.

1.28 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise. Coordinate with block coursing (if applicable).

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.

.1 Local switches: 1100 mm (43.3").

.2 Wall receptacles:

.1 General: 400 mm (16").

.2 Above top of continuous baseboard heater: 200 mm (8").

.3 Above top of counters or counter splash backs: 100 mm (4").

.4 In mechanical rooms: 1200 mm (48").

.3 Panelboards: as required by Code or 1400 mm (56").

.4 Voice/Data outlets: At height of adjacent outlet or at 400 mm (16").

.5 Fire alarm stations: 1200 mm (3' - 11").

.6 Fire alarm visual and signal devices: 2250 mm (88 ½").

.7 Television outlets: 400 mm (16").

.8 Thermostat: 1200 mm (3’-11").

.9 Clocks: 2100 mm (84").

.10 Heaters: 200 mm (8" AFF) to bottom of heater.

.11 Emergency call switches and/or pushbuttons: 900 mm (36").

1.29 LOAD BALANCE

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Submit, at completion of work, report listing phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

1.30 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete shall be schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm (2") beyond either side.

.2 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

1.31 FIELD QUALITY CONTROL

.1 Conduct and pay for following tests:

.1 Power distribution system including phasing, voltage, grounding, and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

.5 Systems: fire alarm system, communications, security.

.2 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.

.3 Insulation resistance testing.

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

.4 Carry out tests in presence of Consultant.

.5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.6 Submit test results for Consultant's review.

1.32 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings as indicated on drawings or as determined from co-ordination study.

1.33 GUARANTEE AND WARRANTY

.1 At ready for takeover of this project this Contractor must provide a written guarantee indicating that any defects, not due to ordinary wear and tear or improper use which occur within the first **two years** from the date of ready for takeover will be corrected at the contractors expense.

.2 If the electrical sub-contractor’s office is 50 kilometers (30 miles) or more from the project site, the sub-contractor is to provide a service/warranty work agreement for warranty period with a local electrical sub-contractor approved by Consultant. Include copy of service/warranty agreement in warranty section of operation and maintenance manual.

.3 Warranty period shall start from date of ready for takeover completion.

.4 Refer to individual specification sections for information on any special manufacturer's equipment warranties.

1.34 SYSTEM START UP

.1 Provide consultant with written notice verifying all equipment operation and installation is complete prior to scheduled start-up period.

.2 Start up shall be in presence of the following: owner or representative, contractor, and manufacturer's representative. Each person shall witness and sign off each piece of equipment. Consultant's attendance will be determined by consultant.

.3 Arrange with all parties and provide 72 hours notice for start up procedure.

.4 Simulate system start up and shut down and verify operation of each piece of equipment.

.5 These tests are to demonstrate that the systems and equipment installed are operational as specified.

.6 The contractor must describe during the start up session the required maintenance for each piece of equipment according to the manufacturer.

.7 The contractor must provide all necessary tools (including a digital multimeter) to successfully complete the start up procedure.

1.35 OPERATION AND MAINTENANCE MANUAL

.1 Provide operation and maintenance data for incorporation into manual as specified in other Sections of this Division.

.2 Operation and maintenance manual to be approved by, and final copies deposited with, Consultant before final inspection.

.1 Submit 1 copy of Operation and Maintenance Manual to Consultant for approval. Submission of individual data will not be accepted unless so directed by Consultant.

.1 Manual(s) shall be in a three ring binder (minimum 50 mm (2") ring) labelled:

.1 Operation and Maintenance Manual.

.2 Project Name.

.3 Location.

.2 Make changes as required and re-submit as directed by Consultant.

.3 Each manual must include (in "tabbed" sections) the following:

.1 Index

.2 List of General, Mechanical, Electrical Contractors and all associated sub-contractor names, addresses and contact numbers.

.3 List of suppliers and equipment wholesalers local to the project.

.4 One year warranty letter for all parts, equipment and workmanship.

.5 List of manufacturers, spare parts list and source.

.6 Copy of typewritten schedules for all new and renovated panels.

.7 Copy of all substantial performance final certificates.

.8 Copy of electrical shop drawings which have been stamped and reviewed by Consultant.

.9 Electrical As-built drawings including contractor company's as built stamp.

.10 Coordination study/Arc flash hazard study shop drawings

.11 Any special warranties on equipment required (i.e. LED lighting, digital lighting control, SPDs, power generation).

.12 Certificate of completion from all associated sub-contractors.

.13 Cable test results and floor plans containing address labels.

.14 System commissioning certificate and report.

.4 Final Submittals:

.1 Upon acceptance of Operation and Maintenance Manual by the Consultant provide the following:

.1 Provide two (2) copies of final operation maintenance manuals, as well as a PDF file of the entire approved manual on a USB stick. Only one USB stick is to be provided containing both the approved manual and as-built drawings.

1.36 AS-BUILT DRAWINGS

.1 Site records:

.1 Contractor shall provide 2 sets of reproducible electrical drawings. Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include field and contract changes to electrical systems.

.2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection at all times.

.2 As-built drawings:

.1 Identify each drawing in lower right hand corner in letters at least 3 mm (1/8") high as follows: - "AS-BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW ELECTRICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).

.2 Submit hard copy to Consultant for approval. When returned, make corrections (if any) as directed.

.3 Once approved, submit completed reproducible paper as-built drawings as well as a scanned pdf file copy on USB stick with Operating and Maintenance Manuals.

1.37 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTIONS

.1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.2 Manufacturers or their representatives are to provide demonstrations and instructions.

.3 Use operation and maintenance manual, As-built drawings, audio visual aids, etc. as part of instruction materials.

.4 Instruction duration time requirements as specified in appropriate sections.

.5 Where deemed necessary, Consultants may record these demonstrations on video tape for future reference.

1.38 READY FOR TAKEOVER

.1 Complete the following to the satisfaction of the consultant prior to request for ready for takeover.

.1 As-built Drawings.

.2 Maintenance Manuals.

.3 System Start up.

.4 Instructions to Owners.

.5 Final Certificates (Electrical Safety Authority, Fire Alarm, Emergency Lighting, Integrated Life Safety Systems Commissioning.

1.39 TRIAL USAGE

.1 Consultant or owner may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

1.40 REVISION TO CONTRACT

.1 Provide the following for each item in a given change notice:

.1 Itemized list of material with associated costs.

.2 Labour rate and itemized list of labour for each item.

.3 Copy of manufacturers/suppliers invoice if requested.

1.41 EQUIPMENT SUPPORTS

.1 Equipment supports supplied by equipment manufacturer: shall be installed by the electrical contractor.

.2 Equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel meeting requirements of - Structural Steel Section. Submit structural calculations with shop drawings if necessary.

.3 Mount base mounted equipment on chamfered edge housekeeping pads, minimum of 100 mm (4") high and 150 mm (6") larger than equipment dimensions all around. This installation of this pad shall be the responsibility of the electrical contractor.

.4 This contractor shall be responsible for providing all anchor bolts and associated formed concrete bases for lighting standards as detailed.

1.42 SLEEVES

.1 Pipe sleeves: at points where pipes pass through masonry, concrete, or fire rated assemblies and as indicated.

.2 Schedule 40 steel pipe.

.3 Sleeves with annular fin continuously welded at midpoint:

.1 Through foundation walls.

.2 Where sleeve extends above finished floor.

.4 Sizes: minimum 6 mm (1/4") clearance all around, between sleeve and conduit.

.5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm (1") above other floors.

.6 Through foundation walls PVC sleeves are acceptable.

.7 Fill voids around pipes:

.1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.

.2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.

.3 Fill future-use sleeves with easily removable filler.

1.43 FIRESTOPPING

.1 Firestopping material and installation within annular space between conduits, ducts, and adjacent fire separation.

.2 Provide materials and systems capable of maintaining effective barrier against flame, smoke, and gases.

.3 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.

.4 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation.

.5 Provide “firewrap” blanket around services penetrating firewalls. Extent of blanket must correspond to ULC recommendations. In general wrap individual conduits with approved firewrap materials on each side of firewall. Refer to architectural drawings for FT ratings. Provide 1 and/or 2 layers of firewrap with transverse and longitudinal seams overlapped and/or butted (second layer offset from first layer). Cut edges are to be sealed with aluminum foil tape. Provide 50 mm stainless steel banding at 200 mm intervals. Install firewrap to manufacturers’ recommendations for proper FT rating. Acceptable manufacturers are 3M Firemaster ductwrap or approved equal.

.6 The firestopping materials are not to shrink, slump or sag and be free of asbestos, halogens and volatile solvents.

.7 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

.8 Firestop materials are to be capable of receiving finish materials in those areas, which are exposed and scheduled to receive finishes.

.9 Firestopping shall be inspected and approved by local authority prior to concealment or enclosure.

.10 Install material and components in accordance with ULC certification, manufacturers instructions and local authority.

.11 Submit product literature and installation material on firestopping in shop drawing and product data manual.

.12 Acceptable manufacturers:

.1 Rectorseal Corporation (Metacaulk)

.2 Proset Systems

.3 3M

.4 Hilti

.5 STI Firestop

Note: Fire stop material must conform to requirements of local authorities having jurisdiction. Contractor to confirm prior to application and ensure material used is compatible with that used by other trades on site.

.13 Ensure firestop manufacturer representative performs on site inspections and certifies installation. Submit inspection reports/certification at time of ready for takeover.

1.44 PAINTING

.1 Refer to Section Interior Painting and specified elsewhere.

.2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

.3 Prime and touch up marred finished paintwork to match original.

.4 Restore to new condition, or replace equipment at discretion of consultant, finishes which have been damaged too extensively to be merely primed and touched up.

1.45 ACCESS DOORS

.1 Supply access doors to concealed electrical equipment for operating, inspecting, adjusting and servicing.

.2 Flush mounted 600 mm x 600 mm (24" x 24") for body entry and 300 mm x 300 mm (12" x 12") for hand entry unless otherwise noted. Doors to open 180º, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.

.3 Material:

.1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Consultant.

.2 Remaining areas: use prime coated steel.

.3 Fire rated areas: provide ULC listed access doors

.4 Installation:

.1 Locate so that concealed items are accessible.

.2 Locate so that hand or body entry (as applicable) is achieved.

.3 Installation is specified in applicable sections.

.5 Acceptable materials:

.1 Le Hage

.2 Zurn

.3 Acudor

.4 Nailor Industries Inc.

1.46 DELIVERY STORAGE & HANDLING

.1 Follow Manufacturer's directions in delivery, storage, and protection, of equipment and materials. Contractor to include all costs associated with delivery storage and handling in tender price.

.2 Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or mechanical injury, but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in dry, heated space.

1.47 REPAIR, CUTTING, CORING AND RESTORATION

.1 Be responsible for required digging, cutting, and patching incident to work of this Division and make required repairs afterwards to satisfaction of Consultant. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.

.2 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

.3 Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

.4 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

.5 Slots, cores and openings through floors, walls, ceilings, and roofs shall be provided by this contractor but performed by a trade specializing in this type of work. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

1.48 EXISTING SYSTEMS

.1 Connections into existing systems to be made at time approved by Consultant. Request written approval of time when connections can be made.

.2 Be responsible for damage to existing plant by this work.

1.49 CLEANING

.1 Clean interior and exterior of all electrical equipment provided including light fixture lenses.

.2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition.

1.50 ASBESTOS

.1 If asbestos is suspected or identified cease all work in the immediate area in accordance with OHSA and notify consultant.

.2 Each contractor and on site employee of the contractor shall have “asbestos awareness training”.

.3 The Contractor shall ensure that employees who may come into contact with asbestos due to the nature of the work that they perform, have received training that enables them to recognize asbestos and that enables them to react in accordance with the Occupational Health and Safety Act and regulations thereto should contact with asbestos occur during the course of their work.

.4 It is the responsibility of the contractor to review the asbestos book in the building prior to starting any work.

.5 Existing occupied buildings (depending upon their age) may contain asbestos in thermal insulating materials and some manufactured products, such as vinyl asbestos floor tile. Any insulating materials, on pipes, fittings, boilers, tanks, ductwork, etc. may contain asbestos and shall not be disturbed.

.6 **A survey of each building documenting the location and condition of asbestos-containing materials is available for your mandatory review prior to commencing any work on premises.**

1.51 DISCONNECTION AND REMOVAL

.1 Disconnect and/or remove equipment as indicated.

.2 Cap and conceal all redundant and obsolete connections.

.3 Provide a list of equipment to be removed to the owner, for his acceptance of same. Remove all equipment from site, which the owner does not retain.

.4 Store equipment to be retained by owner on site where directed by consultant.

1.52 ENCLOSURES

.1 This contractor must ensure that all electrical equipment mounted in sprinklered areas is provided with an enclosure in conformance with the Electrical Safety Code.

1.53 EXISTING CONCRETE SLAB X-RAY/SCANNING

.1 This contractor shall retain the services of a qualified company to provide and X-ray and/or scan of the existing buried services in walls and/or floors prior to starting any work in the affected area.

.2 Failure to locate existing piping, conduit, rebar etc., shall not relieve this contractor of repair of same prior to installing his service.

.3 This contractor shall be responsible for all repairs and/or replacement of existing services caused by cutting the existing concrete slabs and/or walls.

1.54 PHASING OF WORK

This work for this project shall be constructed in phases. Refer to the architectural drawings for phasing information and details. Misinterpretation of the drawings with respect to the extent of the phasing of the work shall not relieve the contractor of the work required to complete the entire contract.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

.1 Conform to the General Provisions of Division 1 and Electrical General Requirements Section.

.2 This project is one of a retrofit nature in part, and which will require extensive demolition.

.3 Allow for all remedial work in areas indicated on the drawings and as generally defined in the relevant sections of the specifications.

1.2 SCOPE OF WORK

.1 The scope of work is essentially the selected disconnection and/or removal of services and/or equipment, devices etc. as indicated or required to complete the work.

Part 2 Products

2.1 GENERAL

.1 This Division is to liaise with the Owners or Consultant for equipment being removed that may be suitable for reuse to that specified or handed over to the owner.

.2 This Division to take full responsibility for any special tools or equipment required to disassemble or remove material from building.

Part 3 Execution

3.1 GENERAL

.1 The general requirements are indicated on the drawings and on the outline specification in Division 1.

.2 The general execution of the demolition is to be carried out in a clean and efficient manner.

.3 Demolition of existing ceiling, walls etc., to facilitate removal of existing services or equipment or installation of new to be kept to a minimum and then restored to match existing.

.4 All openings or holes created by removal of existing electrical systems which are not being reused are to be patched with the same material surrounding surfaces.

.5 All new holes and openings to facilitate electrical systems are to be patched to match surrounding surfaces.

.6 Protect all existing furnishings materials and equipment. Any damage occurring as a result of the work of this Division shall be repaired or replaced at the expense of this Division.

.7 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Owners in an expedient manner with minimum disruption to the facility and systems downtime.

.8 Where unknown services are encountered immediately advise Consultant and confirm findings in writing.

.9 Where the location of any services has been shown on the plans, such information is not guaranteed. It is this Division's responsibility to verify locations, etc., immediately after moving on site. Should for any reason the information obtained necessitates changes in procedure or design, advise the Consultant at once. If verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Division's.

.10 Disconnect and/or remove equipment, devices, cabling, services, etc. as indicated.

.11 Remove all redundant and obsolete systems, connections, and wiring.

.12 Provide a list of equipment to be removed to the owner, for their acceptance of same. Remove all equipment from site that the owner does not retain.

.13 Maintain equipment to be retained by owner on site where directed by consultant.

.14 Demolition shall take place within areas isolated from all other areas with appropriate hoarding, scaffolding, netting, fencing or other means of security between building users and the work.

END OF SECTION

Part 1 General

1.1 INTENT

.1 Life safety and fire protection systems are to be installed to comply with the provisions of the current Ontario Building and Fire Codes. As a result, testing of these integrated systems must be performed as a whole to ensure the proper operation and inter-relationship between systems (functional testing).

.2 The testing is to provide functional verification and documented confirmation that these building systems satisfy the intent of the Building Code.

.3 These systems as applicable to any given project include but are not limited to fire alarm, carbon monoxide alarms, sprinkler system and associated valves, door hold open devices, elevator recalls, smoke dampers.

1.2 GENERAL

.1 This testing process is the responsibility of the Integrated Testing Firm as a sub-contractor to the **General Contractor. General Contractor** to include all costs associated with the Integrated Testing Coordinator in contract. Electrical trade is to confirm General Contractor is aware of this obligation.

.2 This process must be co-ordinated with suppliers and sub-contractors associated with these systems (mechanical and/or electrical).

.3 This process must be co-ordinated with the project construction schedule and be completed, including all associated documentation, prior to the consultant's certification of the project for occupancy.

.4 All applicable contractors, sub-contractors, and suppliers are to include all required costs in their respective tender costs.

.5 All work is to be performed in accordance with CAN/ULC S1001-2011. Special consideration is to be given to the Sample Integrated Testing Plan (ITP), the review of life safety system design documents, and the provision of test plans and reports.

.6 The work to be performed by this contractor is also described in CAN/ULC S1001-2011.

.7 Refer to CAN/ULC S1001-11 Rev1-2019 Informative Annex (C) for Sample Integrated Testing Plan (ITP).

1.3 QUALITY ASSURANCE

.1 The following criteria must be met in order to be considered an acceptable Integrated Testing Coordinator for this project:

.1 Manufacturers: Firms regularly engaged in functional testing and implementation of life safety and fire protection systems for not less than five years.

.2 Qualifications: Firms with at least five years of successful experience in facility construction, inspection, acceptance testing or commissioning as it relates to fire protection and life safety and equipment similar to that required for this project.

.3 The Contractor shall be an established commissioning contractor that has had and currently maintains a locally run and operated business for at least five years.

.4 The Contractor shall show satisfactory evidence, upon request, that he maintains a fully equipped service organization capable of furnishing adequate inspection and service to the systems.

.2 For bidder information only, experienced Life Safety Systems Testing Firms include these listed below or local branches of the companies noted in the vicinity of this project:

.1 Vintage Fire and Life Safety Ltd.
25 Coverdale Cres.
Kitchener, Ontario N2M 4X1

.2 Troy Life and Fire Safety
805 Boxwood Dr., Unit #201
Cambridge, Ontario N3E 1A4

.3 Control Tech Systems
31 Regal Road
Guelph, Ontario N1K 1B6

.4 Lonergan Engineering
4 Industrial Parkway South
Aurora, Ontario L4G 3W1

.5 Guardian Fire Consulting Group
55-346 Northfield Dr.
Waterloo, Ontario N2K 3T6

NOTE: This agent must be a third party firm NOT associated with this project in any way and be under contract with the electrical sub-contractor not the fire alarm supplier.

.3 Other firms to these listed above, who feel they are capable, must submit in writing, to the Consultant's office confirmation of the items listed in the criteria above, a minimum of one week prior to tender close in order to be considered as a bidder.

1.4 GENERAL REQUIREMENTS

.1 The Commissioning Process shall generally encompass and co-ordinate the following key areas:

.1 Integrated systems testing planning.

.2 Integrated systems testing implementation (functional testing).

.3 Integrated systems testing documentation

1.5 RESPONSIBILITIES

.1 General Contractor:

.1 The Integrated Life Safety Systems Testing Coordinator (ITC) is being retained by the General Contractor, however; this contractor's work to satisfy the ITC requirements shall be included in the tender price.

.2 The general contractor shall verify completeness of the building envelope, perimeter and interior items which affect proper operation of the noted systems.

.3 The general contractor will assure participation and co-operation of Sub-Contractors and Specialty Contractors (mechanical, electrical, building management, etc.) under the General Contractor's jurisdiction as required for the commissioning process.

.2 Mechanical Contractor:

.1 Verify Functional performance of associated mechanical systems for compliance with design intent as specified in the appropriate Specification sections.

.2 Provide the documentation with standard Functional performance reports on completion of the testing.

.3 Verify submissions for system operation and maintenance manuals, as-built documents, spare parts listing, special tools listing, and other items as may be specified.

.3 Electrical Contractor:

.1 Verify Functional performance of electrical systems for compliance with design intent as specified in the appropriate Specification sections.

.2 Provide the documentation with standard Functional performance reports on completion of the testing.

.3 Verify submissions for electrical system operation and maintenance manuals, as-built documents, spare parts listing, special tools listing, and other items as may be specified.

.4 As a minimum this contractor must include for:

.1 Providing the ITC with documentation of design and shop drawings.

.2 Provide documents for sequence of operation and maintenance of system.

.3 Testing of all components and accessories to confirm Alarm/Supervisory/Trouble at the fire panel.

.4 Testing and operation of any generator (s) as applicable to the project.

.5 Other items that may be requested by the ITC.

.6 Re-commissioning of any items that may have failed.

.7 Re-setting of the system to proper operation after tests are completed.

.8 Provide written confirmation that life safety systems are installed in accordance with applicable codes and standards, as well as the scope of the project engineering documents.

.4 Equipment Manufacturers:

.1 The equipment manufacturers shall be responsible for providing labour, material, equipment, etc., required within the scope of the respective equipment to facilitate the commissioning process.

.2 The equipment manufacturers will perform Pre-Functional and Functional Performance Tests required by the commissioning process.

.5 Design Engineer:

.1 The design engineer shall review and provide written confirmation of acceptance of the Integrated Testing Pan (ITP).

.2 The design engineer shall observe Functional Performance Testing, at his discretion.

.3 The design engineer shall provide technical capabilities for resolution of deficiencies, where required.

.4 The design engineer shall provide necessary information to assist Integrated Test Coordinator including written confirmation of life safety systems installation in accordance with project engineering documents and are ready for integrated testing.

Part 2 Commissioning Process

2.1 OPERATIONS AND MAINTENANCE MANUALS

.1 Furnish Final, reviewed Operation and Maintenance Manuals to the Consultant fourteen (14) days prior to scheduled Functional Performance Tests.

2.2 FUNCTIONAL PERFORMANCE TEST

.1 The contractor shall be responsible for the Functional Performance Tests. These tests ensure that all equipment and systems are installed in accordance with the Specifications, Drawings and manufacturers' requirements.

.2 The contractor shall be responsible for co-ordinating schedule for Functional tests of various equipment and systems.

.3 In the Functional Test, all noted systems and sub-systems shall be checked for the following:

.1 Verify that each element has been properly installed, properly identified, and that all connections have been made correctly.

.2 Verify that tests, meter readings, and specific mechanical/electrical performance characteristics agree with those required by equipment or system manufacturer.

.3 Re-commission any item(s) that may have failed.

.4 Notify the consultant in writing, at least fourteen (14) days prior to the date of Functional Performance Testing. Schedule the Functional performance tests over a period of consecutive business days.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA C22.2 No.0.3-92, Test Methods for Electrical Wires and Cables.

.2 CAN/CSA-C22.2 No.131-M89(R1994), Type TECK 90 Cable.

1.2 PRODUCT DATA

.1 Submit product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger.

.2 Minimum size: 12 AWG.

.3 Copper conductors: size as indicated, with 600 V insulation of chemically cross-linked thermosetting polyethylene material 90°C (194ºF) rated T90 for indoor above grade installations and RW90 for below grade installations.

2.2 ARMOURED CABLES

.1 Conductors: insulated, copper minimum size as indicated above.

.2 Type: AC90 (minimum size 12 AWG).

.3 Armour: interlocking type fabricated from aluminum strip.

.4 Connectors must be suitable for installed environment and approved for use with armoured cable.

Part 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Install wiring from source to load through raceways as specified.

.2 Provide separate neutral conductors for all lighting circuits and circuits originating from surge protected panels. Size raceways accordingly.

3.2 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible.

.2 Terminate cables in accordance with Wire and Box Connectors - 0 - 1000 V Section.

.3 These cables are to be installed in concealed locations only. These concealed locations are considered to be stud walls and “drops” to stud walls, lighting fixtures, and ceiling mounted devices.

.4 These "drops' shall not be permitted to exceed 2.4 m (8'-0"). To limit these "drops" to lengths noted above provide additional branch wiring in conduit.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data for cabinets in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 MATERIALS

.1 Splitters must conform to CSA C22.2 No. 76 (latest edition).

.2 Junction and pull boxes must conform to CSA C22.2 No. 40 (latest edition)

2.2 SPLITTERS

.1 Sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.

.2 Main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.

.3 At least three spare terminals on each set of lugs in splitters less than 400 A.

.4 Splitter length must match arrangement of equipment unless indicated otherwise.

2.3 JUNCTION AND PULL BOXES

.1 Welded steel construction with screw-on flat covers for surface mounting.

.2 Covers with 25 mm (1") minimum extension all around, for flush-mounted pull and junction boxes.

Part 3 Execution

3.1 SPLITTER INSTALLATION

.1 Install splitters and mount plumb, true and square to the building lines on 21 mm (3/4”) painted plywood backboards.

3.2 JUNCTION AND PULL BOXES INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Install junction and pull boxes so as not to exceed 30 m (100') of conduit run between pull boxes and in conformance with the Electrical Safety Code.

3.3 IDENTIFICATION

.1 Provide equipment identification in accordance with General Electrical Requirements Section.

.2 Install size 2 identification labels indicating system name, voltage and phase.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Outlet boxes, conduit boxes, and fittings must conform to CSA C22.2 No. 18 (latest edition).

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm (4") square or larger outlet boxes as required for special devices.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 347 V outlet boxes for 347 V switching devices.

.6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 SHEET STEEL OUTLET BOXES

.1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 mm x 50 mm x 64 mm (3" x 2" x 2½") or as indicated. 102 mm (4") square outlet boxes when more than one conduit enters one side with extension and plaster rings as required. Iberville 1104 Series.

.2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit **in utility rooms**, minimum size 102 mm x 57 mm x 38 mm (4" x 2¼" x 1½"). Iberville 1110 Series.

.3 102 mm (4") square or octagonal outlet boxes for lighting fixture outlets.

.4 102 mm (4") square outlet boxes with extension and plaster rings for flush mounting devices in finished tile walls.

2.3 MASONRY BOXES

.1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4 CONCRETE BOXES

.1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5 CONDUIT BOXES

.1 Cast FS or FD feraloy boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacle **in areas (other than utility rooms) where surface conduit is used.**

2.6 OUTLET BOXES FOR NON-METALLIC SHEATHED CABLE

.1 Electro-galvanized, sectional, screw ganging steel boxes, minimum size 76 mm 50 mm x 63 mm (3" x 2" x 2-1/2") with two double clamps to take non-metallic sheathed cables.

2.7 FITTINGS- GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 32 mm (1- 1/4") and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm (1/4") of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.

.5 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA C22.2 No.65-1956(R1965) Wire Connectors.

Part 2 Products

2.1 MATERIALS

.1 Pressure type wire connectors: with current carrying parts of copper sized to fit copper conductors as indicated.

.2 Fixture type splicing connectors: with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Clamps or connectors for armoured cable, mineral insulated cable, and flexible conduit, as required.

Part 3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

.3 Install fixture type connectors and tighten. Replace insulating cap.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

- .1 CAN/CSA C22.2 No.18-92, Outlet Boxes, Conduit Boxes, and Fittings.
- .2 CSA C22.2 No.56-1977(R1977), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .3 CSA C22.2 No.83-M1985(R1992), Electrical Metallic Tubing.
- .4 CSA C22.2 No.211.2-M1984(R1992), Rigid PVC (Unplasticized) Conduit.
- .5 CAN/CSA C22.2 No.227.3-M91, Flexible Nonmetallic Tubing.

Part 2 Products

2.1 CONDUITS

.1 Epoxy coated conduit: to CSA C22.2 No.45, with zinc coating and corrosion resistant epoxy finish inside and outside.

.2 Electrical metallic tubing (EMT) with couplings: to CSA C22.2 No.83.

.3 Rigid PVC conduit: to CSA C22.2 No.211.2.

.4 Flexible metal conduit: to CSA C22.2 No.56, aluminum and liquid-tight flexible metal.

.5 Flexible PVC conduit: to CAN/CSA C22.2 No.227.3, ENT.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 53 mm (2") and smaller. Two hole steel straps for conduits larger than 53 mm (2").

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 1.5 m (5'0") oc.

.4 Threaded rods, 6 mm (1/4") diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

.1 EMT fittings shall be set screw style (zinc alloy).

.2 Flexible metal conduit fittings shall be screw-in type.

.3 Liquid type flexible metal conduit fittings shall be sealtite type.

.4 PVC fittings shall be PVC type complete with PVC adaptors at all boxes.

.5 Coating: same as conduit.

.6 Factory "ells" where 90° bends are required for 27 mm (1") and larger conduits.

.7 Where bushings are noted to be provided they must be “screwed” type fastened to a conduit connector. Push-fit or glued in place bushings will NOT be accepted.

2.4 FISH CORD

.1 Nylon twine.

Part 3 Execution

3.1 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical/ electrical service rooms and in unfinished areas.

.3 Use electrical metallic tubing (EMT) for all branch circuits unless specified otherwise.

.4 Use rigid aluminum threaded conduit where specified and up to 2.1 m (7'0") above finish floor where exposed to mechanical injury.

.5 Use flexible metal conduit for connection to motors in dry areas, connection to recessed fixtures without a prewired outlet box, connection to surface or recessed fixtures, work in movable metal partitions.

.6 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations and for connections to kitchen equipment.

.7 Conduits terminating at electrical equipment in sprinklered areas are to be provided with insulated compression style connectors equal to Thomas & Betts Cat. #TC8XXSC or approved equal.

.8 **Minimum conduit size for branch circuits shall be 21 mm (3/4").** Single drops from ceiling mounted junction boxes down to a light switch or duplex receptacle may be reduced to 16 mm (½").

.9 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.10 Mechanically bend steel conduit over 27 mm (1") diameter.

.11 Install fish cord in empty conduits.

.12 Run 2- 27 mm (1") spare conduits up to accessible ceiling space from each flush panel. Terminate these conduits in 152 mm x 152 mm x 102 mm (6" x 6" x 4") junction boxes in ceiling space.

.13 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.

.14 Dry conduits out before installing wire.

3.2 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m (5') clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended or surface channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm (3") parallel to steam or hot water lines with minimum of 25 mm (1") at crossovers.

.7 Do not fasten surface conduit to roof deck. Provide standoffs or supports as manufactured by Caddy or use unistrut trapeze fastened to structure.

3.3 CONCEALED CONDUITS

.1 Do not install horizontal runs in masonry walls.

.2 Do not install conduits in terrazzo or concrete toppings.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS

.1 Submit shop drawings for each system in Conformance with The Electrical General Requirements Section.

1.2 PRODUCT/MAINTENANCE DATA

.1 Submit product/maintenance data for each system for inclusion in maintenance manual conforming to The General Electrical Requirements Section.

1.3 SCOPE

.1 The scope of this Section will include the following systems.

- .1 Hand dryers.
- .2 Security and access control rough-in.
- .3 Telecommunication network system rough-in.
- .4 Public address system rough-in.
- .5 Access control system.
- .6 Digital lighting control.

Part 2 Products

2.1 HAND DRYERS

.1 Hand dryers where noted on the drawings are to be supplied and installed by this Division with the following features:

- .1 Surface mounting.
- .2 Fixed nozzle.
- .3 White finish with automatic activation.
- .4 Rating of 1800 W at 120 V.
- .5 Comac Cat.#SW-100220004 School Edition

2.2 SECURITY AND ACCESS CONTROL ROUGH-IN

.1 Provide conduit from device and outlet locations to cable management systems as noted on drawings.

.2 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.

.3 Provide grounding of equipment as noted on drawings.

.4 Security and access control systems installation shall be by Owner’s approved vendor as part of separate tender.

.5 Refer to Telecommunication Network Installations and Security System sections for additional requirements

2.3 TELECOMMUNICATION NETWORK SYSTEM ROUGH-IN

.1 Outlets where noted shall be single gang flush mounted in wall or surface raceways.

.2 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.

.3 Provide a #6 insulated green ground conductor from main service ground to voice equipment backboard located on drawings.

.4 Security and access control systems installation shall be by Owner's approved vendor as part of separate tender.

.5 Refer to Telecommunication Network Installations section for additional requirements.

2.4 PUBLIC ADDRESS SYSTEM ROUGH-IN

.1 Provide conduit from device and outlet locations to cable management systems as noted on drawings.

.2 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.

.3 Provide grounding of equipment as noted on drawings.

.4 Public address system installation shall be by Owner's approved vendor as part of separate tender.

Part 3 Execution

3.1 DIGITAL LIGHTING CONTROL

.1 Install electromechanical lighting controls as indicated and in accordance with manufacturer's instructions.

.2 Coordinate with owner's representative and install 'trippers' to suit.

3.2 DIGITAL LIGHTING CONTROL

.1 Install electromechanical lighting controls as indicated and in accordance with manufacturer's instructions.

.2 Coordinate with owner's representative and install 'trippers' to suit.

3.3 OCCUPANCY SENSORS

.1 Install power packs in accessible maintenance areas.

.2 Provide access doors if power packs are installed above drywall ceilings.

.3 Install sensors in gym where noted on plan at mid height of wall.

.4 It shall be the contractor's responsibility to locate and aim sensors in the correct location required for complete and proper coverage within the range of coverage as per the manufacturer's recommendations. The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective rooms.

.5 It is the contractor's responsibility to arrange a pre-installation meeting with the manufacturer's factory authorized representative, at the facility, to verify placement to sensors and installation criteria.

.6 The contractor shall also provide the on-site training necessary to familiarize the owner's personnel with the operation, use, adjustment and problem solving diagnosis of the occupancy sensing devices systems.

.7 Upon completion of the installation, the system shall be completely commissioned by the manufacturer's factory authorized technician who will verify all adjustments and sensor placement to ensure a trouble-free occupancy-based lighting control. Submit commissioning report with closeout documents.

3.4 HAND DRYERS

.1 Install and connect hand dryers in conformance with manufacturer's recommendations.

.2 Hand dryers are to be mounted at a height to suit age of expected users'. Unless otherwise noted confirm height with manufacturer, owner, Architect, and/or consultant prior to rough in.

.3 Once installed this contractor is to caulk the joint between dryer and wall surface with a bead of white silicone.

3.5 SECURITY AND ACCESS CONTROL ROUGH-IN

.1 Outlets are to be provided for devices with conduit as detailed on drawings.

.2 Conduits terminated into ceiling spaces must be within 1m of cable management of tray.

3.6 TELECOMMUNICATION NETWORK SYSTEM ROUGH-IN

.1 Install incoming service ducts and terminate as noted.

.2 Provide backboard as noted complete with ground connection to main service ground.

.3 Conduits terminated into ceiling spaces must be within 3m (10') of zone conduits (if applicable).

.4 Ensure specified zone conduits are installed back to service backboard.

.5 Outlets are to be installed complete with 25 mm (1") conduit to corridor ceiling space or nearest zone conduit (if applicable).

.6 Provide insulated bushings on all conduits terminated in ceiling space.

.7 A 25mm (1") conduit is to be installed from elevator machine room to voice service backboard.

.8 Refer to Telecommunication Network Installations Section for additional requirements.

3.7 PUBLIC ADDRESS SYSTEM ROUGH-IN

.1 Conduits terminated into ceiling spaces must be within 1m (10') of cable management tray.

.2 Outlets are to be installed complete with 25 mm (1") conduit to corridor ceiling space or nearest cable management tray.

.3 Provide insulated bushings on all conduits terminated in ceiling space.

.4 Electrical contractor shall obtain speaker back boxes from School Board vender for installation into ceiling tiles, block walls, etc.

3.8 DIGITAL LIGHTING CONTROL

.1 Supply and install a digital time switch with 40 Amp SPST contacts.

.2 Unit shall be capable of 20 set points.

.3 Unit shall repeat the same schedule each day.

.4 Unit shall have automatic Daylight Savings Time and Leap Year compensation.

.5 Unit shall program in AM/PM format.

.6 Unit shall have LCD display.

.7 Unit shall have permanent schedule retention.

.8 Unit real time clock shall be retained by supercapacitator for 100 hours in a power failure.

.9 Unit shall be capable of manual override ON and OFF either to the next scheduled event or permanently.

.10 Unit shall have a NEMA 3R indoor/outdoor plastic enclosure.

.11 Unit shall have Load Status indication.

.12 Unit shall have Power Failure indication.

.13 Acceptable Manufacturer:

Tork Cat. #EW/EWZ Series

3.9 OCCUPANCY SENSORS

.1 Install power packs in accessible maintenance areas.

.2 Provide access doors if power packs are installed above drywall ceilings.

.3 Install sensors in gym where noted on plan at mid height of wall.

.4 It shall be the contractor's responsibility to locate and aim sensors in the correct location required for complete and proper coverage within the range of coverage as per the manufacturer's recommendations. The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective rooms.

.5 It is the contractor's responsibility to arrange a pre-installation meeting with the manufacturer's factory authorized representative, at the facility, to verify placement to sensors and installation criteria.

.6 The contractor shall also provide the on-site training necessary to familiarize the owner's personnel with the operation, use, adjustment and problem solving diagnosis of the occupancy sensing devices systems.

.7 Upon completion of the installation, the system shall be completely commissioned by the manufacturer's factory authorized technician who will verify all adjustments and sensor placement to ensure a trouble-free occupancy-based lighting control. Submit commissioning report with closeout documents.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

.1 Submit product data in accordance with Electrical General Requirements Section.

.2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

Part 2 Products

2.1 PANELBOARDS

.1 Panel boards must conform to CSA C22.2 No. 29 (latest edition).

.2 Panelboards: product of one manufacturer.

.3 Install circuit breakers in panelboards before shipment.

.4 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand. **Series rating is acceptable – submit information with shop drawings. Provide lamicoid label on feeder breaker. Lamicoid label to state "Series Rating Breaker." Lamicoid label to be size 2.**

.5 Bus and breakers must be rated as indicated.

.6 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

.7 Panelboard mains, number of circuits, and number and size of branch circuit breakers as indicated.

.8 Two keys for each panelboard and key panelboards alike.

.9 Aluminum bus with neutral of same ampere rating as mains.

.10 Mains must be suitable for bolt-on breakers. Provide main (if applicable) and branch breakers as bolt-on style.

.11 Trim with concealed front bolts and hinges.

.12 Trim and door finish must be baked grey enamel.

.13 All panels regardless of voltage and amperage must be provided with a lockable door.

.14 Branch circuit panelboards (250 AMP or smaller) must be one of the following:

- .1 Eaton Cat # POW-R-LINE-C PRL-1 or PRL-2
- .2 Schneider Electric Cat # NQ Series for up to 240V or NF Series for up to 600V
- .3 Siemens Cat #Sentron P1 Series

2.2 BREAKERS

.1 Breakers: to Moulded Case Circuit Breakers Section.

.2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.

.3 Main breaker (as specified) must be separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.

.4 Lock-on devices for fire alarm, stairway, exit and night light circuits.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Electrical General Requirements Section.

.2 Nameplate for each panelboard size 4 engraved description as indicated. In finished areas install label on inside of panel, and in service areas install label on exterior of panel.

.3 Nameplate for each circuit in distribution panelboards size 2 engraved “name of load” as indicated.

.4 Complete circuit directory with typewritten legend showing location of each circuit. **Include a copy of the directories in the maintenance manuals.**

Part 3 Execution

3.1 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

.2 Install surface mounted panelboards on plywood backboards. Where practical, group panelboards on common backboard. Plywood shall be 21mm (3/4”) fire rated or painted with intumescent fire block paint having a minimum of 1h rating, unless noted otherwise.

.3 Mount panelboards to height specified in Electrical General Requirements Section or as indicated.

.4 Connect loads to circuits.

.5 Connect neutral conductors to common neutral bus.

.6 Install series rating lamicoids adjacent to all breakers utilized to achieve series ratings.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

.1 Submit product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 BREAKERS GENERAL

.1 Moulded case circuit breakers must conform to CSA C22.1 No.5.1-M91 (latest edition.)

.2 Bolt-on moulded case circuit breaker quick-make, quick-break type, for manual and automatic operation.

.3 Common-trip breakers: with single handle for multi-pole applications.

.4 Unless otherwise indicated moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

.5 Moulded case circuit breakers 250 Amps and above are to operate by means of a solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and long time, short time, instantaneous tripping for phase and ground fault short circuit protection (if indicated or applicable by the Electrical Safety Code versus the breaker amperage). Unless otherwise specified, complete system selective co-ordination shall be provided by the individually adjustable time/current curve shaping elements as following:

.1 Breakers shall have fixed rating plug determining breaker continuous current rating.

.2 All breakers shall have adjustable long delay pickup and time, L.

.3 All breakers shall have individual adjustments for short delay pickup and time, S; including I2t settings in time adjustment.

.4 Breakers shall have adjustable instantaneous pickup, I; that if required by co-ordination study can be turned off, (I).

.5 If required by Electrical Safety Code breakers shall have individually adjustable ground fault current pick-up and time, G; including I2t settings in time adjustment.

.6 Unless otherwise specified, for the low voltage systems provide an electronic trip unit as specified above for the following moulded case circuit breakers:

.1 Mains or ties in main switchboard: LS trip unit with fixed instantaneous over-ride exceeding maximum value of fault at the point of installation.

.2 Transformer feeder for the units 225kVA and above: LSI or LS trip unit with fixed instantaneous over-ride, where instantaneous trip setting or instantaneous over-ride allows for transformer inrush of 12xFLA at 0.1s and exceeds maximum value of fault at the transformer secondary.

.3 Feeders exceeding 250A trip setting: LS trip unit with fixed instantaneous over-ride exceeding maximum value of fault at downstream panelboard.

.4 Branch circuits or feeders for MCCs with fusible combination starters: LSI trip unit where instantaneous trip setting allows for maximum size downstream fuse total clearing time.

Part 3 Execution

3.1 INSTALLATION

.1 Install circuit breakers as indicated complete with all necessary mounting hardware and filler panels if necessary.

.2 Provie lamicoid labels for series rating breakers. Lamicoid label to state “Series Rating Breaker.” Lamicoid to be size 2.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 SWITCHES

.1 General purpose AC switches must conform to CSA C22.2 No. 111 (latest edition).

.2 15 or 20 A, 120 V, single pole, three-way, four-way, keyed, or motor rated switches complete with pilot light.

.3 Manually-operated general purpose ac switches with following features:

- .1 Terminal holes approved for No. 10 AWG wire.
- .2 Silver alloy contacts.
- .3 Urea or melamine molding for parts subject to carbon tracking.
- .4 Suitable for back and side wiring.
- .5 Toggle style (Rocker style) (architect to select colour).

.4 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.

.5 Switches of one manufacturer throughout project.

.6 Acceptable materials:

single pole: Hubbell Cat # HBL1201 [HBL2101 (decora)] Series

three way: Hubbell Cat # HBL1203 [HBL2103 (decora)] Series

four way: Hubbell Cat # HBL1204 [HBL2124 (decora)] Series

Keyed: Hubbell Cat. #HBL1221 Series complete with 2 keys per switch

(Keys): Hubbell Cat. #HBL1209

Motor rated: Hubbell Cat. #HBL1221PL [HBL2121 PL (decora)] c/w pilot light (20 A):

.7 Acceptable alternate manufacturers include:

- .1 Pass & Seymour
- .2 Leviton.

2.2 RECEPTACLES

.1 Receptacles, plugs, and other similar wiring devices must conform to CSA 22.2 No 42 (latest edition).

.2 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, with following features (20A where noted):

- .1 Urea molded housing (Colour by architect).
- .2 Suitable for No. 10 AWG for back and side wiring.
- .3 Break-off links for use as split receptacles.
- .4 Eight back wired entrances, four side wiring screws.
- .5 Triple wipe contacts and rivetted grounding contacts.

.3 Other receptacles with ampacity and voltage as indicated.

.4 Receptacles of one manufacturer throughout project.

.5 Acceptable materials:

T-slot receptacles	Hubbell Cat. #HBL5352
Dryer receptacle	Hubbell Cat # HBL9430A
Range receptacle	Hubbell Cat # HBL9450A
Tamper resistant receptacle	Hubbell Cat # BR15TR
Tamper resistant T-slot receptacle	Hubbell Cat. #BR20TR
Tamper resistant ground fault protected receptacle	Hubbell Cat. #GFTR15
Tamper resistant ground fault protected T-slot receptacle	Hubbell Cat. #GFTR20 complete with Decora style coverplate to suit specification below
Tamper resistant duplex receptacle complete with dual USB ports	Hubbell Cat. #USB15XXX

.6 Acceptable alternate manufacturers include:

- .1 Pass & Seymour
- .2 Leviton

2.3 COVER PLATES

.1 Cover plates from one manufacturer throughout project.

.2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.3 Stainless steel, brushed, 1 mm (1/32") thick cover plates for wiring devices mounted in flush-mounted outlet box.

.4 Sheet metal cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

.5 Weatherproof cover plates complete with gaskets and “heavy-duty in use” covers in conformance with the Electrical Safety Authority. Provide product equal to Intermatic Cat. #WP5100C.

.6 Where noted on plans for exterior weatherproof GFCI receptacles at grade, provide extra-duty single gang horizontal die cast receptacle covers. NEMA 3R rated complete with lockable hasp and reinforced hinge. Suitable for use with 12-gauge cord sets. Intermatic Cat. # WP1010HMXD or equal.

Part 3 Execution

3.1 INSTALLATION

.1 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches at height specified in Electrical General Requirements Section or as indicated.

.2 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height specified in Electrical General Requirements Section or as indicated.

.3 Where split receptacle has one portion switched mount vertically and switch upper portion.

.3 Cover plates:

.1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.2 Install suitable common cover plates where wiring devices are grouped.

.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.2 No.248.12/94, Low Voltage Fuses Part 12: Class R (Bi-National Standard with, UL 248-12 (1st Edition).

.2 CSA C22.2 No. 106-M92 (latest edition).

1.2 MAINTENANCE MATERIAL

.1 Three spare fuses of each type and size installed.

1.3 DELIVERY AND STORAGE

.1 Ship fuses in original containers.

.2 Store fuses in original containers in moisture free location.

Part 2 Products

2.1 FUSES GENERAL

.1 Fuses: product of one manufacturer for entire project .

.2 Fuses specified below must conform to CSA C22.2 No. 106 (latest edition). Fuses conforming to standard C22.2 No. 106-1953 will be rejected.

.3 Fuses must provide a fully co-ordinated system for both overload and fault conditions.

2.2 FUSE TYPES

.1 Class L fuses (formerly HRC-L) for ratings 601-6000 A..

.1 Time delay, capable of carrying 500% of its rated current for 10 s minimum.

.2 Fast acting as noted.

.2 Class J fuses (formerly HRCI- J).

.1 Time delay, capable of carrying 500% of its rated current for 10 s minimum.

.2 Fast acting as noted.

.3 Class R fuses (formerly HRCI- R). For UL Class RK1 fuses, peak let-through current and I^2t values not to exceed limits of UL 198E-1982, table 10.2.

2.3 ACCEPTABLE PRODUCTS

.1 Motor Protection:

1-600 A: Mersen Type AJT

601-2000 A: Mersen Type A4BT

.2 Other acceptable manufacturers:

.1 GEC

.2 Little Fuse

Part 3 Execution

3.1 INSTALLATION

.1 Install fuses in mounting devices immediately before energizing circuit.

.2 Ensure correct fuses fitted to physically matched mounting devices.

.1 Install Class R rejection clips for HRCI-R fuses.

.3 Ensure correct fuses fitted to assigned electrical circuit.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

.1 Submit product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 DISCONNECT SWITCHES

.1 Enclosed manual air break switches must conform to CSA C22.1 No.4 (latest edition).

.2 Fuseholder assemblies must conform to CSA C22.2 No.39 (latest edition).

.3 Fusible, and/or non-fusible, horsepower rated disconnect switches, size as indicated.

.4 Provision for padlocking in off switch position by three locks.

.5 Mechanically interlocked door to prevent opening when handle in ON position.

.6 Fuses: size as indicated, to Fuses - Low Voltage Section.

.7 Fuseholders: relocatable and suitable without adaptors, for type and size of fuse indicated.

.8 Quick-make, quick-break action.

.9 ON-OFF switch position indication on switch enclosure cover.

.10 Disconnects feeding elevator controllers must be equipped with two auxiliary contacts approved by the elevator supplier.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Electrical General Requirements Section.

.2 Indicate name of load controlled on size 4 nameplate.

2.3 ACCEPTABLE MANUFACTURERS

Manufacturer	General Purpose	Weather Proof
Eaton	IHD Series	3HD Series
Schneider Electric	Type A Series	Type R Series
Siemens	ID Series	NFR/FR Series

Part 3 Execution

3.1 INSTALLATION

.1 Install disconnect switches complete with fuses if applicable.

.2 Connect auxiliary contacts to elevator controller using conduit, wire and route approved by the elevator supplier.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with Electrical General Requirements Section.

.2 Indicate:

- .1 Mounting method and dimensions.
- .2 Starter/contactor size and type.
- .3 Layout of identified internal and front panel components.
- .4 Enclosure types.
- .5 Wiring diagram for each type of starter.
- .6 Interconnection diagrams.

1.2 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into manual specified in Electrical General Requirements Section.

.2 Include operation and maintenance data for each type and style of starter/contactor.

1.3 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with Electrical General Requirements Section.

.2 Provide listed spare parts for each different size and type of starter:

- .1 1 operating coil.
- .2 3 fuses.
- .3 10% indicating lamp bulbs used.

Part 2 Products

2.1 MATERIALS

.1 Starters: must conform to CSAC22.2 No. 14 (latest edition) and EEMAC E14-1.

.2 Control transformers must conform to CSAC22.2 No. 66 (latest edition).

.3 Auto-transformers must conform to CSAC22.2 No 47 (latest edition).

.4 Contactors must conform to CSA C22.2 No. 14 (latest edition).

.5 Half size starters will not be accepted. NEMA and IEC rated starters are acceptable.

2.2 MANUAL MOTOR STARTERS

.1 Single and Three phase manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:

- .1 Switching mechanism, quick make and break.
- .2 One or Three overload heaters, manual reset, trip indicating handle.

.3 Toggle switch: standard duty labeled “on”/”off”.

.4 Indicating light: standard duty type and red colour.

.5 Locking tab to permit padlocking in "ON" or "OFF" position.

2.3 FULL VOLTAGE MAGNETIC STARTERS

.1 Magnetic and combination magnetic starters of size, type, rating and enclosure type as indicated with components as follows:

.1 Contactor solenoid operated, rapid action type.

.2 Motor overload protective device in each phase, manually reset from outside enclosure.

.3 Wiring and schematic diagram inside starter enclosure in visible location.

.4 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.

.2 Combination type starters to include fused disconnect switch with operating lever on outside of enclosure to control disconnect, and provision for:

.1 Locking in "OFF" position with up to 3 padlocks.

.2 Independent locking of enclosure door.

.3 Provision for preventing switching to "ON" position while enclosure door open.

.3 Accessories:

.1 Pushbuttons Selector switches standard duty labeled as indicated.

.2 Indicating lights: standard duty type and color as indicated.

.3 1-N/O and 1-N/C spare auxiliary contacts unless otherwise indicated.

.4 1 red pilot light for “stop” or “off” and 1 green light for “start” or “on”.

2.4 CONTROL TRANSFORMER

.1 Single phase, dry type, control transformer with primary voltage as indicated and secondary voltage to suit remote control device, complete with secondary fuse, installed in with starter as indicated.

.2 Size control transformer for control circuit load plus 20% spare capacity.

2.5 CONTACTORS

.1 Electrically held and controlled by pilot devices as indicated and rated for type of load controlled.

.2 Complete with 2 normally open and 2 normally closed auxiliary contacts unless indicated otherwise.

.3 Mount in CSA Enclosure 1 unless otherwise indicated.

.4 Include following options in cover:

.1 Red indicating lamp.

.2 Hand - Off - Auto selector switch.

.5 Control transformer: mounted in contactor enclosure.

.6 Contactors must be definite purpose.

2.6 FINISHES

.1 Apply finishes to enclosure in accordance with Electrical General Requirements Section.

2.7 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Electrical General Requirements Section.

.2 Manual starter designation label: black plate, white letters, size 1, engraved as indicated.

.3 Magnetic starter designation label: black plate, white letters, size 2, engraved as indicated.

.4 Contactor designation label:

black plate, white letters, size 4, indicating name of load controlled.

2.8 ACCEPTABLE MANUFACTURERS

.1 The acceptable manufacturers are as follows:

.1 Allen Bradley

.2 Eaton

.3 Siemens

.4 Group Schneider

.5 Klockner Moeller

Part 3 Execution

3.1 INSTALLATION

.1 Install starters, connect power and control as indicated.

.2 Ensure correct fuses and overload devices elements installed.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Electrical General Requirements Section.

.2 Operate switches, contactors to verify correct functioning.

.3 Perform starting and stopping sequences of contactors and relays.

.4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

.5 Install contactors and connect auxiliary control devices.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE C62.41- 1991, Recommended Practices for Surge Voltages in Low-Voltage AC Power Circuits.

.2 American Society for Testing and Materials (ASTM)

.1 ASTM F1137- 88 (1993), Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.3 United States of America, Federal Communications Commission (FCC)

.1 FCC (CFR47) EM and RF Interference Suppression.

.4 IESNA LM-79-08, IES Electrical Method for the Electrical and Photometric Measurements of Solid State Lighting Products.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with Electrical General Requirements Section for all light fixtures supplied under this contract.

.2 Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Consultant.

.3 Photometric data to include: VCP Table spacing criterion.

1.3 SCOPE

.1 This contractor is responsible to supply and install all lighting fixtures as scheduled and/or indicated including lamp and those accessories required for a complete lighting system. This contractor must coordinate lighting installations with all other Divisions of this project.

.2 All fixtures must be CSA approved or approved at this contractor's expense by the Special Inspection Division of the Electrical Safety Authority.

1.4 GUARANTEE

.1 Guarantees for materials replacement shall be as follows from date of substantial completion.

.1 LED lamps: 3 months

.2 LED fixtures, and driver: 5 years.

.2 The labour required to replace these ballasts, lamps or drivers must be included in the above guarantee, however only for the extent of the contract guarantee and warranty period as noted in Electrical General Requirements.

1.5 EXISTING FIXTURE BALLAST REMOVAL AND DESTRUCTION

.1 Scope

.1 This Contractor is responsible for contracting with an approved company for the dismantling, disposal and removal of all existing fluorescent ballasts and lamps from this project. This process must include but is not limited to the following:

.1 Removal of existing ballasts from fixtures by this contractor.

.2 This contractor is to compare the ballast number to the PCB ballast identification booklet provided by the disposal company.

.3 If the ballast is not contaminated it is to be disposed of by normal means.

.4 If the ballast is contaminated provide:

.1 Approved interm on site storage area.

.2 Approved interm on site storage containers.

.3 Any and all necessary on site inspections.

.4 All necessary approval certificates (include copies in maintenance manuals).

.5 Full dismantling, complete destruction and disposal of all ballasts components.

.2 Approved Disposal Companies

.1 PCB Containment Technology Inc.
75 Wanless Court
Ayr, Ontario
N0B 1E0
Phone: (519) 740-1333
Fax: (519) 740-2320

.3 Payment Procedures

.1 Cost of complete services of this sub-contractor shall be paid for by this Section. Refer to Allowances and Fees Section for allowance to be carried for this work.

Part 2 Products

2.1 FIXTURE CONSTRUCTION

.1 Fixtures must be constructed of 20 gauge (minimum) cold rolled steel. All metal edges require smooth finish.

.2 Light leaks must be prevented by providing gasketting, stops, and barriers.

.3 Fixtures must be finished in high reflective baked white enamel. This surface must have a reflectance of not less than 85%.

2.2 FIXTURE LENS

.1 Unless otherwise noted fixture lenses shall be as follows:

.1 Lens thickness: 3.2 mm (1/8")

.2 Material: injection moulded clear prismatic virgin acrylic

.3 Frame: hinged, latched, steel.

2.3 LED FIXTURES

.1 Fixture LED's must be tested in conformance with IESNA LM80 standard.

.2 LED's must be selected using a binning algorithm to ensure colour and lumen output of a given fixture are consistent, as well as meet or surpass ANSI C78.377 specification for the rated lifetime of the fixture. Colour accuracy between products must be within a 2-step MacAdam ellipse.

.3 Luminaires must be tested to IESNA LM79 by an independent approved laboratory.

.4 Luminaires must be tested prior to shipping.

.5 Luminaires must be ULC certified and approved for use in Canada.

.6 Fixtures must maintain a minimum of 90% of their initial light output for 60,000 hours. Submit test results upon request.

.7 Lumen values indicated for fixtures in the project documents are to be considered as "absolute" or "delivered" values.

.8 Other than for specialty fixtures, and unless otherwise indicated, the maximum driver current is to be 750 mA.

2.4 STANDARD EXIT LIGHTING UNITS

.1 Exit lighting units must conform to CSA C860, CSA 22.2 No. 141 (latest edition).

.2 Housing: extruded aluminum housing, white finish.

.3 Face and back plates: extruded aluminum.

.4 Lamps: 2W LED.

.5 Operation: 25 year.

.6 Units are to be provided with three (3) pictogram legends indicating "left from here", "straight from here", and "right from here".

.7 Face plate to remain captive for relamping.

2.5 SELF-POWERED COMBINATION EXIT/EMERGENCY LIGHTING UNITS

.1 Exit lighting units must conform to CSA C860, CSA 22.2 No. 141 (latest edition).

.2 Housing: extruded aluminum housing. White Finish.

.3 Face and back plates: extruded aluminum.

.4 Lamps 2W LED (EXIT).

.5 Operation: 25 year life.

.6 Units are to be provided with three (3) pictogram legends indicating “left from here”, “straight from here”, and “right from here”.

.7 Face plate to remain captive for relamping.

.8 Supply voltage: as noted on drawings.

.9 Output voltage: 12 V DC.

.10 Battery: sealed maintenance free 10 year life.

Note: Battery must be capable of supplying the wattage indicated for a minimum of 30 minutes.

.11 Charger: solid state, voltage/current regulated, inverse temperature compensated, short circuit protected, with regulated output of plus or minus 0.01 V for plus or minus 10% V input variation.

.12 Solid state transfer circuit.

.13 Signal lights: “AC Power On” condition and “charging” condition.

.14 Lamp heads: integral on unit, 345º horizontal and 180º vertical adjustment. Lamp type: minimum 4 watt LED.

.15 Mounting: suitable for universal mounting directly on junction box and complete with knockouts for conduit. Removable or hinged front panel for easy access to batteries.

.16 Cabinet: finish: white.

.17 Auxiliary equipment:

.1 Test switch.

2.6 EMERGENCY LIGHTING UNITS

.1 Emergency lighting units must conform to CSA C22.2 No 141 (latest edition).

.2 Supply voltage: as noted on drawings.

.3 Output voltage: 12 V DC.

.4 Battery: sealed, maintenance free, 10 year life.

Note: Battery units must be capable of supplying the wattage indicated for a minimum of 30 minutes.

.5 Charger: solid state, multi rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01 V for plus or minus 10% input variations.

.6 Solid state transfer circuit.

.7 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

.8 Signal lights: “AC Power ON” condition and “charging” condition.

.9 Lamp heads: integral on unit, 345º horizontal and 180º vertical adjustment. Lamp type: minimum 4 watt LED.

.10 Cabinet suitable for direct of shelf mounting to wall and complete with knockouts for conduit. Removable or hinged front panel for easy access to batteries.

.11 Auxiliary equipment:

.1 Test switch.

.2 Ac input and DC output terminal blocks inside cabinet.

.3 Shelf.

.4 Cord and plug connection for AC. (**Not applicable on 347 V units**).

2.7 ACCEPTABLE LIGHTING MANUFACTURERS

.1 Refer to the light fixture schedule as indicated on drawings.

Part 3 Execution

3.1 INSTALLATION

.1 Locate and install luminaires as indicated. Luminaires are not to be supported from the roof deck. Provide additional unistrut support channel and/or support from structure. Co-ordinate with consultant on site.

.2 Ball align hangers must be provided for rod suspended fixtures.

.3 Fixtures surface mounted to suspended ceilings must be secured through ceiling assembly to cross member supports. These supports are to be steel channels or angles independently secured **to structure** using # 12 “jack” chain. Each chain must be secured so no fixture weight is added to the ceiling assembly.

.4 Plaster frames/flange kits must be provided by this Division for fixtures recessed in plaster and/or drywall ceilings.

.5 Where specified, fixtures to be chain hung shall be hung using “jack” chain with a capacity to suit the fixture weight. Branch circuit wiring feeding these fixtures shall be AC90 cable “ty-wrapped” at 900mm (36") intervals along length of drop. Final appearance must be neat and professional.

.6 Install exit lighting units with illuminated faces and chevrons/arrows indicating path(s) of exit as indicated. Unless otherwise noted install exit fixtures at 2400 mm (8' 0") above finished floor.

.7 Install emergency lighting units and associated remote mounted fixtures as indicated.

.8 Install emergency lighting units and remote fixtures at 300mm (12") below finished ceiling, unless indicated otherwise.

.9 Provide a 15 A 120 V duplex receptacle (connected to circuit indicated) adjacent to unit. **Not applicable on 347 V units. This receptacle connection is to be no lower than 8' 0" (2400 mm) AFF.**

.10 Special installation: Secure fixtures to structure to conform to the Electrical Safety Code using “jack chain” NOT ceiling suspension wire. Where coreslab is used, suspension point must be independent of the one used for suspension of the ceiling assembly. As an alternate to jack chain the contractor may use a pre-manufactured aircraft cable suspension and fastening system as manufactured by Gripple (Gripple Cat. #HF02-10F2). Provide minimum 2 per fixture.

.11 All battery units are to be provided with a visible lamicoid label indicating the unit number as per drawings.

3.2 WIRING

.1 Connect luminaires to lighting circuits as indicated.

.2 Connect exit fixtures to exit lighting circuits and unit equipment (if applicable).

.3 Connect unit equipment to circuits as indicated.

.4 All wiring of remote emergency fixtures shall be minimum #10 T90 for each circuit and run in conduit. Wiring must be sized in conformance with manufacturer's recommendations for distances required.

3.3 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.

.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.4 DELIVERIES

.1 Fixtures are to be completely assembled at the manufacturer's plant and delivered to the project site in original unitized containers. Ensure that a dry, protected and secure space is available for proper storage before scheduling delivery of fixtures.

3.5 TESTING/CERTIFICATION

.1 At the completion of the project and in the presence of the consultant, test all exit and emergency fixtures. On company letterhead, the contractor is to prepare a chart indicating:

.1 project
.2 date
.3 equipment type
.4 certification of correct connection
.5 certification of correct operation
.6 duration of test in minutes (minimum 30)
.7 actual period of testing (time of day)

.2 Provide "Integrated Testing" of this life safety system in conformance with the noted specification section. Include all associated costs in tender.

3.6 EQUIPMENT ALLOWANCES

.1 The manufacturer and electrical contractor are to allow in their bid the cost to add two (2) additional emergency lighting units to be installed and tested in locations as directed by the consultant. Note: This installation and test will be occurring after the initial testing/certification testing is complete.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE).

.2 Underwriter Laboratories of Canada (ULC).

.3 International Electrotechnical Commission.

.4 International Organization for Standardization (ISO).

.5 National Electrical Manufacturers Association (NEMA).

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with Section 26 01 16.

.2 Submit composite wiring diagrams and control schedule for each room control circuit type as proposed to be installed. Include load type, sequence of operation, sensor parameters, time delays, sensitivities and daylighting set points.

.3 Catalog cut sheets with performance specifications demonstrating compliance with specified requirements.

1.3 SCOPE

.1 This contractor is responsible to supply and install all equipment and control wiring as specified for the digital occupancy and daylight control systems. This contractor must coordinate these control systems with the lighting fixtures being supplied for the project to ensure intended function as specified.

.2 Control Intent: Control Intent includes, but is not limited to:

.1 Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, etc.

.2 Initial sensor and switching zones.

.3 All equipment must be CSA approved or approved at this contractor's expense by the Special Inspection Division of the Electrical Safety Authority.

.4 Reference section 26 51 13 for Lighting information.

.5 Reference section 26 05 75 for line voltage occupancy sensors and switches (hard wired analog).

1.4 SYSTEM DESCRIPTION AND OPERATION

.1 The Digital Lighting Control (room level) as defined under this section covers the following equipment:

.1 Digital Room Controllers – Self-configuring, digitally addressable one, two or three relay controllers.

.2 Digital Occupancy Sensors – Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.

.3 Digital Switches – Self-configuring, digitally addressable pushbutton switches, dimmers, and scene switches with two-way active infrared (IR) communications.

.4 Digital Photosensors – Single-zone closed loop sensors with two-way active infrared (IR) communications can provide switching or dimming control for daylight harvesting.

.5 Configuration Tools – Handheld remote for room configuration provides two-way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from an accessible location.

1.5 LIGHTING CONTROL APPLICATIONS

.1 Provide a minimum application of intended lighting control functions as detailed on design drawings and specified herein. Control functions shall include the following:

.1 Space Control Requirements – Provide occupancy/vacancy sensors with Manual-ON functionality in all spaces except toilet rooms, storerooms, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors.

.2 Bi-Level Lighting – Provide single zone, multi-level controls in any enclosed office, conference room, meeting room, and training room in all enclosed spaces except where variable dimming or multi-zone switching is used.

.3 Daylit Areas – All luminaries closest to the daylight source, and zoned separately from other fixtures in the space, shall be controlled separately from luminaires outside of daylit zones. Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings.

1.6 WARRANTY

.1 Provide a five-year complete manufacturer's warranty on all products to be free of manufacturers' defects.

.2 The labour required to replace these products must be included in the above warranty, however only for the extent of the contract guarantee and warranty period as noted in Electrical General Requirements.

1.7 QUALITY ASSURANCE

.1 Manufacturer: Minimum 10-years experience in manufacture of lighting controls.

Part 2 Products

2.1 MANUFACTURERS

.1 Basis of design product: WattStopper Digital Lighting Management (DLM). Acceptable alternates are subject to compliance and prior approval with specified requirements of this section, as one of the following:

.1 Cooper Controls (Greengate).

.2 Acuity Controls (nlight).

.2 Substitutions:

.1 All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by the design professional a minimum of 7 working days prior to the bid date and must be made available to all bidders.

.2 By using pre-approved substitutions, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring.

2.2 DIGITAL WALL OR CEILING MOUNTED OCCUPANCY SENSOR SYSTEM

.1 Wall or ceiling mounted (to suit installation) passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor. Furnish the Company's system which accommodates the square-foot coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors and accessories which suit the lighting and electrical system parameters.

.2 Digital Occupancy Sensors shall provide calibration and electronic documentation for the following features:

.1 Digital calibration and pushbutton programming for the following variables:

.1 Sensitivity – 0-100% in 10% increments

.2 Time delay – 1-30 minutes in 1 minute increments

.3 Test mode – Five second time delay

.4 Detection technology – PIR, Ultrasonic or Dual Technology activation and/or re-activation.

.5 Walk-through mode

.6 Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.

.2 Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.

.3 Device Status LEDs including:

.1 PIR Detection

.2 Ultrasonic detection

.3 Configuration mode

.4 Load binding

.4 Manual override of controlled loads.

.5 One or two RJ-45 port(s) for connection to DLM local network.

.3 Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.

WattStopper product numbers: LMPX, LMDX, LMPC, LMUC, LMDC

2.3 DIGITAL WALL SWITCHES

.1 Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5, and 8 button configuration; colour per architect, compatible with wall plates with decorator opening. Wall switches shall include the following features:

.1 Two-way infrared (IR) transceiver for use with personal and configuration remote controls.

.2 Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.

.2 Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required to achieve multi-way switching.

.3 The following switch attributes may be changed or selected using a wireless configuration tool:

.1 Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).

.2 Individual button function may be configured to Toggle, On only or Off only.

.3 Individual scenes may be locked to prevent unauthorized change.

.4 Switch buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads.

.4 Two RJ-45 ports for connection to DLM local network.

.5 Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required to achieve multi-way switching.

.6 WattStopper product numbers: LMSW-101, LMSW-102, LMSW-103, LMSW-104, LMSW-105, LMSW-108, LMDM-101.

2.4 DIGITAL POWER PACKS (ROOM CONTROLLERS)

.1 Room Controllers automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room Controllers shall be provided to match the room lighting load and control requirements. The controllers will be simple to install and will not have, dip switches, potentiometers or require special configuration. The control units will include the following features:

.1 Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.

.2 Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf unit without requiring any configuration or setup.

.3 Device Status LEDs to indicate:
  .1 Data transmission
  .2 Device has power
  .3 Status for each load
  .4 Configuration status
.4 Quick installation features including:
  .1 Standard junction box mounting
.5 Plenum rated
.6 Manual override and LED indication for each load
.7 120 VAC, 60 Hz operation.
.8 Zero cross circuitry for each load.

.2 On/Off Room Controllers shall include:
.1 One or multiple relay configuration to suit control details
.2 Efficient 150 mA switching power supply
.3 Sufficient sensor connection points to suit indicated function without the requirement for additional hardware
.4 Discrete model listed for connection to receptacles, for schedule-based control of plug loads within the space.
  .1 One relay configuration only.
  .2 Automatic-ON/OFF configuration.
  .3 Optional Network Bridge for BACnet MS/TP communications
.5 Three RJ-45 DLM local network ports.
.6 WattStopper product numbers: LMRC-101, LMRC-102, LMPL-101, LMPL-201.

.3 On/Off Room/Dimming enhanced Room Controllers shall include:
.1 One or multiple relay configuration to suit control details.
.2 Efficient 250 mA switching power supply.
.3 One 0-10 volt analog output per relay for control of compatible ballasts and LED drivers.
.4 The following dimming attributes may be changed or selected using a wireless configuration tool:
  .1 Establish preset level for each load from 0-100%.
  .2 Set high and low trim for each load.
  .3 Set lamp burn in time for each load up to 100 hours.
.5 Four RJ-45 DLM local network ports.
.6 Optional Network Bridge for BACnet MS/TP communications.
.7 WattStopper product numbers: LMRC-211, LRMC-212, LRMC-213, LMPL-201, LMRC-311, LMRC-312, LMRC-313.

2.5 DIGITAL ROOM CONTROL SYSTEMS

.1 Digital occupancy and daylight control system designed to control a small area of a building (room level). Digital devices connect to the room controller(s) using CAT 5e cables (LMRJ) with RJ-45 connectors which provide both data and power to room devices. Features of the system shall include:

.1 Plug n' Go automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.

.2 Simple replacement of any device in the system with a standard off the shelf unit without requiring commissioning, configuration or setup.

.3 Push n' Learn configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices which are part of the local system.

.4 Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.

2.6 CONFIGURATIONS TOOLS

.1 A configuration tool facilitates optional customization of digital lighting control system featuring infrared communications.

.2 Features and functionality of the wireless configuration tool shall include:

.1 Two-way infrared (IR) communication with DLM IR-enabled devices within a range of approximately 30 feet.

.2 Read, modify and send parameters for occupancy sensors, daylighting sensors, room controllers and buttons on digital wall switches.

.3 Save up to nine occupancy sensor setting profiles, and apply profiles to selected sensors.

.3 WattStopper Product Numbers: LMCT-100, LMCI-100/LMCS-100

2.7 SYSTEM INPUT/OUTPUT

.1 Provide a means to allow seamless integration with third party devices to provide additional functionality to the Digital Lighting Management system via low voltage input/output interface. Wattstopper Product Number: LMIN-104.

.2 Provide a means to integrate analog occupancy sensors to the Digital Lighting Management system via low voltage analog sensor input module. Wattstopper Product Number: LMIO-201.

Part 3 Execution

3.1 INSTALLATION

.1 Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated.

.2 When using wire for connections other than the DLM local network (LMRJ Cat 5e with RJ-45 connectors), provide detailed point to point wiring diagrams for every termination. Provide wire specifications and wire colors to simplify contactor termination requirements.

.3 Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings.

.1 Adjust time delay so that controlled area remains lighted for 5 minutes after occupant leaves area.

.4 Install power packs in accessible maintenance areas unless noted otherwise. Provide access doors if power packs are installed above drywall ceilings.

.5 Install sensors in gym where noted on plan at mid-height of wall.

.6 It shall be the contractor's responsibility to locate and aim sensors in the correct location required for complete and proper coverage within the range of coverage as per the manufacturer's recommendations. The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective rooms.

.7 Provide written or computer-generated documentation on the commissioning of the system including room by room description including:

.1 Sensor parameters, time delays, sensitivities, and daylighting setpoints.

.2 Sequence of operation, (e.g. manual ON, Auto OFF. etc.)

.3 Load Parameters (e.g. blink warning, etc.)

.8 Re-commissioning – After 30 days from occupancy re-calibrate all sensor time delays and sensitivities to meet the Owner's Project Requirements. Provide a detailed report to the Architect / Owner of re-commissioning activity.

3.2 FACTORY COMMISSIONING

.1 Upon completion of the installation, the system shall be commissioned by the manufacturer's factory authorized representative who will verify a complete fully functional system.

.2 The electrical contractor shall provide both the manufacturer and the electrical engineer with ten working days written notice of the system startup and adjustment date.

.3 Upon completion of the system commissioning the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.

.4 Factory commissioning shall include functional testing and documentation of the control system conforming to the "Functional Testing" requirements included in the current ASHRAE standard. This cost shall be included in the Tender Price.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CAN/ULC-S524 (latest edition), Installation of Fire Alarm Systems.

.2 ULC-S525 (latest edition), Audible Signal Appliances for Fire Alarm Systems.

.3 CAN/ULC-S526 (latest edition), Visual Signal Appliances, Fire Alarm.

.4 CAN/ULC-S527 (latest edition), Control Units, Fire Alarm.

.5 CAN/ULC-S528 (latest edition), Manual Pull Stations.

.6 CAN/ULC-S529 (latest edition), Smoke Detectors.

.7 CAN/ULC-S530 (latest edition), Heat Actuated Fire Detectors, Fire Alarm.

.8 CAN/ULC-S531 (latest edition), Smoke Alarms.

.9 CAN/ULC-S536 (latest edition), Inspection and Testing of Fire Alarm Systems.

.10 CAN/ULC-S537 (latest edition), Verification of Fire Alarm Systems.

.11 CAN/ULC-S552 (latest edition), Inspection, Testing and Maintenance of Smoke Alarms.

.12 CAN/ULC-S553 (latest edition), Installation of Smoke Alarms.

.13 OBC-2012, Ontario Building Code.

1.2 DESCRIPTION OF SYSTEM

.1 System includes:

.1 Control panel to carry out fire alarm and protection functions including receiving alarm signals, initiating general alarm, supervising system continuously, actuating zone annunciators, and initiating trouble signals.

.2 Trouble signal devices.

.3 Power supply facilities.

.4 Addressable manual alarm stations.

.5 Addressable and conventional automatic alarm initiating devices.

.6 Audible and visual signal devices.

.7 End-of-line devices.

.8 Annunciators.

.9 Ancillary devices.

.10 Interface and zone modules.

.11 Remote trouble indicator.

1.3 REQUIREMENTS OF REGULATORY AGENCIES

.1 This system is subject to review by local building department officials, local fire department officials. **Therefore, submission of verification certificate and field technician device verification sheets is required prior to inspection by these officials. Schedule accordingly.**

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Electrical General Requirements Section.

.2 Include:

.1 Layout of equipment.

.2 Zoning.

.3 Complete wiring diagram.

1.5 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for Fire Alarm System for incorporation into manual specified in Electrical General Requirements Section.

.2 Include:

.1 Operation and maintenance instructions for complete fire alarm system to permit effective operation and maintenance.

.2 Technical data - illustrated parts lists with parts catalogue numbers.

.3 Copy of approved shop drawings.

.4 List of recommended spare parts for system.

1.6 MAINTENANCE MATERIALS

.1 Include:

.1 10% spare glass rods for total number of manual pull box stations if applicable.

1.7 TRAINING

.1 Arrange and pay for on-site demonstrations by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system. **Obtain written receipt of training session and include in maintenance manual.**

1.8 SYSTEM OPERATION

.1 Operation of any alarm initiating device to:

.1 Cause audible and visual signal devices to sound throughout building.

.2 Transmit signal to fire department via monitoring station.

.3 Cause zone of alarm device to be indicated on control panel and remote annunciator(s).

.4 Cause air conditioning and ventilating fans to shut down and to function so as to provide required control of smoke movement.

.5 Cause fire doors and smoke control doors if normally held open, to close automatically.

.6 Log the alarm in the historical alarm log file.

.2 System Reset

.1 It shall not be possible to reset the fire alarm system until all the alarm zones have been properly reset or cleared.

.3 System Trouble Operation

.1 A trouble initiated by the actuation of a sprinkler system supervisory trouble switch shall cause the following to occur:

.1 An audible and visual trouble signal shall sound at the main control panel Only until acknowledged by an operator.

.2 Annunciate the Supervisory Trouble Alarm at the main control panel LCD Display and all remote annunciator(s).

.3 Log the Supervisory Trouble Alarm in the Historical Trouble Log File.

.4 Cause the remote trouble indicator to activate

.2 Any system trouble shall cause the following to occur:

.1 An audible and visual trouble signal shall sound at the main control panel LCD Display Only until acknowledged by an operator.

.2 Log the trouble condition in the separate Historical Trouble Log File.

1.9 PERFORMANCE CRITERIA

.1 These specifications describe the minimum functional requirements for an electronically supervised, microprocessor based, fully integrated system. The initial installation shall include all the necessary electronic hardware, software and memory for a completely operable system in accordance with these specifications.

1.10 QUALITY ASSURANCE

.1 Each and all items of the fire alarm system shall be listed as the products of a single manufacturer under the appropriate category by the Underwriter's Laboratories of Canada and shall bear the "U.L.C." label.

.2 Each and all items of the fire alarm system shall be covered by a one year parts and labour warranty covering defects resulting from faulty workmanship and materials. The warranty shall be deemed to begin on the date the system is accepted by the Project Manager on issuance of the substantial performance certificate for the project.

.3 All control equipment must have Transient Protection Devices to comply with U.L.C. requirements.

Part 2 Products

2.1 GENERAL

.1 The fire alarm system shall be an addressable, single stage, zoned, non-coded, indicating, fully integrated fire alarm.

.2 The fire alarm control panel shall allow for loading or editing of special instructions and operating sequences as required. The system shall be capable of on site programming to accommodate expansion, and changes required by local codes. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control panel. Loss of primary and secondary power shall not erase the instructions stored in memory.

.3 The ability to selectively program input/output control functions based on ANDing, ORing, NOTing, Timing and Special Coded Operations is also to be incorporated in the resident software programming of the system.

.4 The system shall have the ability to manually disable and enable any device/circuit individually for maintenance or testing purposes.

.5 It shall be possible to reprogram selected or all smoke detector initiating zones for alarm verification.

.6 It shall be possible to program an adjustable time delay circuit for each waterflow initiating circuit to prevent false alarms that may be caused by erroneous pressure surges in the sprinkler system.

.7 All on site programming changes to the fire alarm system shall be password protected.

.8 Wiring to any remote annunciator shall be supervised for open and ground conditions. A separate annunciator trouble indicator must be provided at the control panel, which shall illuminate and an audible trouble signal shall sound at the control panel upon the detection of an open or ground condition.

.9 All Control Panels and Remote Annunciator Cabinets are to be properly grounded to building ground. Conduit ground will not be acceptable. The green coloured grounding loop shall be a minimum #14 AWG insulated copper conductor run in conduit. The ground loop shall be connected to building water supply to the line side of the water meter. Ground wire must not be run in the same conduit as the Fire Alarm wiring.

2.2 POWER REQUIREMENTS

.1 The control panels shall receive 120 VAC power via a dedicated overcurrent protected circuit. The incoming power to the system shall be supervised so that any power failure must be audibly and visually indicated at the control panel and the remote annunciator. A green `Power On' LED shall be displayed continuously while incoming power is present.

.2 Control Panel output power supply shall have the following operating characteristics:

.1 Rated for five Amps continuous duty

.2 24 VDC filtered and regulated

.3 Power limited with a range of 20.4 VDC to 32 VDC.

.4 Automatic "Brownout" transfer to standby batteries when supply voltage falls to 102 VAC

.3 The system batteries shall be supervised so that a low battery condition or disconnection of the batteries shall be audibly and visually annunciated at the control panel.

.4 Battery charger shall have the following operating characteristics:

.1 Ability to charge a range up to 33 AH to 70% of their capacity within 12 hours.

.2 Compatible with either lead acid or nicad batteries.

.5 All circuits requiring system operating power shall be individually fused at the control panel.

.6 The system shall be modular in design to allow future expansion with a minimum of hardware additions and system interruptions.

2.3 ADDRESSABLE MANUAL ALARM STATIONS

.1 Manual alarm stations shall be addressable, single action, non-coded, semi-flush mounted type. Pull stations shall be break-glass style. Contacts are to activate when the handle is pulled down.

.2 Addressable pull station electronics shall be mounted to the back plate of the station. The station's address will be set at the time of installation. Device addressing shall be accomplished by either an electrical or mechanical means.

2.4 INTELLIGENT DETECTORS-GENERAL OPERATION

.1 Addressable devices shall use simple to install and maintain decade, numbered 0 to 9, address switches. Detectors that have expanded addressing will have decade switch numbered from 0 to 15 for the most significant digit to allow detector addressing from 1 to 250.

.2 Device addressing shall be accomplished by either an electrical or mechanical means.

.3 Detectors shall be intelligent (analog) and addressable, and shall connect with two wires to the fire alarm control panel signalling line circuits.

.4 Addressable smoke detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.

.5 The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. Sensitivity shall be automatically adjusted by the panel on a time-of-day basis.

.6 Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance.

.7 The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature.

.8 The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.

.9 Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (PHOTO, THERMAL).

.10 Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.

.11 Detectors shall provide address-setting means using decimal switches and shall also store an internal identifying code that the control panel shall use to identify the type of device. LEDs shall be provided that shall flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.

.12 Addressable devices shall provide address-setting means using decimal switches and shall also store an internal identifying code that the control panel shall use to identify the type of device. LED(s) shall be provided that shall flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.

.13 The sensors shall be of a low profile design and ULC listed for both ceiling and wall mount applications.

.14 Automatic smoke sensors shall be equipped with a dust cover, which shall be removed at the time of verification to prevent dust and dirt entering the smoke chamber during construction.

.15 A magnetic test switch shall be provided to test detectors and modules. Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.

2.5 INTELLIGENT MULTI-DETECTOR

.1 The intelligent multi-detector shall be an addressable device, which is designed to monitor photoelectric, ionization, and thermal technologies in a single sensing device. This detector shall utilize advanced electronics which react to smaller products of combustion found in fast flaming fires (ionization), slow smouldering fires (photoelectric), and heat (thermal) all within a single sensing device.

.2 The multi-detector shall include two bicolor LEDs, which flash green in normal operation and turn on steady red in alarm.

.3 Detectors are to be provided with relay base where noted on the drawings.

.4 Separately mounted photoelectric ionization and heat detectors in the same location are not acceptable alternatives.

2.6 FIXED TEMPERATURE HEAT DETECTOR

.1 These heat detectors shall have a low mass thermistor heat sensor and operate at a fixed temperature. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the/ time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. The heat detector shall have a nominal alarm point rating of 57ºC (1 35ºF). The heat detector shall be rated for ceiling installation at a minimum of 21.3m (70') centres and be suitable for wall mount applications.

2.7 FIXED TEMPERATURE / RATE OF RISE HEAT DETECTOR

.1 These heat detectors shall have a low mass thermistor heat sensor and operate at a fixed temperature and at a temperature rate-of-rise. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm, The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable. The intelligent heat detector shall have a nominal fixed temperature alarm point rating of 57ºC (135ºF) and a rate-of-rise alarm point of 9ºC (15ºF) per minute. The heat detector shall be rated for ceiling installation at a minimum of 21.3m (70') centres and be suitable for wall mount applications.

2.8 STANDARD DETECTOR MOUNTING BASES

.1 Provide standard detector mounting bases suitable for mounting on North American 1-gang, 85mm (3 ½ ") or 100 mm (4") octagon box and 100 mm (4") square box. The base shall, contain no electronics, support all detector types and have the following minimum requirements:

.1 Removal of the respective detector shall not affect communications with other detectors.

.2 Terminal connections shall be made on the room side of the base. Bases which must be removed to gain access to the terminals shall not be acceptable.

2.9 AUDIBLE/VISUAL SIGNAL DEVICES

.1 Strobe: semi-recessed, 24Vdc operation, complete with selectable 15/30/75/110 candela output (unless otherwise noted set at 75 cd), synchronized strobe, red finish, FM and ULC listed. Suitable for mounting on a single gang box.

NOTES:

.1 Signal devices with integral strobe lights in high abuse areas (i.e. gymnasium, change rooms, etc.) must be provided with protective wireguards.

.2 Any surface mounted signal devices must be provided with suitable backboxes supplied by the manufacturer.

.3 Provide synchronization modules to suit signal devices (if required by manufacturer).

2.10 END OF LINE RESISTORS

.1 End-of-line resistors for signalling circuits shall be sized to ensure the correct supervisory current flows in each circuit.

.2 End-of-line resistors shall be mounted on a stainless steel plate for mounting on a standard single gang box and bear the ULC label.

2.11 REMOTE ANNUNCIATOR PANELS

.1 Each remote panel in the installed system shall include remote control display annunciators. These annunciators shall have integral membrane style, tactile push-button control switches for the control of system functions, and LED-s with programmable (software-controlled) flash rates and slide-in labels for annunciation of system events.

.2 The remote control display annunciators shall provide the system with individual zone and device annunciation.

.3 Annunciator must be keyed similar to control panel.

2.12 GRAPHIC DISPLAY (PASSIVE)

.1 Black and white layout of facility showing all zones as specified/indicated.

.2 Display is to be found behind Plexiglas, approximate size: 500 mm x 500 mm (20" x 20").

.3 Finish frame to architects direction.

2.13 INTELLIGENT MODULES – GENERAL OPERATION

.1 The modules shall have a minimum of 2 diagnostic LEDs mounted behind a finished coverplate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The module shall be capable of storing up to 24 diagnostic codes, which can be retrieved for troubleshooting assistance. Input and output circuit wiring shall be supervised for open and ground faults. The module shall be suitable for operation in the following environment:

.1 Temperature: 0ºC to 49ºC (32ºF to 120ºF).

.2 Humidity: 0-93% RH, non-condensing.

2.14 MONITOR MODULE

.1 The monitor modules shall have the following operating characteristics:

A flashing LED indicates that the module is in communication with the control panel. The LED latches steady on alarm (subject to current limitations on the loop).

.2 The monitor modules shall have the following features:

Nominal operating voltage:	15 to 32 VDC.
Maximum current draw:	5.1 mA (LED on)
Average operating current:	400 uA (LED flashing)
EOL resistance:	47K ohms.
Temperature range:	0°C to 49°C (32°F to 120°F)
Humidity range:	10% to 93% noncondensing
Dimensions:	114.3mm (4.5") high x 101.6 mm (4") wide x 31.75 mm (1.25") deep. Mounts to a 101.6 mm (4") square x 53.975 mm (2.1/8") deep box.

2.15 ISOLATOR MODULE

.1 Fault isolator modules shall be provide to automatically isolate wire-to-wire short circuits on an SLC loop. The fault isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop. If a wire-to wire short occurs, the fault isolator module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the fault isolator module shall automatically reconnect the isolated section of the SLC loop. The fault isolator module shall not require any address-setting, and its' operations shall be totally automatic. It shall not be necessary to replace or reset a fault isolator module after its normal operation. The fault isolator module shall mount in a standard 10.16 cm (4") deep electrical box, in a surface-mounted backbox, or in the fire alarm control panel. It shall provide a single LED which shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

2.16 CONTROL MODULE

.1 Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay.

.2 The control module NACs may be wired for Style Z or Style Y (Class A/B) with up to 1 Amp of inductive A/V signal, or 2 Amps of resistive A/V signal operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% or all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

.3 The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 Amps at 30 VDC.

2.17 DOOR HOLD OPEN DEVICES

.1 Units to be complete with the following features:

.1 Wall mounted style.
.2 Long life electromagnet.
.3 Low current operation.
.4 Completely silent operation.
.5 25 lbf (111N) minimum holding force.
.6 Adjustable swivel contact plate.
.7 Brushed zinc finish.
.8 Maintenance free operation.
.9 Water resistant design.
.10 ULC, CSA, and FM approved.

2.18 SPRINKLER AND SUPERVISED VALVE CONNECTIONS

.1 Sprinkler and standpipe system contacts shall be provided by the mechanical/sprinkler contractor but connected into the fire alarm system by this Division.

2.19 REMOTE TROUBLE INDICATOR

.1 A system remote trouble indicator where noted on the drawings shall be provided complete with the following features:

.1 Flush mounted in a double gang box.

.2 Trouble LED.

.3 Trouble buzzer.

2.20 SYSTEM WIRING

.1 The system wiring must be FSA rated in conformance with the Electrical Safety Code to suit the type of installation.

.2 Wiring shall be minimum #18 AWG twisted shielded pair in conduit. “Securex 2” armoured cable will be permitted to be used for “drops” to devices on accessible ceilings.

.3 As indicated on system riser diagram initiating device wiring shall be run in a loop with a home run from the last device to the control panel (Class ‘A’ configuration).Wiring from the “loop” module to conventional devices must be supervised, run in conduit, and conform to the standards of the Electrical Safety Code.

.4 Signal wiring is to be cross connected in a class ‘B’ configuration.

.5 Install isolator modules and end of line resistors in service rooms no higher than 2.4 M AFF. Provide location of these devices at the time of shop drawing submission.

.6 **These are the basic wiring requirements for system operation. Prior to tender close manufacturer and contractor are to confirm all necessary wiring specifications and requirements.**

2.21 APPROVED EQUIPMENT

Existing Control Panel	
	EST 3X
Intelligent Devices	
Manual Alarm Stations 1-Stage	SIGA-270
Addressable Multi-Sensor	SIGA2-PS
Addressable Base	SIGA-SB

Addressable Base c/w Relay	SIGA-RB
Heat Sensor	SIGA2-HRS or SIGA2-HFS
Smoke Detectors	SIGA-PS
Monitor Module	SIGA-CT Series
Control Module	SIGA-CR
Isolator Module	SIGA-IM
Annunciator	EST3-6ANN
Conventional and Auxiliary Devices	
Remote Trouble Indicator	RTU

Part 3 Execution

3.1 INSTALLATION

.1 The entire system shall be installed in accordance with CAN/ULC-S524 (latest edition) and approved manufacturers manuals and wiring diagrams. The contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation, All wiring shall be of the type recommended by the Electrical Safety Code, approved by local authorities having jurisdiction for the purpose, and shall be installed in dedicated conduit throughout.

.2 Install main control panel and connect to ac power supply.

.3 Locate and install manual alarm stations and connect to alarm circuit wiring.

.4 Locate and install detectors and connect to alarm circuit wiring. **Do not mount detectors within 1 m (39") of air outlets.** Maintain at least 600 mm (24") radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.

.5 Connect alarm circuits to main control panel.

.6 Locate and install signal devices and connect to signalling circuits.

.7 Connect signalling circuits to main control panel.

.8 Install end-of-line devices at end of applicable alarm and signalling circuits.

.9 Install remote annunciator panels and connect to annunciator circuit wiring.

.10 Locate and install door releasing devices.
Note: Door holders must release by way of local smoke detector and signal from main control panel. Provide additional relays to suit.

.11 Locate and install remote relay units to control fan shut down.

.12 Sprinkler system: wire alarm and supervisory switches and connect to control panel.

.13 Connect fire suppression systems to control panel.

.14 Elevator controllers are to be connected with 4 #14 conductors in conduit from fire alarm control panel to signal elevator recall in the event of a general alarm.

.15 Where more than one smoke alarm is installed within a space or dwelling unit, interconnect smoke alarms to each other such that audible signal sounds throughout the space upon activation of any smoke alarm. Smoke alarms are to be interconnected with 3#12 conductors in conduit and connected per manufacturers recommendations.

3.2 FIELD QUALITY CONTROL

.1 The system shall be installed and fully tested under the supervision of trained manufacturer's representative. The system shall be demonstrated to perform all the functions as specified.

3.3 ACCEPTABLE INSTALLER

.1 The fire alarm / life safety system specified herein shall be installed by an Authorized Electrical Contractor who is CFAA certified.

3.4 EXAMINATION

.1 Prior to the commencement of any of the work detailed herein, an examination and analysis of the area(s) where the Fire Alarm / Life Safety System and all associated components are to be installed shall be made.

.2 Any of these area(s) which are found to be outside the manufacturers' recommended environments for the particular specified products shall be noted on a Site Examination Report which shall be given to the Building Owners Representative, and the Consultant.

.3 Any shorts, opens, or grounds found on existing wiring shall be corrected prior to the connection of these wires to any panel component or field device.

3.5 DEMONSTRATION

.1 Each of the intended operations of the installed Fire Alarm / Life Safety System shall be demonstrated to the Building Owners' Representative and the Consultant.

3.6 SYSTEM TEST

.1 Perform tests in accordance with General Electrical Requirements Section and CAN/ULC-S537-(latest edition) Standard for the Verification of Fire Alarm Systems.

.2 Fire alarm system:

.1 Test each device and alarm circuit to ensure noted devices transmit alarm to control panel and actuate general alarm and ancillary devices.

.2 Check annunciator panels to ensure zones are shown correctly.

.3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of system.

.4 Class A circuits.

.1 Test each conductor on all circuits for capability of providing alarm signal on each side of single open-circuit fault condition imposed near middlemost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.2 Test each conductor on all circuits for capability of providing alarm signals during ground-fault condition imposed near middlemost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.5 Class B circuits

.1 Test each conductor on all circuits for capability of providing alarm signal on line side of single open-circuit fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.3 The control panel shall continuously perform as automatic self-test routine on each sensor, which will functionally check the sensor electronics and ensure the accuracy of the valves being transmitted to the control panel.

.4 Automatic testing will occur at a rate of one sensor every four minutes.

.5 The sensor's average analogue value is the average of the last 2000 recorded analogue entries of its chamber.

.6 Any sensor that fails this test shall indicate a '**SELF-TEST ABNORMAL'** trouble condition with the sensor's address at the control panel.

.7 The system shall automatically indicate when an individual sensor needs cleaning. When the sensor's average value reaches a predetermined value, a **'DIRTY SENSOR'** trouble condition shall be audibly and visually indicated at the local control panel for that sensor. IF a **'DIRTY SENSOR'** indication is left unattended and its average value increases to a second predetermined value, an **'EXCESSIVELY DIRTY SENSOR'** trouble condition shall be indicated at the local control panel for that sensor. To prevent false alarms, these **'DIRTY'** conditions shall in no way decrease the amount of smoke obscuration necessary to generate an alarm condition.

.8 An operator having a proper access level, shall have the capability to manually access the following information from the control panel:

.1 Primary Status

.2 Device Type

.3 Present Average Value

.4 Present Sensitivity Selected*

.5 Highest Peak Detection Values (HVP)*

.6 Sensor Range (Normal, Dirty, Excessively Dirty)

* Values shall be in 'percent of smoke obscuration' format so that no interpretation is required by the operator.

.9 **Provide "Integrated Testing" of this life safety system in conformance with the noted specification section. Include all associated costs in tender.**

3.7 AUDIBILITY TESTING

.1 Audibility Testing:

.1 The contractor is to coordinate an audibility test prior to occupancy of the facility. The test is to be performed by the representatives of the fire alarm manufacturer in the presence of the consultant. The test report is to be in chart form indicating:

.1 Project

.2 Date of test

.3 Room name and number

.4 Ambient dB level

.5 Alarm dB level

.6 Name of testing technician

.2 The test results are to be submitted to the consultant for review prior to issuing to owner's representatives and/or authorities having jurisdiction.

3.8 EQUIPMENT ALLOWANCES

.1 The manufacturer and electrical contractor are to include in their bid the cost to add two (2) additional signaling devices to be installed and verified in locations as directed by the consultant. Note: This installation and verification and subsequent audibility test will be occurring after the initial audibility testing is complete.

.2 The manufacturer and electrical contractor are to include in their bid the cost to add three (3) additional fire alarm zones with associated zone modules and including six (6) additional isolation modules to be installed and verified as directed by the consultant.

END OF SECTION

CHUNG & VANDER DOELEN
ENGINEERING LTD.

GEOTECHNICAL INVESTIGATION
PROPOSED ELEVATOR AT SUDDABY PUBLIC SCHOOL
171 FREDERICK STREET
KITCHENER, ONTARIO

SUBMITTED TO:
Caird-Hall Construction Inc.
850 Legion Road - Unit 15
Burlington, Ontario
L7S 1T5

ATTENTION:
Martin Hannan

FILE NO / 1490 / November 1, 2023

CHUNG & VANDER DOELEN
ENGINEERING LTD.

311 VICTORIA STREET NORTH
KITCHENER / ONTARIO / N2H 5E1
519-742-8979

November 1, 2023
File No.: 1490

Caird-Hall Construction Inc.
850 Legion Road - Unit 15
Burlington, Ontario
L7S 1T5

Attention: Martin Hannan

RE: Geotechnical Investigation
Proposed Elevator at Suddaby Public School
171 Frederick Street, Kitchener, Ontario

We take pleasure in enclosing one (1) copy of our Geotechnical Investigation Report carried out at the above-referenced Site. Soil samples will be retained for a period of three (3) months and will thereafter be disposed of unless we are otherwise instructed.

If you have any questions or clarifications are required, please contact the undersigned at your convenience.

We thank you for giving us this opportunity to be of service to you.

Yours truly,
CHUNG & VANDER DOELEN ENGINEERING LTD.

Eric Y. Chung, M. Eng., P.Eng.
Principal Engineer

TABLE OF CONTENTS

LIST OF ENCLOSURES

1.0 INTRODUCTION

CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD) has been retained by Caird-Hall Construction Inc. to carry out a geotechnical investigation for the proposed elevator to be designed and constructed at Suddaby Public School located at 171 Frederick Street in Kitchener, Ontario.

It is understood that the Waterloo Region District School Board is considering installing the proposed elevator along an existing interior load bearing wall between Classroom #30 and Stairwell 'A'. No as-built building drawings or preliminary drawings for the proposed elevator were available at the time of reporting.

The purpose of this investigation is to provide geotechnical recommendations to address the following items:

- Subsurface soil and groundwater conditions
- Foundation design recommendations
- Excavation condition
- Drainage recommendations
- Groundwater control during construction
- Backfilling recommendations
- Foundation soil classification for seismic design per OBC 2012
- Horizontal earth pressure

2.0 FIELD WORK

To investigate the subsurface conditions at the site, one (1) borehole designated as Borehole 1 was advanced at the exterior of the building closest to the proposed elevator to a depth of 9.6 m below ground surface on October 6, 2023. In addition, one (1) test pit was excavated inside the school at the location of the proposed elevator to a depth of 1.3 m below the existing slab-on-grade floor on August 22, 2023. The borehole and test pit locations are indicated on the Borehole Location Plan, Drawing No. 1.

The field work was carried out under the supervision of a member of our engineering team, who logged the borehole and test pit in the field, effected the subsurface sampling, and monitored the groundwater conditions.

The borehole was advanced using a track-mounted drilling rig, supplied, and operated by a specialist contractor. The drill rig was equipped with hollow stem augers and standard soil sampling equipment. Standard penetration tests (SPTs) in accordance with ASTM Specification D1586, were carried out at frequent intervals of depth, and the results are shown on the Borehole Logs as Penetration Resistance or "N"-values.

The test pit was hand excavated by the contractor to allow for assessment of the founding subsoils at the proposed underside of footing level for the new elevator and to determine the projection, thickness, and depth of the existing interior load bearing wall footings.

The location and ground surface elevation of the borehole were surveyed by CVD with reference to a local temporary benchmark (TBM). The temporary benchmark elevation and ground surface elevation were surveyed by CVD for the purpose of this report using a Network RTK Global Navigation Satellite System (GNSS) Receiver. The survey data was collected using The UTM Zone 17N Projection, NAD83(CSRS)v7-2010 datum and Canada Geoid Model HT2_2010v70 (CGVD28). The referenced temporary benchmark (TBM) is described below:

TBM: East entrance finished floor at exterior of building, as shown on Drawing No. 1.

Elevation: 342.60 m (Geodetic)

3.0 LABORATORY TESTING

Soil samples obtained from the in-situ tests were examined in the field and subsequently brought to our laboratory for visual and tactile examination to confirm field classification. Moisture content determination of all retrieved samples occurred.

4.0 SUBSURFACE CONDITIONS

4.1 General

The detailed subsurface conditions encountered in one (1) borehole advanced as part of this investigation is shown on the Borehole Log Sheet, Enclosure 1. Section 4.2 provides a description of the subsurface conditions encountered in the test pit and Sections 4.3 to 4.8 provide descriptions of the major soil deposits encountered in the borehole.

The stratigraphic boundaries shown on the borehole log are inferred from non-continuous sampling conducted during advancement of the borehole drilling procedures and, therefore, represent transitions between soil types rather than exact planes of geologic change. The subsurface conditions will vary between and beyond the borehole locations.

4.2 Test Pit

A test pit was hand excavated by the contractor to a depth of 1.3 m below the existing slab-on-grade floor at the location of the proposed elevator. The test pit was located in Classroom #30 along an existing load bearing wall near to the classroom entrance.

A representative from CVD attended the site on August 22, 2023, to inspect the test pit. The results of the test pit indicated that the top of the existing footing was 0.6 m below the slab-on-grade floor, the footing was approximately 0.4 m thick and had a projection of 0.25 m. The founding subsoils for the existing footings and proposed elevator footings generally consisted of a compact to dense native brown sand with trace to some silt. The sand was judged to be damp to moist. No free water or caving soils were observed in the test pit upon completion.

4.3 Pavement Structure

An asphaltic concrete pavement structure comprising 90 mm of asphalt over 450 mm of granular base/subbase was encountered at the ground surface of the borehole.

4.4 Fill

A layer of fill, comprising sand and silt was encountered below the pavement structure extending to a depth of 1.4 m below ground surface.

The SPT "N"-value measured within the fill was 4 blows per 300 mm of penetration, indicating a very loose to loose compactness condition. The measured moisture contents of the samples collected from this layer ranged between 11 and 18%, thus indicating a moist to wet moisture condition.

4.5 Upper Sand

An upper sand stratum containing trace silt was encountered below the fill materials extending to a depth of 2.1 m below ground surface.

The SPT "N"-value measured within the deposit was 18 blows per 300 mm penetration, indicating a compact compactness condition. The moisture content of the sample collected from this deposit was measured to be 5%, indicating a moist moisture condition.

4.6 Silt

A layer of silt containing trace sand was contacted below the sand stratum extending to a depth of 2.9 m below ground surface.

The SPT "N"-value measured within the deposit was 21 blows per 300 mm penetration, indicating a compact compactness condition. The moisture content of the sample collected from the bottom 150 mm of this deposit was measured to be 20%, indicating a saturated moisture condition. The moisture condition was judged to be moist in the upper portion of the deposit. The saturated moisture condition is indicative of a perched groundwater condition.

4.7 Clayey Silt

A layer of clayey silt containing trace gravel and sand was encountered below the silt and extended to a depth of 3.5 m below ground surface.

The SPT "N"-value measured within the deposit was 23 blows per 300 mm penetration. Pocket penetrometer testing was carried out on the retrieved split spoon sample and the undrained shear strength was determined to be greater than 225 kPa. Based on the above test results and tactile examination, the clayey silt is considered to have a very stiff to hard consistency. The moisture content of the sample collected from this deposit was measured to be 15%, indicating that the clayey silt is drier than the plastic limit (DTPL).

4.8 Lower Sand

A major deposit of sand containing trace to some silt was encountered below the clayey silt and extended until borehole termination at a depth of 9.6 m below ground surface. The SPT "N"-values measured within the deposit ranged from 37 to 53 blows per 300 mm penetration, indicating a dense to very dense compactness condition. The moisture content of the samples collected from this deposit ranged between 3 and 6%, indicating a damp to moist moisture condition.

4.9 Groundwater

Groundwater conditions were monitored during and immediately following drilling and test pit completion. Both the borehole and test pit were observed to be dry with no free water upon completion. A groundwater monitoring well was installed to a depth of 9.1 m in the borehole upon completion of drilling. The table below summarizes the water level reading in the monitoring well taken on October 18, 2023:

Borehole No.	Existing Ground Elevation (m)	Water Level Reading	
		October 18, 2023	
		Depth (m)	Elevation (m)
1	342.37	Dry to 9.1 m	Below 333.27

Based on the above observations, the groundwater table is expected to lie below the explored depth of the borehole drilled for this investigation. However, perched groundwater should be expected at shallow depth based on the saturated moisture condition of the silt layer overlying the discrete cohesive clayey silt layer which was encountered at a depth 2.9 m in the borehole.

It is noted that the groundwater table and perched groundwater will fluctuate seasonally and in response to major weather events.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 General

It is understood that the Waterloo Region District School Board is considering installing the proposed elevator along an existing interior load bearing wall between Classroom #30 and Stairwell 'A'. No as-built building drawings or preliminary drawings for the proposed elevator were available at the time of reporting.

In general, the pavement structure was underlain by very loose to loose sand and silt fill which extended to a depth of 1.4 m below ground surface. The fill materials were underlain by compact fine granular deposits comprising sand or silt which extended to a depth of 2.1 m. A discrete very stiff to hard clayey silt layer was encountered below the fine granular deposits extending to a depth of 3.5 m. A major dense to very dense fine sand stratum containing trace to some silt was contacted below the clayey silt layer and extended until borehole termination at a depth of 9.6 m.

Based on the results of the dry water level reading taken in the monitoring well installed in the borehole, the groundwater table is expected to lie below the explored depth of the borehole drilled for this investigation. However, perched groundwater should be expected at shallow depth based on the saturated moisture condition of the silt layer overlying the discrete cohesive clayey silt layer which was encountered at a depth 2.9 m in the borehole. It is noted that the groundwater table and perched groundwater level will fluctuate seasonally and in response to major weather events.

5.2 Footing Foundations

Conventional strip and spread footing foundations can be used to support the proposed elevator and underpinning of existing footings (if required). Footings cast on the native undisturbed soils encountered at a depth of 1.0± m below the existing classroom finished floor can be designed using a Net Geotechnical Reaction at SLS of 250 kPa. The SLS value given above is based on a maximum settlement of 25 mm under the footing foundations. The Factored Net Geotechnical Bearing Resistance at ULS is 400 kPa.

A modulus of vertical subgrade reaction of 25 MN/m^3 can be used for structural design of the elevator foundation.

These soil bearing pressures can be achieved provided that the founding subgrade is undisturbed during construction. In addition, the footings should be founded below any existing fill, building foundations and utility trenches, on competent native undisturbed soils. Spacing between adjacent footing steps should not be steeper than 10H to 7V.

The maximum total and differential settlements of footings designed to the above recommended soil bearing pressure are expected to be less than 25 and 20 mm, respectively, and these are considered tolerable for the structure being contemplated. The majority of the settlements will take place during construction and the first loading cycle of the building.

Exterior footings and footings in unheated portions of the building should be provided with a soil cover of not less than 1.2 m or equivalent synthetic thermal insulation for adequate frost protection. The founding subgrade soils must be protected from frost penetration during winter construction.

It is recommended that the footing excavations be inspected by the geotechnical engineer to ensure adequate soil bearing and proper subgrade preparation.

5.3 Underpinning

Underpinning of the existing footings will be required if the proposed elevator footings are to be constructed directly adjacent to and at a greater depth than the existing footings. For non-cohesive soils, it is recommended that underpinning be carried out utilizing a 1-2-3 underpinning panel sequence. Each underpinning panel should not exceed a width of 900 mm and a height of 900 mm. Concrete should be poured up to 50 mm below the existing footing and allowed to cure for a minimum of 24 hours. Following initial concrete curing dry pack grout should be rammed into the 50 mm void between the underside of the existing footing and top of the underpinning panel. The grout should be allowed to cure for 24 hours prior to proceeding with the next panel sequence.

The above underpinning recommendations are provided to aid the structural engineer in selecting a panel sequence appropriate for the soils encountered on site. The final underpinning detail, concrete strength and the need for reinforcing steel should be specified by the project structural engineer.

5.4 Earthquake Considerations

In accordance with the 2012 Ontario Building Code (OBC), the proposed structure should be designed to resist earthquake load and effects as per OBC Subsection 4.1.8.

Based on the compactness condition of the underlying soil deposits encountered in the boreholes and the results of nearby deeper publicly available geotechnical boreholes, the site can be classified as a Site Class C as per OBC Table 4.1.8.4.A (Page B4-24).

5.5 Excavation

Trenching and excavation can be carried out using conventional open cut procedures. The excavation for construction of the proposed elevator is expected to be 1.5± m deep. The excavation will generally extend through the existing underfloor fill and into the native fine granular deposits comprising sand and/or silt.

The on-site fill and native soils through the expected excavation depth are generally considered to be Type 3 Soils in accordance with the latest Occupational Health and Safety Act (OHSA). Assuming adequate groundwater control, excavations in the Type 3 Soils are expected to remain stable during the construction period provided side slopes are cut to 1H : 1V from the bottom of the excavation. No workers shall enter trenches that are not sloped in accordance with the OHSA.

Where excessively loose/soft soils and/or seepage zones are intersected, side slopes may need to be flattened locally and the groundwater controlled by suitable means. The side slopes should be suitably protected from erosion processes. Excavations can also be supported using a trench box or timber lagging.

The sand deposit on which the underpinning and the elevator pit will be founded contains trace silt and was in a moist condition. If the sand is exposed to prolonged periods of drying, the sand will "run"/slump into the excavation and stabilized at side slopes of less than 1H :1V. To this end, the exposed side slopes should be covered with tarps to prevent loss of soil moisture.

5.6 Groundwater Control

Based on the results of the dry water level reading taken in the monitoring well installed on site, the groundwater table is expected to lie below the explored depth of the borehole drilled for this investigation. However, perched groundwater should be expected at a shallow depth based on the saturated moisture condition of the silt layer overlying the discrete cohesive clayey silt layer which was encountered at a depth 2.9 m in the borehole. It is noted that the groundwater table and perched groundwater level will fluctuate seasonally and in response to major weather events.

Perched groundwater can be controlled by pumping from filtered sump pits, as and where required.

5.7 Elevator Pit Drainage and Backfill Considerations

Considering the perched groundwater condition encountered in the borehole, it is recommended that a perimeter weeping tile drainage system be provided at the base of the elevator pit in conjunction with damp proofing of the below grade foundation walls.

If adequate perimeter drainage cannot be provided at the base, the elevator base slab and below grade foundation walls should be waterproofed and all construction joints should be provided with water stops. Integral waterproofing utilizing crystalline admixtures incorporated into the concrete mix could also be considered as an alternative to a waterproofing membrane.

The backfill for the foundation walls should be free-draining granular materials or the excavated fine sand which should have less than 8% silt particles (OPSS Granular "B" Type I). The backfill should be placed in thin layers and compacted to 95% SPMDD. Over-compaction adjacent to the foundation walls should be avoided. Compaction should be carried out with hand operated equipment within 1 m of the foundation wall.

5.8 Lateral Earth Pressure

The unbalanced foundation walls and any other soil retaining structures should be designed to resist the lateral earth pressure acting against these walls. The following formula may be used to calculate the unfactored earth pressure distribution. The factored resistance can be calculated by using a factor of 0.8.

$$P = K (\gamma H + q)$$

where:

P =	Lateral earth pressure	kPa
K =	earth pressure coefficient, 0.5 for non-yielding foundation wall earth pressure coefficient, 0.3 for yielding retaining wall	
γ =	unit weight of granular backfill, compacted to 95% SPMDD	21 kN/m^3
H =	unbalanced height of wall	m
q =	surcharge load at ground surface	kPa

The sliding resistance of the retaining wall footings should be checked. The unfactored horizontal resistance against sliding between cast-in-place concrete and the various soils can be calculated using a friction coefficient as follows:

Soil	Unit Weight (kN/m^3)	Friction Coefficient
Fine granular deposits (sand, silt)	19.0	0.35

5.9 Handling of Excess Soils

Excess soil may be generated due to the proposed site works. The management of excess soil is now governed by Ontario Regulation 406/19. In accordance with the regulation, the Project Leader is responsible for the handling, storage, reuse, transportation, and removal of all soil. If the anticipated volume of excess soil generated during construction activities is greater than 2,000 m^3, the following is required for on-site and excess soil management:

- Planning Documentation
    - Assessment of Past Use
    - Sampling and Analysis Plan
    - Excess Soil Characterization Report
    - Excess Soil Destination Report
- Tracking
- Registry
- Record Keeping

CVD can provide further assistance on this matter as the project develops.

6.0 CLOSURE

The Limitations of Report, as quoted in Appendix A, is an integral part of this report.

We trust that the information presented in this report is complete within our terms of reference. If there are any further questions concerning this report, please do not hesitate to contact our office.

Yours truly,
CHUNG & VANDER DOELEN ENGINEERING LTD.

Andrew Dale, P.Eng.
Project Engineer

Eric Y. Chung, M. Eng., P.Eng.
Principal Engineer

APPENDIX A

Limitations of Report

APPENDIX "A"

LIMITATIONS OF REPORT

The conclusions and recommendations given in this report are based on information determined at the testhole locations. Subsurface and groundwater conditions between and beyond the testholes may differ from those encountered at the testhole locations, and conditions may become apparent during construction which could not be detected or anticipated at the time of the site investigation. It is recommended practice that the Soils Engineer be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in the testholes.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of testholes and their respective depths may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusion as to how the subsurface conditions may affect their work.

The benchmark and elevations mentioned in this report were obtained strictly for use in the geotechnical design of the project and by this office only, and should not be used by any other parties for any other purposes.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. CHUNG & VANDER DOELEN ENGINEERING LIMITED accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final design stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.

This report does not reflect the environmental issues or concerns unless otherwise stated in the report.

ENCLOSURES

Soil Abbreviations and Terms Used on Record of Borehole Sheets

TERMINOLOGY DESCRIBING COMMON SOIL TYPES:

Topsoil	-	mixture of soil and humus capable of supporting vegetation
Peat	-	mixture of visible and invisible fragments of decayed organic matter
Till	-	unstratified glacial deposit which may range from clay to boulders
Fill	-	soil materials identified as being placed anthropologically

CLASSIFICATION (UNIFIED SYSTEM)

Clay	<0.002mm		
Silt	0.002 to .075mm		
Sand	0.075 to 4.75mm		
		Fine	0.075 to 0.425 mm
		Medium	0.425 to 2.0 mm
		Coarse	2.0 to 4.75 mm
Gravel	4.75 to 75mm		
		Fine	4.75 to 19 mm
		Coarse	19 to 75 mm
Cobbles	75 to 300mm		
Boulders	>300mm		

TERMINOLOGY

Soil Composition	**% by Weight**
"traces"	<10%
"some"(eg. some silt)	10-20%
Adjective (eg. sandy)	20-35%
"and"(eg. sand and gravel)	35-50%

Standard Penetration Resistance (SPT): Standard Penetration Resistance ('N' Values) refers to the number of blows required to advance a standard (ASTM D1586) 51 mm Ø (2 inch) split-spoon sampler by the use of a free falling, 63.5 Kg (140lbs) hammer. The number of blows from the drop weight is recorded for every 15 cm (6 inches). The hammer is dropped from a distance of 0.76m (30 inches) providing 474.5 Joules per blow. When the sampler is driven a total of 45 cm (18 inches) into the soil, the standard penetration index ('N' Value) is the total number of blows for the last 30 cm (12 inches).

Dynamic Cone Penetration Resistance (DCPT): Dynamic Cone Penetration Resistance is similar to a SPT with the 474.5 Joule/blow impulse provided by the free falling hammer where the split-spoon sampler is replaced by a 51 mm Ø, 60˚ conical point and the number of blows is recorded continuously for every 30 cm (12 inches).

COHESIVE SOILS CONSISTENCY

	(kPa)	**(P.S.F.)**	**Nominal 'N' Value**
Very Soft	<12	<250	0-2
Soft	12-25	250-500	2-4
Firm	25-50	500-1000	4-8
Stiff	50-100	1000-2000	8-15
Very Stiff	100-200	2000-4000	15-30
Hard	>200	>4000	>30

RELATIVE DENSITY OF COHESIONLESS SOIL

	'N' Value
Very Loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	>50

MOISTURE CONDITIONS:

Cohesive Soil
DTPL- Drier than plastic limit
APL- About plastic limit
WTPL- Wetter than plastic limit
MWTPL- Much wetter than plastic limit

Cohesionless Soil
Damp
Moist
Wet
Saturated

SAMPLE TYPES AND ADDITIONAL FIELD TESTS

SS	Split Spoon Sample (obtained from SPT)	**GS**	Grab Sample	**PP**	Pocket Penetrometer
		BS	Bulk Sample	**VANE**	Peak & Remolded shear
AS	Auger Sample	**TW**	Thin Wall Sample or Shelby Tube	**DMT**	Flat Plate Dilatometer

LABORATORY TESTS

SG	Specific Gravity	**S**	Sieve Analysis	**W**	Water Content
H	Hydrometer	**P**	Field Permeability	**K**	Lab Permeability
W_p	Plastic Limit	**W_l**	Liquid Limit	**I_p**	Plasticity Index
GSA	Grain Size Analysis	**C**	Consolidation	**UNC**	Unconfined compression

CHUNG & VANDER DOELEN
ENGINEERING LTD.

Enclosure A

FILE No: 1490

BOREHOLE No. 1

Client: **Caird-Hall Construction Inc.**

Project: **Suddaby Public School**

Location: **171 Frederick Street, Kitchener**

EQUIPMENT DATA

Machine: **Geoprobe**
Method: **Hollow Stem Auger**
Size: **108 mm I.D.**
Date: **Oct 06 - 23** TO **Oct 06 - 23**

Ground Elevation: **342.37 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	TYPE	N-VALUE
341.87	50 mm ASPHALT 450 mm GRANULAR BASE	0.5	1	SS	28
0.50	compact to loose brown to dark brown FILL, sand and silt moist	1.0	2	SS	4
340.97		1.5			
1.40	compact, brown Fine SAND trace silt moist	2.0	3	SS	18
340.27		2.5			
2.10	compact brown SILT trace sand moist to saturated	3.0	4	SS	21
339.47		3.5			
2.90	very stiff, brown CLAYEY SILT trace gravel, trace sand DTPL	4.0	5	SS	23
338.87		4.5			
3.50	dense to very dense brown Fine SAND trace to some silt moist	5.0	6	SS	37
		5.5			
		6.0	7	SS	38
		6.5			
		7.0			
		7.5			
		8.0	8	SS	42
		8.5			
		9.0			
		9.5	9	SS	54
			10	SS	53
332.77					
9.60	End of Borehole				

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

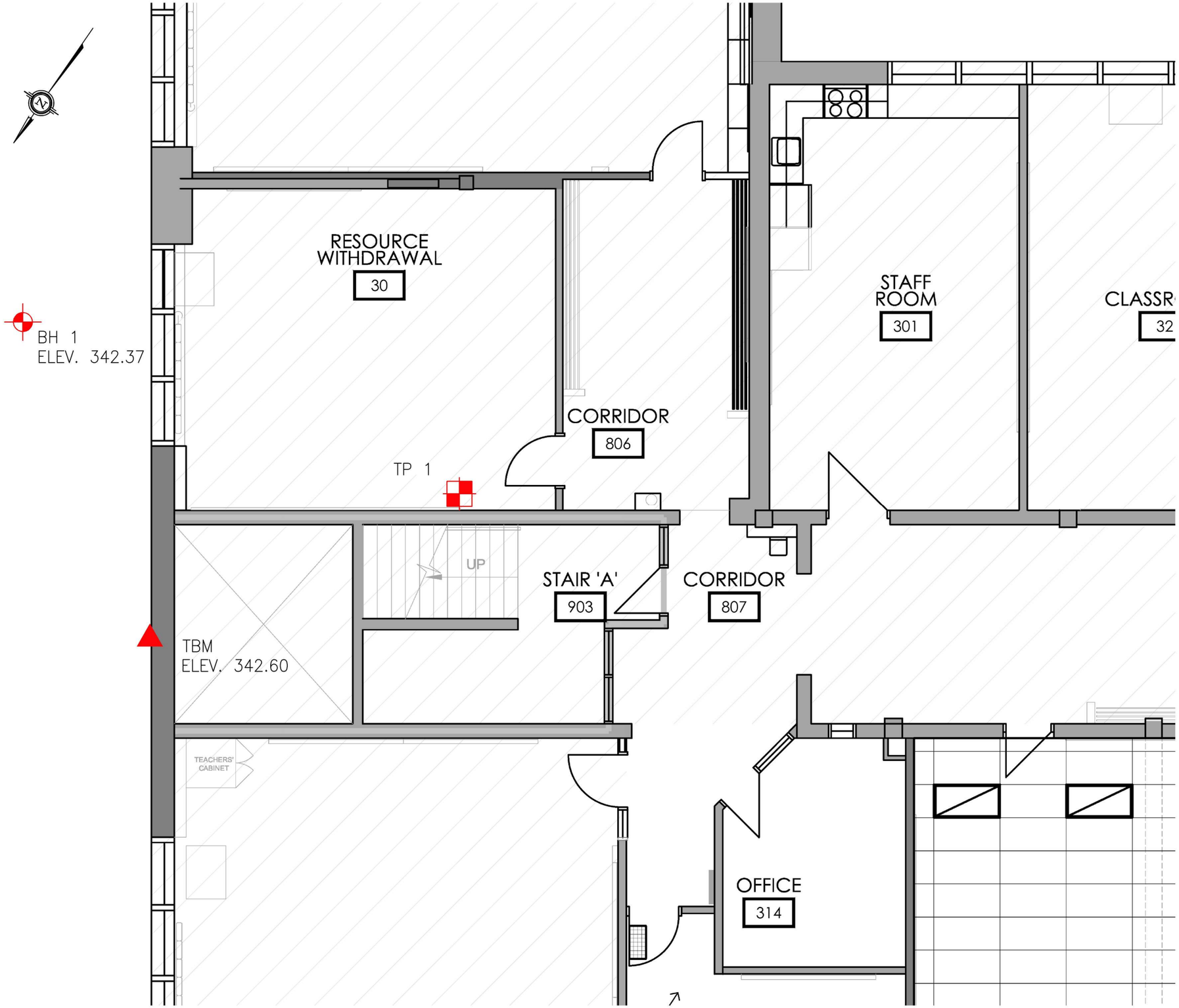
WATER CONTENT (%)
W_P W W_L
10 20 30

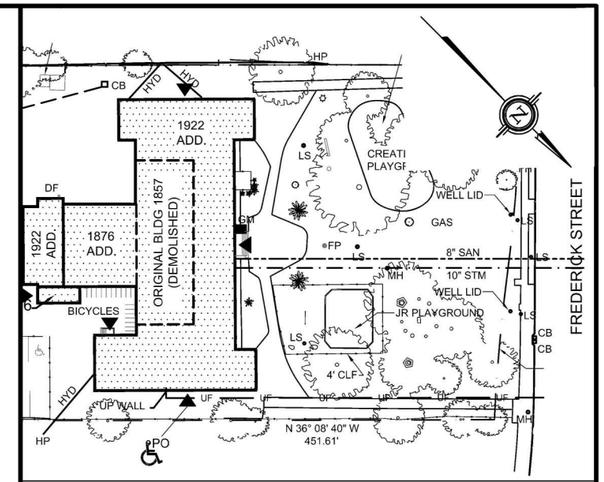
WELL DATA

DEPTH (m)	REMARKS
0.5	flushmount casing set in concrete
2.5	becoming saturated
3.0	bentonite seal/50 mm I.D. PVC riser
7.5	3 m long, 50 mm I.D. PVC screen with sandpack
9.0	monitoring well dry on October 18, 2023

PROJECT MANAGER: **EYC**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739





KEY PLAN **SOURCE:** WRDSB SITE PLAN

LEGEND

Borehole Location

Test Pit Location

TBM: Finished Floor at East Entrance on Exterior of Building
Elevation: 342.60 m

DWG Ref.: aba architects inc.; "HVAC UPGRADE: BASEMENT REFLECTED CEILING PLAN , Project: 2022-152, SUDDABY PUBLIC SCHOOL A/C UPGRADES PHASE 2 & WASHROOM UPGRADES"; 171 Frederick Street, Kitchener, ON; Drawing No. A3.0; Dated 2023/02/02

Elev. Ref.: The borehole locations and associated ground surface elevations were surveyed using a Network RTK Global Navigation Satellite System (GNSS) Receiver. The survey data was collected using UTM Zone 17N Projection, NAD83(CSRS)v7-2010 datum and Canada Geoid Model HT2_2010v70 (CGVD28).

BOREHOLE LOCATION PLAN
Proposed Elevator
Suddaby Public School
171 Frederick Street
Kitchener, Ontario

CHUNG & VANDER DOELEN ENGINEERING LTD.

311 VICTORIA STREET NORTH
KITCHENER / ONTARIO / N2H 5E1 / 519-742-8979

Drawn By: AD	Date: October, 2023	File No.: 1490
Checked By: EYC	Scale: NTS	Drawing No.: 1

Suddaby Public School

2020 Asbestos Audit Update Report

Project Location:
171 Frederick Street, Kitchener, ON

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

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

September 18, 2020

MTE File No.: C34532-919

Engineers, Scientists, Surveyors.

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

September 18, 2020

MTE File No.: C34532-919

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

RE: 2020 Asbestos Audit Update – Suddaby Public School
171 Frederick Street, Kitchener, Ontario

1.0 Introduction

MTE Consultants Inc. (MTE) was authorized by the Waterloo Region District School Board (WRDSB) to conduct the 2020 Asbestos Audit Update for the subject building.

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

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

2.0 Scope of Work

The Scope of Work for this assessment was completed by MTE and included the following activities:

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

3.0 Methodology and Assessment Criteria

This inspection was conducted by visual and laboratory identification methods for the assessment of ACM and their corresponding location, use, condition, and friability. The areas outlined in Section 2.0 were inspected limited to building components, materials and service connections. Notwithstanding that reasonable attempts were made to identify all ACMs, the possibility of concealed material exists and may not become visible until substantial demolition has occurred and therefore are currently undocumented and did not include the following.

- Locations that may be hazardous to the surveyor, such as electrical equipment;
- Where invasive inspection could cause consequential damage to the property or impair the integrity of the equipment, such as roof systems, underground services or components of mechanical equipment;
- Locations concealed by building finishes that require substantial demolition or removal for access or determination of quantities;
- Materials that is present in such an inconsistent fashion that without complete removal of finishes, the extent cannot be determined.
- Non-permanent items or personal contents, furnishings; and
- Settled dust or airborne agents unless otherwise stated.

3.1 Condition of ACM

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

Monitor Annually

These are items which display minor isolated damage; however, do not pose an immediate risk to workers from exposure to asbestos fibres due to the current condition of the material and/or location. No remediation is required at this time; however, these items should be monitored on a yearly basis for evidence of continued degradation. Should the condition of the material change, an evaluation should be completed by a competent person to determine remedial action.

Abatement Action Required

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

4.0 Findings

An inspection of the building was conducted by MTE on September 11, 2020. The two-storey school was constructed in 1857 with additions in 1876 and 1922. The inspection did not include areas of post 1990 construction or renovation (where all building finishes have been removed and replaced), as applicable.

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

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

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

4.1 Analytical Results

During this inspection, a total of 22 building material samples that are suspect ACM were collected with a total of 18 analyses being performed. Equal to or greater than 0.5%, asbestos by dry weight, the laboratory method detection limit (MDL), classifies the material as ACM according to O. Reg. 278/05. Samples collected were submitted for analysis to Paracel Laboratories Ltd. (Paracel), in Mississauga, Ontario. Paracel is certified under the National Voluntary Laboratory Accreditation Program to perform asbestos analysis of bulk samples by PLM. Laboratory analysis was conducted in accordance with the United States Environmental Protection Agency, Test Method EPA/600-R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, June, 1993 by Polarized Light Microscopy as prescribed by O. Reg. 278/05.

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

4.2 Removed ACM

No ACM has been removed since the previous audit.

4.3 Discovery of Additional ACM

ACM or suspect ACM that was not previously identified includes the following:

Non-Friable:

- 1922 Addition – Interior black door pane sealant.
- 1857 Addition – Interior black door sealant.

4.4 Damaged ACM

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

5.0 Recommendations

5.1 Remedial

At the time of the audit, all ACM within the building was noted to be in good condition and no

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

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

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

5.2 Long Term Management

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

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

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

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

6.0 Limitations

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

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

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

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

All of which is respectfully submitted,

MTE Consultants Inc.

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jscozzafava@mte85.com

Paul Semeniuk, B.E.S., C.E.T.
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JAS: apm
Attach.
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Appendix A

Asbestos Management Database

	School Name	Legend:	Notes:
	Suddaby Public School	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - Material Sampled VC - Visually Confirmed - Material not sampled, deemed ACM NF - Non-Friable F- Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1857		
	Addition(s): 1876, 1922		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
Structure/Additions										
	Original Building	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
	Original Building	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-
	Original Building	Façade	Concrete	Concrete	-	Non ACM	-	-	-	-
	Original Building	Deck	Concrete	-	-	Non ACM	-	-	-	-
	Original Building	Roof	Roofing Materials	Replaced 2011	-	Non ACM	-	-	-	-
	Original Building	Windows	Interior Frame	White Sealant	-	Non ACM	HM	S01	11-Sep-20	ND
	Original Building	Window	Exterior Frame	Silicon	-	Non ACM	-	-	-	-
	Original Building	Door	Interior Frame	Black Sealant	NF	ACM	SL	S06ABC	11-Sep-20	1% Chrysotile
	Original Building	Door	Interior Frame	White Sealant	-	Non ACM	SL	S05ABC	11-Sep-20	ND
	Original Building	Door	Exterior Frame	Silicon	-	Non ACM	-	-	-	-
	Original Building	Floor	Floor Tile Mastic	Black Mastic	-	Non ACM	SL	S04ABC	2-Dec-09	ND
	1876 Addition	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
	1876 Addition	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-
	1876 Addition	Façade	Concrete	Concrete	-	Non ACM	-	-	-	-
	1876 Addition	Deck	Concrete	-	-	Non ACM	-	-	-	-
	1876 Addition	Roof	Roofing Materials	Replaced 2011	-	Non ACM	-	-	-	-
	1876 Addition	Windows	Interior Frame	White Sealant	-	Non ACM	HM	S01	11-Sep-20	ND
	1876 Addition	Window	Exterior Frame	Silicon	-	Non ACM	-	-	-	-
	1876 Addition	Door	Interior/Exterior Frame	Silicon	-	Non ACM	-	-	-	-
	1922 Addition	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
	1922 Addition	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-
	1922 Addition	Façade	Concrete	Concrete	-	Non ACM	-	-	-	-
	1922 Addition	Deck	Concrete	-	-	Non ACM	-	-	-	-
	1922 Addition	Deck	Wood	-	-	Non ACM	-	-	-	-
	1922 Addition	Deck	Metal Pan	-	-	Non ACM	-	-	-	-
	1922 Addition	Roof	Roofing Materials	Replaced 2011	-	Non ACM	-	-	-	-
	1922 Addition	Windows	Interior Frame	White Sealant	-	Non ACM	SL	S01ABC	11-Sep-20	ND
	1922 Addition	Window	Exterior Frame	White Sealant	-	Non ACM	SL	S07ABC	11-Sep-20	ND
	1922 Addition	Door	Interior Pane	Black Sealant	NF	ACM	SL	S02ABC	11-Sep-20	3% Chrysotile
	1922 Addition	Door	Exterior Frame	White Sealant	-	Non ACM	SL	S08ABC	11-Sep-20	ND
	1922 Addition	Floor	Floor Tile Mastic	Black Mastic	-	Non ACM	SL	S04ABC	11-Sep-20	ND
	1922 Addition	Roof	Roofing Materials	Replaced 2011	-	Non ACM	-	-	-	-
	1922 Addition	Roof	Sealant	Tan/Yellow	-	Non ACM	SL	S13abc	14-Apr-11	ND
	1922 Addition	Roof	Sealant	Black	-	Non ACM	SL	S14abc	14-Apr-11	ND
	1922 Addition	Roof	Expansion Joint	Black	-	Non ACM	SL	S15abc	14-Apr-11	ND
	1922 Addition	Roof	Expansion Joint	Yellow	-	Non ACM	SL	S16abc	14-Apr-11	ND

	School Name	Legend:	Notes:
	Suddaby Public School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **NF** - Non-Friable **F**- Friable	**All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.**
	Date Built:		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**
	Original: 1857		
	Addition(s): 1876, 1922		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
Basement										
30	Classroom 30	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
30	Classroom 30	Wall	Concrete	-	-	Non ACM	-	-	-	-
30	Classroom 30	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
30	Classroom 30	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
31	Classroom 31	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
31	Classroom 31	Wall	Concrete	-	-	Non ACM	-	-	-	-
31	Classroom 31	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
31	Classroom 31	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
32	Classroom L5	Floor	Vinyl Floor Tile 12" x 12"	Grey Oatmeal	-	Non ACM	HM	S08	2-Dec-09	-
32	Classroom L5	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
32	Classroom L5	Wall	Concrete	-	-	Non ACM	-	-	-	-
32	Classroom L5	Ceiling	Plaster	-	-	Non ACM	SL	S05g	2-Dec-09	ND
33	Classroom	Floor	Carpet	-	-	Non ACM	-	-	-	-
33	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
33	Classroom	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
34	Classroom 34	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
34	Classroom 34	Wall	Concrete	-	-	Non ACM	-	-	-	-
34	Classroom 34	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
35	Classroom 35	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
35	Classroom 35	Wall	Concrete	-	-	Non ACM	-	-	-	-
35	Classroom 35	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
35	Classroom 35	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
36	Learning Disabilities	Floor	Vinyl Sheet Flooring	Blue Dense Fleck Pattern (2016)	-	Non ACM	-	-	-	-
36	Learning Disabilities	Wall	Concrete	-	-	Non ACM	-	-	-	-
36	Learning Disabilities	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
37	Daycare	Floor	Vinyl Sheet Flooring	Faux Wood Pattern (2016)	-	Non ACM	-	-	-	-
37	Daycare	Floor	Concrete	-	-	Non ACM	-	-	-	-
37	Daycare	Wall	Concrete	-	-	Non ACM	-	-	-	-
37	Daycare	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
37	Daycare	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Fibreglass)	-	Non ACM	-	-	-	-
38	Computer Lab 38	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
38	Computer Lab 38	Wall	Concrete	-	-	Non ACM	-	-	-	-
38	Computer Lab 38	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
38	Computer Lab 38	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Fibreglass)	-	Non ACM	-	-	-	-
39	Classroom 39	Floor	Vinyl Sheet Flooring	Blue Dense Fleck Pattern (2016)	-	Non ACM	-	-	-	-
39	Classroom 39	Wall	Concrete	-	-	Non ACM	-	-	-	-
39	Classroom 39	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
39	Classroom 39	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Fibreglass)	-	Non ACM	-	-	-	-
301	Staff Room	Floor	Vinyl Floor Tile 12" x 12"	Grey Oatmeal	-	Non ACM	SL	S08abc	2-Dec-09	ND
301	Staff Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
301	Staff Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
301	Staff Room	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
302	Storage	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
302	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
302	Storage	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND

	School Name	Legend:	Notes:
	Suddaby Public School	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - Material Sampled VC - Visually Confirmed - Material not sampled, deemed ACM NF - Non-Friable F- Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1857		
	Addition(s): 1876, 1922		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
303	Staff WR	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
303	Staff WR	Wall	Concrete	-	-	Non ACM	-	-	-	-
303	Staff WR	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
304	Boys' Washroom	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
304	Boys' Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
304	Boys' Washroom	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
305	Boiler Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
305	Boiler Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
305	Boiler Room	Ceiling	Plaster	-	NF	ACM	SL	S01ABC	22-Jun-12	1% Chrysotile
305	Boiler Room	Door	Fire Door	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
306	Custodial	Wall	Concrete	-	-	Non ACM	-	-	-	-
306	Custodial	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
306	Custodial	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
307	Girls' Washroom	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
307	Girls' Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
307	Girls' Washroom	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
308	Resource Room	Floor	Vinyl Sheet Flooring	Grey and White	-	Non ACM	HM	S02	2-Dec-09	ND
308	Resource Room	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
308	Resource Room	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
308A	Closet	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
308A	Closet	Wall	Concrete	-	-	Non ACM	-	-	-	-
308A	Closet	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
309	Resource Centre	Floor	Concrete	-	-	Non ACM	-	-	-	-
309	Resource Centre	Wall	Concrete	-	-	Non ACM	-	-	-	-
309	Resource Centre	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
310	Custodial	Floor	Wood	-	-	Non ACM	-	-	-	-
310	Custodial	Floor	Vinyl Floor Tile 12" x 12"	Yellow Dense Fleck (2016)	-	Non ACM	-	-	-	-
310	Custodial	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
310	Custodial	Wall	Concrete	-	-	Non ACM	-	-	-	-
310	Custodial	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
311	WR	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
311	WR	Wall	Concrete	-	-	Non ACM	-	-	-	-
311	WR	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Fibreglass)	-	Non ACM	-	-	-	-
312	Storage	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
312	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
312	Storage	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Fibreglass)	-	Non ACM	-	-	-	-
313	Kiln Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
313	Kiln Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
313	Kiln Room	Ceiling	Plaster	-	-	Non ACM	SL	S10abc	2-Dec-09	ND
314	Office L9	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
314	Office L9	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
314	Office L9	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
314	Office L9	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
315	Office	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
315	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
315	Office	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
315	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
316	Storage	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
	Suddaby Public School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL -** Sample Location - Material Sampled **VC -** Visually Confirmed - Material not sampled, deemed ACM **NF -** Non-Friable **F-** Friable	**All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.**
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316	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
316	Storage	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
801	Corridor	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
801	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
801	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
802	Corridor	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
802	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
802	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
803	Corridor	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
803	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
803	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
803	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
804	Corridor	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
804	Corridor	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
804	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
805	Corridor	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
805	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
805	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
805	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
806	Corridor	Floor	Vinyl Floor Tile 12" x 12"	Grey Oatmeal	-	Non ACM	HM	S08	2-Dec-09	-
806	Corridor	Wall	Drywall	Drywall Joint Compound	-	Non ACM	SL	S07de	2-Dec-09	ND
806	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
808	Corridor	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
808	Corridor	Floor	Concrete	-	-	Non ACM	-	-	-	-
808	Corridor	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
808	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
808	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
808	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
808	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
808	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
809	Corridor	Floor	Concrete	-	-	Non ACM	-	-	-	-
809	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
809	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
809	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
809A	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
809A	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
809A	Stairwell	Ceiling	Metal Pan	-	-	Non ACM	-	-	-	-
809B	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
809B	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
809B	Stairwell	Ceiling	Metal Pan	-	-	Non ACM	-	-	-	-
901	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
901	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
901	Stairwell	Ceiling	Metal Pan	-	-	Non ACM	-	-	-	-
902	Stairwell	Floor	Vinyl Floor Tile 12" x 12"	Grey Dense Fleck (2016)	-	Non ACM	-	-	-	-
902	Stairwell	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
902	Stairwell	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
903	Stairwell	Floor	Vinyl Sheet Flooring	Grey and White	-	Non ACM	HM	S02	2-Dec-09	ND
903	Stairwell	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND

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903	Stairwell	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
906	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
906	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
906	Stairwell	Ceiling	Metal Pan	-	-	Non ACM	-	-	-	-
Level 1										
1	Classroom 1	Floor	Wood	-	-	Non ACM	-	-	-	-
1	Classroom 1	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
1	Classroom 1	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
1	Classroom 1	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
3	Classroom 3	Floor	Wood	-	-	Non ACM	-	-	-	-
3	Classroom 3	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
3	Classroom 3	Ceiling	Plaster	-	-	Non ACM	SL	S05c	2-Dec-09	ND
3	Classroom 3	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
4	Classroom 4	Floor	Wood	-	-	Non ACM	-	-	-	-
4	Classroom 4	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
4	Classroom 4	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
4	Classroom 4	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
4A	Classroom 4	Floor	Wood	-	-	Non ACM	-	-	-	-
4A	Classroom 4	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
4A	Classroom 4	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
4A	Classroom 4	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
5	CRS	Floor	Wood	-	-	Non ACM	-	-	-	-
5	CRS	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
5	CRS	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
5A	Washroom	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
5A	Washroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
5A	Washroom	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
6	Classroom 6	Floor	Wood	-	-	Non ACM	-	-	-	-
6	Classroom 6	Wall	Plaster	-	-	Non ACM	SL	SPS-P-S02A	4-Jun-12	ND
6	Classroom 6	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
6	Classroom 6	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
7	Kindergarten 9	Floor	Vinyl Sheet Flooring	Faux Wood Pattern (2016)	-	Non ACM	-	-	-	-
7	Kindergarten 9	Wall	Concrete	-	-	Non ACM	-	-	-	-
7	Kindergarten 9	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
7	Kindergarten 9	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Fibreglass)	-	Non ACM	-	-	-	-
7A	Kindergarten 9	Floor	Vinyl Sheet Flooring	Faux Wood Pattern (2016)	-	Non ACM	-	-	-	-
7A	Kindergarten 9	Wall	Concrete	-	-	Non ACM	-	-	-	-
7A	Kindergarten 9	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
7A	Kindergarten 9	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Fibreglass)	-	Non ACM	-	-	-	-
9	Kindergarten 9	Floor	Vinyl Sheet Flooring	Faux Wood Pattern (2016)	-	Non ACM	-	-	-	-
9	Kindergarten 9	Wall	Concrete	-	-	Non ACM	-	-	-	-
9	Kindergarten 9	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
9	Kindergarten 9	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Fibreglass)	-	Non ACM	-	-	-	-
9A	Kindergarten 9	Floor	Vinyl Sheet Flooring	Faux Wood Pattern (2016)	-	Non ACM	-	-	-	-
9A	Kindergarten 9	Wall	Concrete	-	-	Non ACM	-	-	-	-
9A	Kindergarten 9	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND

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9A	Kindergarten 9	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Fibreglass)	-	Non ACM	-	-	-	-
10	Classroom 10	Floor	Wood	-	-	Non ACM	-	-	-	-
10	Classroom 10	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
10	Classroom 10	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
10	Classroom 10	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
10	Classroom 10	Ceiling	Plaster	-	-	Non ACM	SL	SPS-P-S02C	4-Jun-12	ND
10	Classroom 10	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
10A	Washroom	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
10A	Washroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
10A	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
10A	Washroom	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
10B	Supply Room	Floor	Wood	-	-	Non ACM	-	-	-	-
10B	Supply Room	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
10B	Supply Room	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
10B	Supply Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
101	Office	Floor	Wood	-	-	Non ACM	-	-	-	-
101	Office	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
101	Office	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
101	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
101	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
102	Copy Room	Floor	Wood	-	-	Non ACM	-	-	-	-
102	Copy Room	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
102	Copy Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
102	Copy Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
102	Copy Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
103	Office	Floor	Wood	-	-	Non ACM	-	-	-	-
103	Office	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
103	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
103	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
103	Office	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
104	Washroom	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
104	Washroom	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
104	Washroom	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
104	Washroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
105	Storage	Floor	Wood	-	-	Non ACM	-	-	-	-
105	Storage	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
105	Storage	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
105	Storage	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
106	General Purpose Room	Floor	Wood	-	-	Non ACM	-	-	-	-
106	General Purpose Room	Wall	Plaster	-	-	Non ACM	SL	SPS-P-S01ABCG	4-Jun-12	ND
106	General Purpose Room	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
106	General Purpose Room	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
107	Change Room	Floor	Vinyl Floor Tile 12" x 12"	Beige with Brown	NF	ACM	SL	S04abc	2-Dec-09	3.3% Chrysotile
107	Change Room	Wall	Plaster	-	NF	ACM	SL	S05a	2-Dec-09	1.2% Chrysotile
107	Change Room	Ceiling	Plaster	-	NF	ACM	HM	S05	2-Dec-09	1.3% Chrysotile
107	Change Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
107A	Washroom	Floor	Wood	-	-	Non ACM	-	-	-	-
107A	Washroom	Wall	Plaster	-	NF	ACM	HM	S05	2-Dec-09	1.3% Chrysotile

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107A	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
107A	Washroom	Ceiling	Plaster	-	NF	ACM	HM	S05	2-Dec-09	1.3% Chrysotile
108	Stage	Floor	Wood	-	-	Non ACM	-	-	-	-
108	Stage	Wall	Plaster	-	NF	ACM	HM	S05	2-Dec-09	1.3% Chrysotile
108	Stage	Ceiling	Plaster	-	NF	ACM	HM	S05	2-Dec-09	1.3% Chrysotile
109	Change Room	Floor	Wood	-	-	Non ACM	-	-	-	-
109	Change Room	Wall	Plaster	-	NF	ACM	HM	S05	2-Dec-09	1.3% Chrysotile
109	Change Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
109	Change Room	Ceiling	Plaster	-	NF	ACM	HM	S05	2-Dec-09	1.3% Chrysotile
109A	Washroom	Floor	Wood	-	-	Non ACM	-	-	-	-
109A	Washroom	Wall	Plaster	-	NF	ACM	HM	S05	2-Dec-09	1.3% Chrysotile
109A	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
109A	Washroom	Ceiling	Plaster	-	NF	ACM	HM	S05	2-Dec-09	1.3% Chrysotile
110	Custodial	Floor	Wood	-	-	Non ACM	-	-	-	-
110	Custodial	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
110	Custodial	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
111	Storage	Floor	Wood	-	-	Non ACM	-	-	-	-
111	Storage	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
111	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
111	Storage	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
112	Office	Floor	Vinyl Floor Tile 12" x 12"	Beige with Brown	NF	ACM	HM	S04	2-Dec-09	3.3% Chrysotile
112	Office	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
112	Office	Ceiling	Ceiling Tile 2' x 4'	Cellulose	-	Non ACM	-	-	-	-
113	Office	Floor	Vinyl Floor Tile 12" x 12"	Beige with Brown	NF	ACM	HM	S04	2-Dec-09	3.3% Chrysotile
113	Office	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
113	Office	Ceiling	Ceiling Tile 2' x 4'	Cellulose	-	Non ACM	-	-	-	-
114	Supply Room	Floor	Wood	-	-	Non ACM	-	-	-	-
114	Supply Room	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
114	Supply Room	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
810	Corridor	Floor	Wood	-	-	Non ACM	-	-	-	-
810	Corridor	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
810	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
811	Entrance	Floor	Wood	-	-	Non ACM	-	-	-	-
811	Entrance	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
811	Entrance	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
812	Stairwell	Floor	Wood	-	-	Non ACM	-	-	-	-
812	Stairwell	Wall	Plaster	-	NF	ACM	SL	S05b	2-Dec-09	1.3% Chrysotile
812	Stairwell	Ceiling	Plaster	-	NF	ACM	HM	S05	2-Dec-09	1.3% Chrysotile
812	Stairwell	Ceiling	Plaster	-	-	Non ACM	SL	S01DE	22-Jun-12	ND
813	Classroom 10	Floor	Wood	-	-	Non ACM	-	-	-	-
813	Classroom 10	Floor	Vinyl Sheet Flooring	Beige	-	Non ACM	SL	S01abc	2-Dec-09	ND
813	Classroom 10	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
813	Classroom 10	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S07	2-Dec-09	ND
813	Classroom 10	Ceiling	Plaster	-	-	Non ACM	SL	SPS-P-S02C	4-Jun-12	ND
813	Classroom 10	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
901	Stairwell	Floor	Wood	-	-	Non ACM	-	-	-	-
901	Stairwell	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
901	Stairwell	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND

	School Name	Legend:	Notes:
	Suddaby Public School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **NF** - Non-Friable **F-** Friable	**All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.**
	Date Built:		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**
	Original: 1857		
	Addition(s): 1876, 1922		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
902	Entrance	Floor	Vinyl Sheet Flooring	Orange	-	Non ACM	HM	S03	2-Dec-09	ND
902	Entrance	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
902	Entrance	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
902	Entrance	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
903	Side Entrance	Floor	Vinyl Sheet Flooring	Grey with White	-	Non ACM	SL	S02abc	2-Dec-09	ND
903	Side Entrance	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
903	Side Entrance	Ceiling	Ceiling Tile 2' x 2'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
903	Side Entrance	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
Level 2										
11	Office	Floor	Wood	-	-	Non ACM	-	-	-	-
11	Office	Wall	Plaster	-	-	Non ACM	SL	SPS-P-S01D	4-Jun-12	ND
11	Office	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
11	Office	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
11	Office	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
12	Classroom 12	Floor	Wood	-	-	Non ACM	-	-	-	-
12	Classroom 12	Wall	Plaster	-	-	Non ACM	SL	SPS-P-S01E	4-Jun-12	ND
12	Classroom 12	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
12	Classroom 12	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
13	Education Museum	Floor	Wood	-	-	Non ACM	-	-	-	-
13	Education Museum	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
13	Education Museum	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
14	Resource	Floor	Wood	-	-	Non ACM	-	-	-	-
14	Resource	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
14	Resource	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
14	Resource	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
15	Classroom 15	Floor	Wood	-	-	Non ACM	-	-	-	-
15	Classroom 15	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
15	Classroom 15	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
16	Classroom 16	Floor	Wood	-	-	Non ACM	-	-	-	-
16	Classroom 16	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
16	Classroom 16	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
17	Classroom 17	Floor	Wood	-	-	Non ACM	-	-	-	-
17	Classroom 17	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
17	Classroom 17	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
17A	Coat Room	Floor	Wood	-	-	Non ACM	-	-	-	-
17A	Coat Room	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
17A	Coat Room	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
18	Classroom 18	Floor	Wood	-	-	Non ACM	-	-	-	-
18	Classroom 18	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
18	Classroom 18	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
19	Classroom 19	Floor	Wood	-	-	Non ACM	-	-	-	-
19	Classroom 19	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
19	Classroom 19	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
20	Workroom	Floor	Wood	-	-	Non ACM	-	-	-	-
20	Workroom	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
20	Workroom	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND

	School Name	Legend:	Notes:
	Suddaby Public School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **NF** - Non-Friable **F**- Friable	**All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.** **Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**
	Date Built:		
	Original: 1857		
	Addition(s): 1876, 1922		

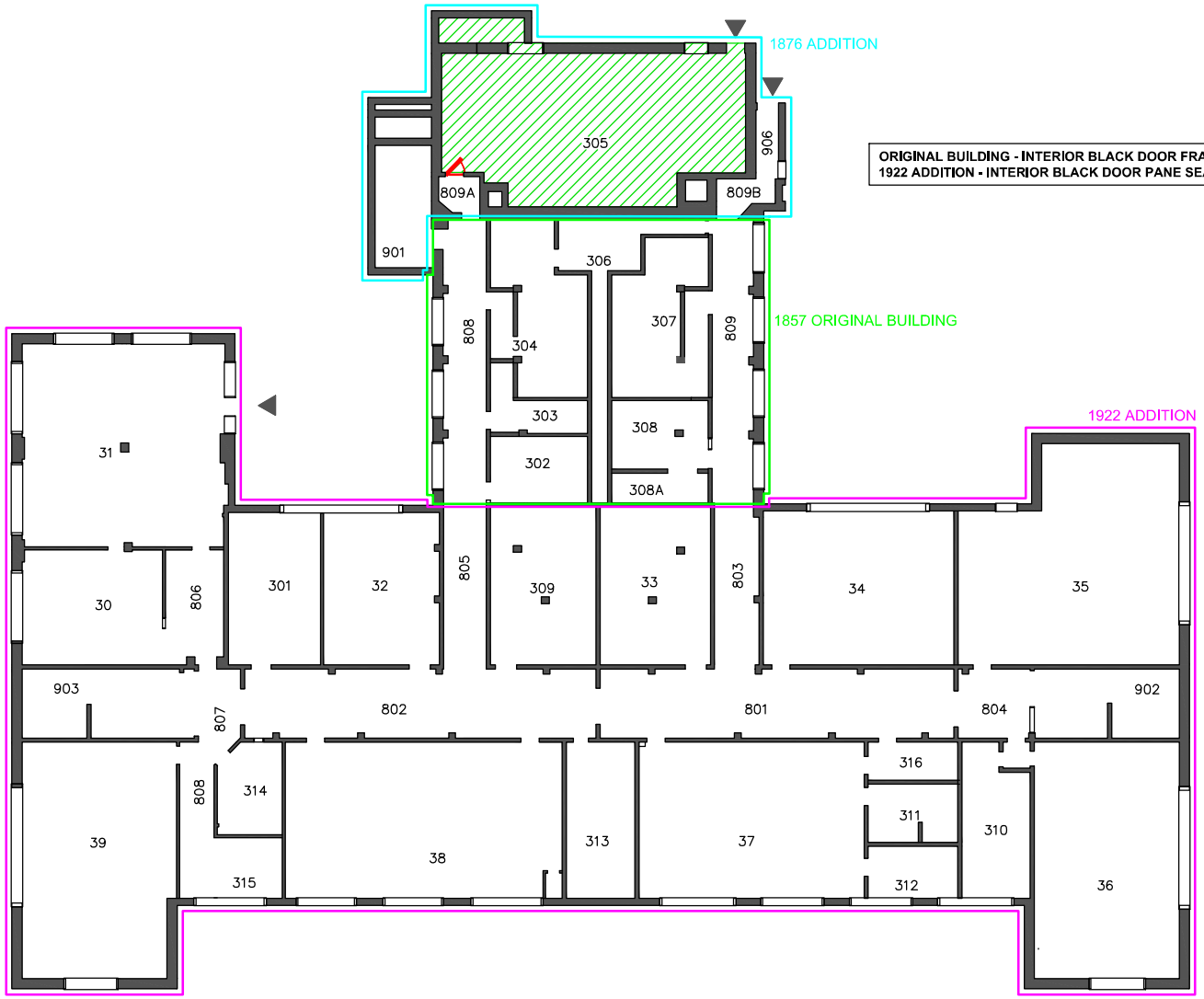
WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
21	Classroom 21	Floor	Wood	-	-	Non ACM	-	-	-	-
21	Classroom 21	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
21	Classroom 21	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
22	Library	Floor	Wood	-	-	Non ACM	-	-	-	-
22	Library	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
22	Library	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
24	Classroom 14	Floor	Wood	-	-	Non ACM	-	-	-	-
24	Classroom 14	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
24	Classroom 14	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
25	Staff room	Floor	Wood	-	-	Non ACM	-	-	-	-
25	Staff room	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
25	Staff room	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
26	Classroom 26	Floor	Wood	-	-	Non ACM	-	-	-	-
26	Classroom 26	Wall	Plaster	-	-	Non ACM	SL	SPS-P-S02D	4-Jun-12	ND
26	Classroom 26	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
201	Kitchen	Floor	Wood	-	-	Non ACM	-	-	-	-
201	Kitchen	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
201	Kitchen	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
202	Storage	Floor	Wood	-	-	Non ACM	-	-	-	-
202	Storage	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
202	Storage	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
203	Custodial	Floor	Wood	-	-	Non ACM	-	-	-	-
203	Custodial	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
203	Custodial	Ceiling	Plaster	-	-	Non ACM	SL	S05e	2-Dec-09	ND
204	Washroom	Floor	Wood	-	-	Non ACM	-	-	-	-
204	Washroom	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
204	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
205	Corridor/WR	Floor	Wood	-	-	Non ACM	-	-	-	-
205	Workroom	Floor	Wood	-	-	Non ACM	-	-	-	-
205	Corridor/WR	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
205	Workroom	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
205	Corridor/WR	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
205	Workroom	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
820	Corridor	Floor	Wood	-	-	Non ACM	-	-	-	-
820	Corridor	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
820	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
17A	Coat Room	Floor	Wood	-	-	Non ACM	-	-	-	-
17A	Coat Room	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
17A	Coat Room	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
821A	Corridor	Floor	Wood	-	-	Non ACM	-	-	-	-
821A	Corridor	Wall	Plaster	-	-	Non ACM	SL	SPS-P-S01F	4-Jun-12	ND
821A	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
821A	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
821B	Corridor	Floor	Wood	-	-	Non ACM	-	-	-	-
821B	Corridor	Wall	Plaster	-	-	Non ACM	SL	SPS-P-S01F	4-Jun-12	ND
821B	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
821B	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S02	4-Jun-12	ND
821C	Hallway	Floor	Wood	-	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
	Suddaby Public School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL -** Sample Location - Material Sampled **VC -** Visually Confirmed - Material not sampled, deemed ACM **NF -** Non-Friable **F-** Friable	**All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.**
	Date Built:		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**
	Original: 1857		
	Addition(s): 1876, 1922		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
821C	Hallway	Wall	Drywall	-	-	Non ACM	SL	S07abc	2-Dec-09	ND
821C	Hallway	Ceiling	Drywall	-	-	Non ACM	HM	S07abc	2-Dec-09	ND
821D	Hallway	Floor	Wood	-	-	Non ACM	-	-	-	-
821D	Hallway	Wall	Drywall	-	-	Non ACM	SL	S07abc	2-Dec-09	ND
821D	Hallway	Ceiling	Drywall	-	-	Non ACM	HM	S07abc	2-Dec-09	ND
822	Corridor	Floor	Wood	-	-	Non ACM	-	-	-	-
822	Corridor	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
822	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
823	Corridor/WR	Floor	Wood	-	-	Non ACM	-	-	-	-
823	Corridor/WR	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
823	Corridor/WR	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
824	Corridor	Floor	Wood	-	-	Non ACM	-	-	-	-
824	Corridor	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
824	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
901	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
901	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
901	Stairwell	Ceiling	Metal Pan	-	-	Non ACM	-	-	-	-
902	Stairwell	Floor	Wood	-	-	Non ACM	-	-	-	-
902	Stairwell	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
902	Stairwell	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
903	Stairwell	Floor	Wood	-	-	Non ACM	-	-	-	-
903	Stairwell	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
903	Stairwell	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
904	Stairwell	Floor	Wood	-	-	Non ACM	-	-	-	-
904	Stairwell	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
904	Stairwell	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
905	Stairwell	Floor	Wood	-	-	Non ACM	-	-	-	-
905	Stairwell	Wall	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
905	Stairwell	Ceiling	Plaster	-	-	Non ACM	HM	SPS-P-S01	4-Jun-12	ND
-	Fan Room	Floor	Wood	-	-	Non ACM	-	-	-	-
-	Fan Room	Wall	Concrete	-	-	Non ACM	SL	S06abc	2-Dec-09	ND
-	Fan Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
-	Fan Room	Ducting	Flex Joint	-	-	Non ACM	HM	S15ABC	2-Dec-09	ND
Summary of Potential ACM Hidden or Not Assessed										
	Throughout Building	Not Inspected	Not Inspected	Wall Cavity Insulation						
	Throughout Building	Not Inspected	Not Inspected	Door Core Insulation						

Appendix B

Figures



NOTES:

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

ALL KNOWN OR SUSPECT ASBESTOS-CONTAINING MATERIALS AND/OR DESIGNATED MATERIALS ARE NOT DEPICTED ON THIS DRAWING. REFER TO THE REPORT FOR A COMPLETE LIST OF IDENTIFIED MATERIALS.

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

Legend

- 13 Fixed Reference Number
- No Access
- Post 2011 Construction

Asbestos-Containing Materials (ACM):

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

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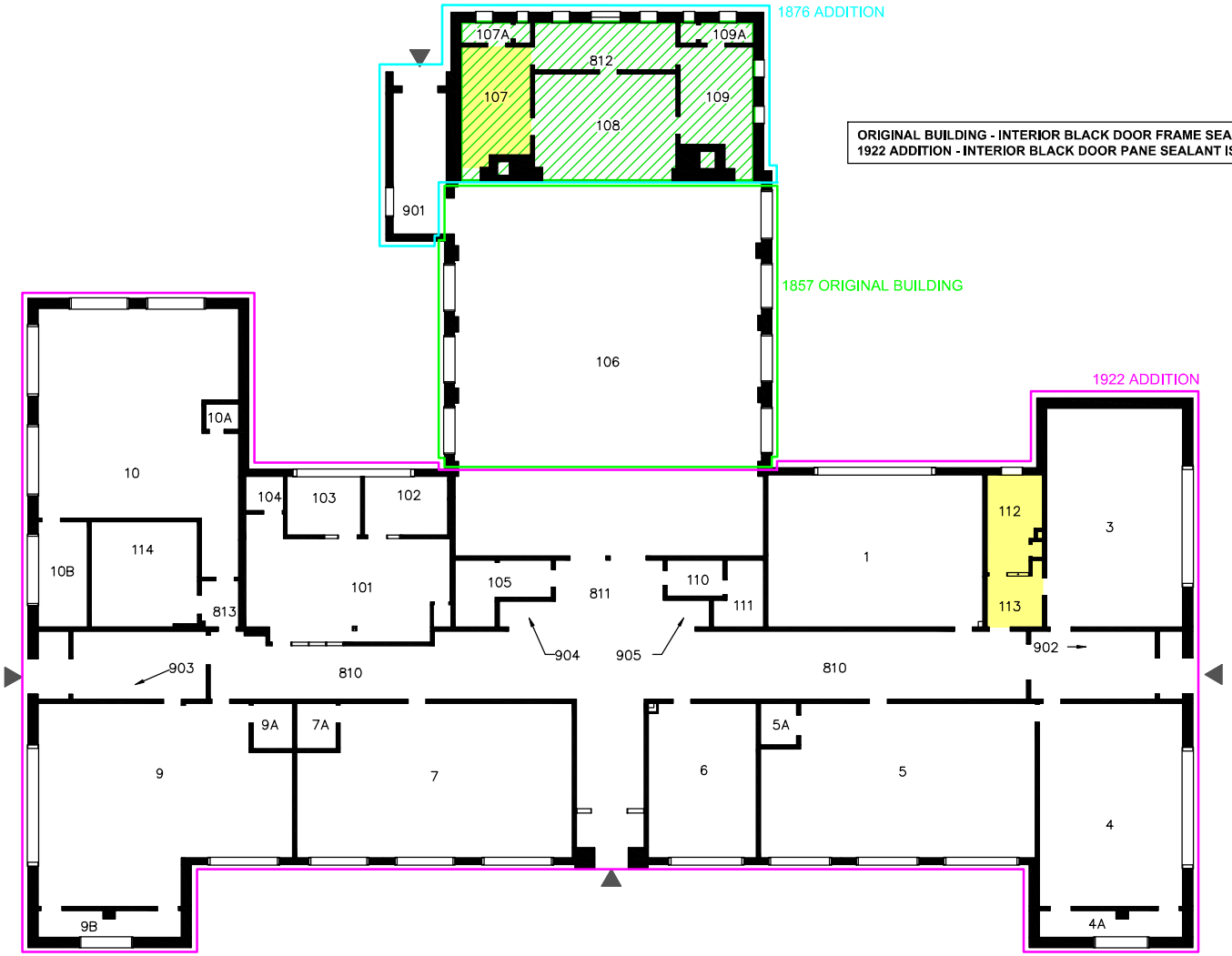
WATERLOO REGION DISTRICT SCHOOL BOARD

PROJECT
2020 ASBESTOS AUDIT UPDATE

DRAWING
SUDDABY PUBLIC SCHOOL

BASEMENT

Project Manager	P. Semeniuk	Date	October 2020
Design By	WRDSB	Project No.	34532-919
Drawn By	S-P. Lemieux	Drawing No.	1.0
Scale	N.T.S.		



ORIGINAL BUILDING - INTERIOR BLACK DOOR FRAME SEALANT IS ACM.
1922 ADDITION - INTERIOR BLACK DOOR PANE SEALANT IS ACM.

NOTES:

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Legend

- 13 Fixed Reference Number
- No Access
- Post 2011 Construction

Asbestos-Containing Materials (ACM):

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

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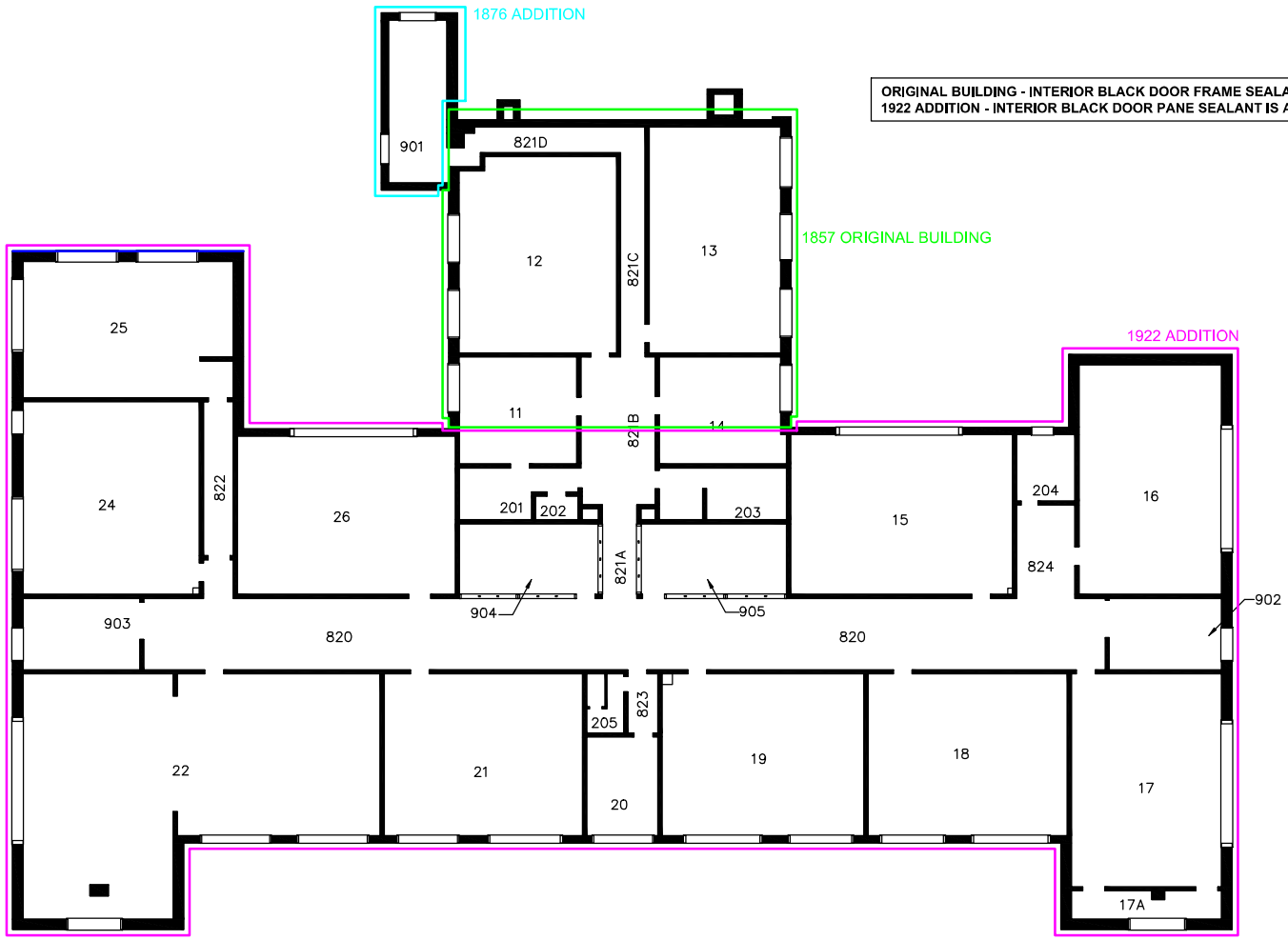
PROJECT
2020 ASBESTOS AUDIT UPDATE

DRAWING
SUDDABY PUBLIC SCHOOL

FIRST FLOOR

Project Manager	P. Semeniuk	Date	October 2020
Design By	WRDSB	Project No.	34532-919
Drawn By	S-P. Lemieux	Drawing No.	1.1
Scale	N.T.S.		



NOTES:

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

Legend

- 13 Fixed Reference Number
- No Access
- Post 2011 Construction

Asbestos-Containing Materials (ACM):

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

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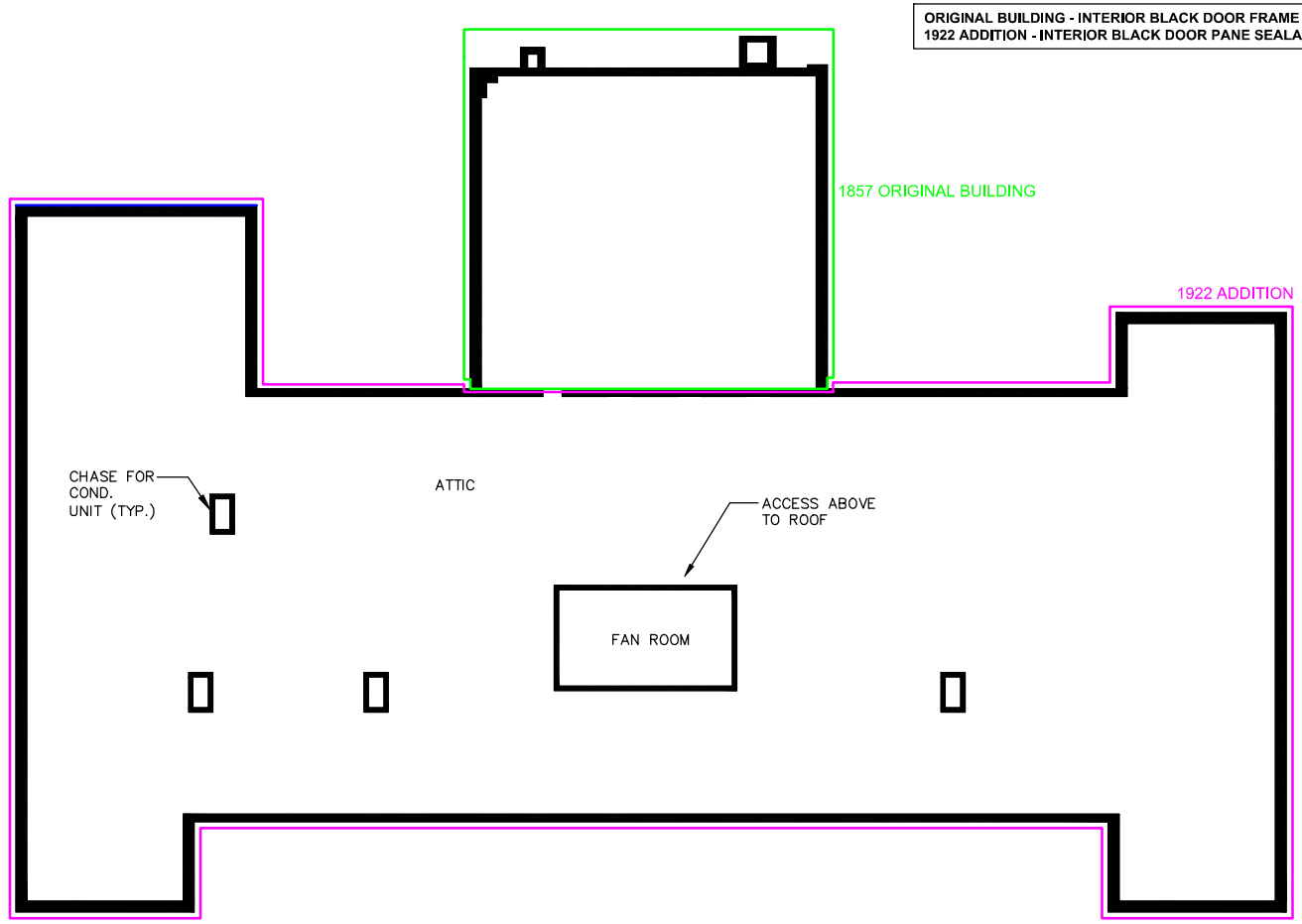
WATERLOO REGION DISTRICT SCHOOL BOARD

PROJECT
2020 ASBESTOS AUDIT UPDATE

DRAWING
SUDDABY PUBLIC SCHOOL

SECOND FLOOR

Project Manager	P. Semeniuk	Date	October 2020
Design By	WRDSB	Project No.	34532-919
Drawn By	S-P. Lemieux	Drawing No.	1.2
Scale	N.T.S.		



NOTES:

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

ALL KNOWN OR SUSPECT ASBESTOS-CONTAINING MATERIALS AND/OR DESIGNATED MATERIALS ARE NOT DEPICTED ON THIS DRAWING. REFER TO THE REPORT FOR A COMPLETE LIST OF IDENTIFIED MATERIALS.

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

Legend

- 13 Fixed Reference Number
- No Access
- Post 2011 Construction

Asbestos-Containing Materials (ACM):

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

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WATERLOO REGION DISTRICT SCHOOL BOARD

PROJECT
2020 ASBESTOS AUDIT UPDATE

DRAWING
SUDDABY PUBLIC SCHOOL

THIRD FLOOR

Project Manager	P. Semeniuk	Date	October 2020
Design By	WRDSB	Project No.	34532-919
Drawn By	S-P. Lemieux	Drawing No.	1.3
Scale	N.T.S.		

Appendix C

Tables

TABLE 1 - INTERNAL ABATEMENT MANAGEMENT							
Suddaby Public School							
Material	**WRDSB Fixed Reference Number**	**MTE Functional Space Number**	**Material Description**	**Approximate Quantity**	**Photograph - Context**	**Photograph - Detail**	**Required Action**
Asbestos Non-Friable	305	B1039	Plaster Ceiling	<0.5 m^2			Monitor Annually
Asbestos Non-Friable	112	1026	9"x9" Floor Tiles - Cream with Brown Streak	2 Tiles			Monitor Annually
Asbestos Non-Friable	107	1032	9"x9" Floor Tiles - Cream with Brown Streak	1 Tile			Monitor Annually
Asbestos Non-Friable	812	1035	Plaster Ceiling	<1 m^2			Monitor Annually

TABLE 1 - INTERNAL ABATEMENT MANAGEMENT

Suddaby Public School

Material	WRDSB Fixed Reference Number	MTE Functional Space Number	Material Description	Approximate Quantity	Photograph - Context	Photograph - Detail	Required Action
Asbestos Non-Friable	812	1035	Plaster Wall	<3 m^2			Monitor Annually

Notes:
1) A copy of this report should be provided to all prospective contractors prior to tender or quotation, in accordance with Section 30 of the Occupational Health and Safety Act.
2) Recommended actions are the minimum required actions, as prescribed by the appropriate Acts, regulations, guidelines, standards, codes and general best practice measures. The Contractor may choose to alter the approach and combine or break out sections of work. This is acceptable provided that the appropriate Acts, regulations, guidelines, standards and codes are followed and afford protection for the health and safety of workers, occupants and the public that is at least equal to the protection that would be provided by complying with the minimum requirements.
3) All waste generated is subject to characterization and disposal in accordance with Ontario Regulation 347.

TABLE 2 - EXTERNAL ABATEMENT MANAGEMENT

Suddaby Public School

Material	WRDSB Fixed Reference Number	MTE Functional Space Number	Material Description	Approximate Quantity	Photograph - Context	Photograph - Detail	Required Action
None Identified During Inspection							

Notes:
1) A copy of this report should be provided to all prospective contractors prior to tender or quotation, in accordance with Section 30 of the Occupational Health and Safety Act.
2) Recommended actions are the minimum required actions, as prescribed by the appropriate Acts, regulations, guidelines, standards, codes and general best practice measures. The Contractor may choose to alter the approach and combine or break out sections of work. This is acceptable provided that the appropriate Acts, regulations, guidelines, standards and codes are followed and afford protection for the health and safety of workers, occupants and the public that is at least equal to the protection that would be provided by complying with the minimum requirements.
3) All waste generated is subject to characterization and disposal in accordance with Ontario Regulation 347.

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY					
Sample #	**Location**	**Material Description**	**Asbestos Content (%)**	**Fibre Type**	**Is Material ACM**
2009 Asbestos Audit Update					
S01-A	1013	Rolled Linoleum - Beige	ND	-	No
S01-B	1013	Rolled Linoleum - Beige	ND	-	No
S01-C	1013	Rolled Linoleum - Beige	ND	-	No
S02-A	1010	Rolled Linoleum - Grey with White	ND	-	No
S02-B	1010	Rolled Linoleum - Grey with White	ND	-	No
S02-C	1010	Rolled Linoleum - Grey with White	ND	-	No
S03-A	1005	Rolled Linoleum - Orange	ND	-	No
S03-B	1005	Rolled Linoleum - Orange	ND	-	No
S03-C	1005	Rolled Linoleum - Orange	ND	-	No
S04-A	**1032**	**12x12 Floor Tile - Beige with Brown Streaks**	**3.3**	**Chrysotile**	**Yes**
S04-B	**1032**	**12x12 Floor Tile - Beige with Brown Streaks**	**NA**	**Chrysotile**	**Yes**
S04-C	**1032**	**12x12 Floor Tile - Beige with Brown Streaks**	**NA**	**Chrysotile**	**Yes**
S04-C	1032	Mastic - Black	ND	-	No
S05-A	**1032**	**Wall Plaster (1876 Addition) - White**	**1.2**	**Chrysotile**	**Yes**
S05-A	1032	Wall Plaster (1876 Addition) - Light Tan Texture	ND	-	No
S05-B	**1035**	**Wall Plaster (1876 Addition) - White**	**1.3**	**Chrysotile**	**Yes**
S05-B	1035	Wall Plaster (1876 Addition) - Off-White Texture	ND	-	No
S05-B	1035	Wall Plaster (1876 Addition) - White/Tan	ND	-	No
S05-C	1027	Wall Plaster (1922 Addition) - White	ND	-	No
S05-D	2008	Wall Plaster (1922 Addition) - White	ND	-	No
S05-E	2022	Ceiling Plaster (1922 Addition) - White	ND	-	No
S05-F	B1001	Ceiling Plaster (1922 Addition) - White/Tan	ND	-	No
S05-G	B1027	Wall Plaster (1922 Addition) - Tan	ND	-	No
S05-G	B1027	Wall Plaster (1922 Addition) - Off-White Texture	ND	-	No
S06-A	Fan Room	Textured Concrete	ND	-	No
S06-B	Fan Room	Textured Concrete	ND	-	No
S06-C	Fan Room	Textured Concrete	ND	-	No
S07-A	2029	Drywall Joint Compound	ND	-	No
S07-B	2029	Drywall Joint Compound	ND	-	No
S07-C	2029	Drywall Joint Compound	ND	-	No
S07-D	B1025	Drywall Joint Compound	ND	-	No
S07-E	B1025	Drywall Joint Compound	ND	-	No
S08-A	B1026	12x12 Floor Tile - Grey Oatmeal	ND	-	No
S08-B	B1026	12x12 Floor Tile - Grey Oatmeal	ND	-	No
S08-C	B1026	12x12 Floor Tile - Grey Oatmeal	ND	-	No
S09-A	B1007	12x12 Floor Tile - Beige Oatmeal	ND	-	No
S09-A	B1007	Mastic - Black	ND	-	No
S09-B	B1007	12x12 Floor Tile - Beige Oatmeal	ND	-	No
S09-C	B1007	12x12 Floor Tile - Beige Oatmeal	ND	-	No
S10-A	B1008	Ceiling Plaster (1922 Addition)	ND	-	No
S10-B	B1008	Ceiling Plaster (1922 Addition)	ND	-	No
S10-C	B1008	Ceiling Plaster (1922 Addition)	ND	-	No
S11-A	B1014	9x9 Floor Tile - Tan with White Streaks	<0.25	Chrysotile	No
S11-B	B1014	9x9 Floor Tile - Tan with White Streaks	<0.25	Chrysotile	No
S11-C	B1014	9x9 Floor Tile - Tan with White Streaks	<0.25	Chrysotile	No
2011 Limited Designated Substance Audit					
S12-A	Roof	Roof Underlayment	ND	-	No
S12-B	Roof	Roof Underlayment	ND	-	No
S12-C	Roof	Roof Underlayment	ND	-	No
S13-A	Roof	Caulk - Tan/Yellow	ND	-	No
S13-B	Roof	CaulkTan/Yellow	ND	-	No
S13-C	Roof	CaulkTan/Yellow	ND	-	No
S14-A	Roof	Caulk - Black	ND	-	No
S14-B	Roof	Caulk - Black	ND	-	No
S14-C	Roof	Caulk - Black	ND	-	No
S15-A	Roof	Expansion Joint - Black	ND	-	No
S15-B	Roof	Expansion Joint - Black	ND	-	No

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY					
Sample #	**Location**	**Material Description**	**Asbestos Content (%)**	**Fibre Type**	**Is Material ACM**
S15-C	Roof	Expansion Joint - Black	ND	-	No
S16-A	Roof	Expansion Joint - Yellowed	ND	-	No
S16-B	Roof	Expansion Joint - Yellowed	ND	-	No
S16-C	Roof	Expansion Joint - Yellowed	ND	-	No
S17-A	1001	Caulk - Tan/Clear	ND	-	No
S17-A	1001	Caulk - Tan/Clear	ND	-	No
S17-A	1001	Caulk - Tan/Clear	ND	-	No
S18-A	Exterior of 1013	Caulk - White	ND	-	No
S18-B	Exterior of 1013	Caulk - White	ND	-	No
S18-C	Exterior of 1013	Caulk - White	ND	-	No
S19-A	Exterior of 1000	Caulk - Off-White	ND	-	No
S19-B	Exterior of 1000	Caulk - Off-White	ND	-	No
S19-C	Exterior of 1000	Caulk - Off-White	ND	-	No
2012 Additional Sampling - May 18					
S20-A	1876 Addition	Flat Roofing Materials - Layer 1	ND	-	No
S20-B	1876 Addition	Flat Roofing Materials - Layer 1	ND	-	No
S20-C	1876 Addition	Flat Roofing Materials - Layer 1	ND	-	No
S20-A	1876 Addition	Flat Roofing Materials - Layer 2	ND	-	No
S20-B	1876 Addition	Flat Roofing Materials - Layer 2	ND	-	No
S20-C	1876 Addition	Flat Roofing Materials - Layer 2	ND	-	No
2012 Additional Sampling - June 4					
SPS-P-S01A	1028	Plaster (1857 Building)	ND	-	No
SPS-P-S01B	1028	Plaster (1857 Building)	ND	-	No
SPS-P-S01C	1028	Plaster (1857 Building)	ND	-	No
SPS-P-S01D	2024	Plaster (1857 Building)	ND	-	No
SPS-P-S01E	2027	Plaster (1857 Building)	ND	-	No
SPS-P-S01F	2026	Plaster (1857 Building)	ND	-	No
SPS-P-S01G	1028	Plaster (1857 Building)	ND	-	No
SPS-P-S02A	1004	Plaster (1922 Addition)	ND	-	No
SPS-P-S02B	1001	Plaster (1922 Addition)	ND	-	No
SPS-P-S02C	1013	Plaster (1922 Addition)	ND	-	No
SPS-P-S02D	2016	Plaster (1922 Addition)	ND	-	No
2012 Additional Sampling - June 21					
S.01a	B1039	Refractory - Grey Hard Boiler Refractory	ND	-	
S.01a	**B1039**	**Refractory - Beige Soft Boiler Refractory**	**5**	**Chrysotile, <0.5 Actinolite/Tremolite**	**Yes**
S.01b	**B1039**	**Refractory - Beige Soft Boiler Refractory**	**NA**	**Chrysotile, <0.5 Actinolite/Tremolite**	**Yes**
S.01c	**B1039**	**Refractory - Beige Soft Boiler Refractory**	**NA**	**Chrysotile, <0.5 Actinolite/Tremolite**	**Yes**
2012 Additional Sampling - June 22					
S01A	B1039	Plaster (1876 Addition) - Ceiling	ND	-	No
S01B	**B1039**	**Plaster (1876 Addition) - Ceiling**	**1**	**Chrysotile**	**Yes**
S01C	**B1039**	**Plaster (1876 Addition) - Ceiling**	**1**	**Chrysotile**	**Yes**
S01D	1035	Plaster (1876 Addition) - Grey Ceiling	ND	-	No
S01D	1035	Plaster (1876 Addition) - White Ceiling	ND	-	No
S01E	1035	Plaster (1876 Addition) - Grey Ceiling	ND	-	No
S01E	1035	Plaster (1876 Addition) - White Ceiling	ND	-	No
S01A	B1039	Refractory - Chimney Refractory Brick	<0.5	Chrysotile	No
S01B	B1039	Refractory - Chimney Refractory Brick	ND	-	No
S01C	B1039	Refractory - Chimney Refractory Brick	ND	-	No
2019 Additional Sampling					
001a	B1014	Floor Tile Black Mastic	ND	-	No
001b	B1014	Floor Tile Black Mastic	ND	-	No
001c	B1014	Floor Tile Black Mastic	ND	-	No
2020 Asbestos Audit Update					
S01A	Room B1001 (1922)	Interior Window Sealant - White	ND	-	No
S01B	Room B1001 (1922)	Interior Window Sealant - White	ND	-	No
S01C	Room B1001 (1922)	Interior Window Sealant - White	ND	-	No
S02A	**Room B1006 (1922)**	**Interior Door Pane Sealant - Black**	**3**	**Chrysotile**	**Yes**
S02B	**Room B1006 (1922)**	**Interior Door Pane Sealant - Black**	**NA**	**Chrysotile**	**Yes**

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY

Sample #	Location	Material Description	Asbestos Content (%)	Fibre Type	Is Material ACM
S02C	**Room B1006 (1922)**	**Interior Door Pane Sealant - Black**	**NA**	**Chrysotile**	**Yes**
S03A	Room 1002 (1922)	Drywall Joint Compound - White	ND	-	No
S04A	Room B1025 (1922)	Floor Tile Mastic - Brown	ND	-	No
S04B	Room B1025 (1922)	Floor Tile Mastic - Brown	ND	-	No
S04C	Room B1025 (1922)	Floor Tile Mastic - Brown	ND	-	No
S05A	Room 1028 (1857)	Interior Door Sealant - White	ND	-	No
S05B	Room 1028 (1857)	Interior Door Sealant - White	ND	-	No
S05C	Room 1028 (1857)	Interior Door Sealant - White	ND	-	No
S06A	**Room 1028 (1857)**	**Interior Door Sealant - Black**	**1**	**Chrysotile**	**Yes**
S06B	**Room 1028 (1857)**	**Interior Door Sealant - Black**	**NA**	**Chrysotile**	**Yes**
S06C	**Room 1028 (1857)**	**Interior Door Sealant - Black**	**NA**	**Chrysotile**	**Yes**
S07A	Room 1002 (1922)	Exterior Window Sealant - White	ND	-	No
S07B	Room 1002 (1922)	Exterior Window Sealant - White	ND	-	No
S07C	Room 1002 (1922)	Exterior Window Sealant - White	ND	-	No
S08A	Room 1002 (1922)	Exterior Door Sealant - White	ND	-	No
S08B	Room 1002 (1922)	Exterior Door Sealant - White	ND	-	No
S08C	Room 1002 (1922)	Exterior Door Sealant - White	ND	-	No

NA: Not Analyzed due to stop positive method **ND**: No asbestos fibres detected above the laboratory minimum detection limit

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

24-7547-RFT - Suddaby Public School - New Elevator, Sprinklers, and Accessibility

Opening Date: March 19, 2024 4:00 PM

Closing Date: April 10, 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	Suddaby Public School - New Elevator, Sprinklers, and Accessibility 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.		