Waterloo Region
District School Board

REQUEST FOR TENDER

25-7636-RFT

Forest Heights Collegiate Institute Tech Room Revitalization

and Partial Window Replacement

ISSUE DATE: Wl·ydzl·Wè om, 2025

ELECTRONIC SUBMISSIONS will be received by the Bidding System no later than **2:00 p.m. local time, on February 20, 2025.**

DIVISION 00 – BIDDING AND CONTRACT DOCUMENTS

00 01 00 Consultant/Professional Seals

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

1.1.1 **CONSULTANT'S SEAL**

KINGSLAND + Architects Inc.

This seal governs all Architectural Sections of these specifications.

Excluded are the following:

Mechanical, and Electrical specifications

END OF SECTION

DIVISION 00 – BIDDING AND CONTRACT DOCUMENTS

00 21 13 Instructions to Bidders

1. Designated Representative

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

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

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

2. Consultant

The Board has hired the following architect/consultant to assist in the preparation of this Tender: **KINGSLAND +** 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, 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 Representative listed above. Any attempt by a Bidder to bypass or influence the procurement process may result in disqualification of the Bidder and the rejection of the Bidder's submission.

The 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.

5. Doing Business with the Waterloo Region District School Board

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

WRDSB competitive opportunities are posted on the Electronic Bidding System, bids&tenders/wrdsb.

The WRDSB only accept electronic Bid Submissions submitted through the Electronic Bidding System, bids&tenders/wrdsb

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

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	January 31, 2025
Non-Mandatory Pre-Bid Site Examination	Date: Tuesday, February 11, 2025 Time: 3:00 PM Address: 255 Fischer Hallman Road Meeting Area: Main Office
Deadline for Questions	February 17, 2025
Closing Date and Time	February 20, 2025, 2:00 pm local time
Anticipated Contract Start / Work begins	July 01, 2025, Controls May 9, 2025
Substantial Completion Date	Classrooms August 25, 2025. HVAC September 30, 2025
Ready for Takeover	August 31, 2025
Deemed Complete Date	August 31, 2025 including fresh air, October 17, 2025. Contractor responsible for temp heat beyond this date if required

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. Exclusive of the HST, or other similar taxes.

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

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

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

vii. All information required on the forms shall be completed in full including references and Sub-contractors that it proposes to use for Work described. Changes made to the list of nominated Sub-contractors after the closing of the Bid, must have prior written approval of the Board's Single Point of Contact.

viii. 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.

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

x. Provisional or Optional 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 Optional items are not purchased, or quantities are less than estimated, no adjustment or compensation will be awarded to the Bidder by the Board. Optional pricing is not used for comparison of Bids for award purpose.

12. 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.

13. 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.

14. Irrevocable Period

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

15. 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).

16. 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.

17. 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.

vii. The Board may request a meeting with Bidders.

18. Post-Award Meeting

A post-award meeting may be held consisting of the successful 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.

19. Intent to Award

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

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

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

iii. If instructed, within twenty-four (24) hours, excluding hours occurring during a Saturday, Sunday, or a legal holiday, of receiving a request or intent to award from the Board, the Bidder (the "Recommended Bidder") shall provide a list of all Subcontractors/Subconsultants that it proposes to use for all Work described in this Procurement including the Company Name, Sub Trade Category and if applicable, related Divisions.

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

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

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

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

20. Post Award

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.

21. Award Posting Notification

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

END OF SECTION

00 21 14 – General Contractors and Subcontractors

1.0 General Contractors

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

1.2 A Site Supervisor and Project Manager, assigned to manage and supervise the Work, must be named in the Bidder's Contact Information Specification section through the electronic Bidding System only and include resumes. Personnel will be subject to approval by the Board and cannot be changed without prior written approval from the Board.

2.0 Subcontractors/Subconsultants

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

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

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

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

2.5.1 Bidders shall select experienced and qualified Subcontractor/Subconsultant or Suppliers in their field to perform or supply an item of Work indicated in this Procurement.

2.5.2 The Bidder shall be fully aware of the capability of each Subcontractor/Subconsultant and/or Supplier included in its bid, including but not limited to technical ability, financial stability and ability to maintain the proposed construction schedule.

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

2.5.4 The Owner reserves the right to obtain information from the Bidder and from third parties respecting the qualifications and experience of the Bidder's nominated list of Subcontractor/Subconsultant for such item of the Work.

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

2.5.6 The substitution of any Subcontractor/Subconsultant and/or Suppliers after the list is submitted will not be accepted unless a valid reason is given in writing to and approved by the Owner, whose approval may be arbitrarily withheld.

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

2.5.8 Where "own forces" have been listed by a bidder, the Owner reserves the right to obtain information from the bidder and from third parties respecting the qualifications and experience of the bidder's "own forces" for such item of the Work.

END OF SECTION

00 21 15 – Scope of Work

The work entails renovations in the Tech Shop wing of the school and existing Staff Room that includes the following work as outlined in the architectural, structural, mechanical and electrical documents included within this tender:

- Some interior masonry partitions demolition and replacement masonry work
- Sound insulated gypsum board partitions.
- Removal of some existing HV equipment and installation of new HVAC roof top units and associated mechanical and electrical work
- BUR roofing work at new HVAC units
- Removal of existing lighting and installation of ne LED lighting
- Exterior steel window removal and replacement with new aluminum windows
- Window blinds.
- New wood flooring in areas and refinishing existing wood flooring
- Painting all walls, existing roof structure and deck and areas of renovation
- New millwork
- New LVT flooring in Staff Room

END OF SECTION

00 31 34 – Subsurface Investigation Report – NOT APPLICABLE

1.0 General

1.1. Related Sections

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

1.2. SUBSURFACE INVESTIGATION REPORT

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

.1 Title:

.2 Dated:

.3 Prepared By:

.2 A copy of this detailed investigation report is included as an appendix to this section.

.3 The subsurface investigation report records properties of the soils, subgrade conditions, and offers recommendations for the design of foundations.

.4 The report as prepared primarily for the use of the Consultants.

.5 The recommendations given shall not be construed as a requirement of this Contract unless also contained in the Contract Documents.

.6 The report, by its nature, cannot reveal all conditions that exist or can or might occur on the subject site. Should subsurface conditions be found or be a concern thereto, or to vary substantially from the investigation report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to the Owner.

END OF SECTION

Appendix 00 31 34A – Soil Report – NOT APPLICABLE

00 41 13A – Asset and Warranty Card

WRDSB PROJECT ASSET & WARRANTY CARD

Instructions:

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

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

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

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

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

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

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

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

Sample:

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

WRDSB Project Asset & Warranty Card

Project Name: _____

School / Location: _____

Date: _____

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

00 56 13 – Definitions Stipulated Price

1.1. Definitions Declaration

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

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

1.2. Supplementary Words and Terms to CCDC 2-2020

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

.20 Tender: Refer to definition of Bid.

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

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

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

.24 Provide: To Supply and Install

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

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

END OF SECTION

00 72 13 – Standard Terms and Conditions

1. Applicable Terms and Conditions (Supplier)

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

3. Basis of Award (Price factor)

Bidders shall be deemed to have included all costs related to the Work in the Total Price as provided in their Bid, except for items clearly identified as provisional in the 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 only required if the project is equal to or greater than $200,000.00.

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

i. Bid Amount

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

ii. Bid Deposit Bond & Agreement to Bond

Bid submissions must be accompanied by a bid deposit in the form of a digital Bid Bond in an electronically verifiable and enforceable (e-Bond) format in the amount of 10% of the total base bid (inclusive of HST) made payable to the Waterloo Region District School Board (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 Supplier shall provide for a Performance Bond for 50% of the total Contract Price, and a Labour and Material Payment Bond for 50% of the total Contract Price.

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

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

The bid deposit of the Bidder whose submission is accepted shall be forfeited by the Bidder should the Bidder fail to execute a Contract or provide the necessary documents as required within this 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 Supplier shall provide a digital Bid Performance and Labour and Materials Bond in an electronically verifiable and enforceable (e-Bond) format in the amount(s) of not less than 50% Performance Bond and a 50% Labour and Materials Bond of the total Contract Price made payable to the Waterloo Region District School Board (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 Sub-contractors, Suppliers, and any other

persons supplying labour or materials to the Project. For more information, contact your surety company or visit the Surety Association of Canada website.

If the Supplier fails to provide a performance bond and/or labour and materials bond when requested, the 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 Supplier 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 Supplier is responsible for throughout the two (2) year period of maintenance and warranty.

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

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

5. Business Code of Conduct for Board Employees

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

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

6. Code of Conduct for Suppliers

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

i. **Courtesy and Respect:** all Suppliers and their employees must conduct themselves in a manner that is lawful, courteous, respectful, businesslike, and free of bias to the Board, its officer, employees, students, guests, or visitors.

ii. **Language and Behavior**: Suppliers and their employees cannot engage in behavior that is rude, threatening, or offensive. Use of profane or insulting language is prohibited. Harassment of any type, including sexual harassment is strictly prohibited. Abusive, derogatory, obscene or improper language, gestures, remarks, whistling, cat calls or other disrespectful behavior cannot be tolerated. Rough housing, fighting, fisticuffs, physical threats, destruction of property, vandalism, littering, or physical abuse of anyone on WRDSB property are not permitted under any circumstance.

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

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

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

vi. **Appearance**: Suppliers and their employees 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. **Vehicles and Driving on Board Property:** Vehicles must clearly indicate the Supplier's company name, identifier number and telephone number. It must be readable from 8 meters (25 feet) away. Vehicles including movable Equipment/Machinery must not enter, leave or drive on Board premises during nutritional breaks, before and after school hours, or anytime there are students or staff outside of the building.

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

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

7. Compliance with Laws, Acts and Regulations

Suppliers shall abide by all applicable 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

- Accessibility for Ontarians with Disabilities Act (AODA)
- Architect Act
- Bill S-211 Fighting Against Forced Labour and Child Labour in Supply Chains Act
- Broader Public Sector Accountability Act, 2010
- Building Ontario Businesses Initiative (BOBI) Act, 2022
- Canada Revenue Agency (CRA) regulations
- Confidentiality Acts (MFIPPA, PIPEDA etc.)
- Construction Act
- Education Act
- Occupational Health and Safety Act
- Trade Agreements (CETA/CFTA etc.)
- Workplace Safety and Insurance Act (WSIB)
- WRDBS Procurement Services Policies website
- 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 Supplier(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 Supplier 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, MFIPPA, and PIPEDA

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.

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

(a) it and all of the Supplier's Sub-contractors shall ensure the PIPEDA compliance of all PIPEDA Protected Information it collects directly from individuals or indirectly from the Board, uses or discloses in the course of performing their obligations under this Agreement; and,

(b) without limitation, it shall ensure the PIPEDA compliance of all PIPEDA Protected Information it transfers or discloses to the Board.

9. Confirmation to Proceed

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

Supplier. 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 Sub-contractors, sub-consultants and suppliers also have no conflict with respect to other work and/or other clients.

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

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

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

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

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

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

11. Construction Act Guidelines

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

12. Criminal Background Checks and Collection of Personal Information

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 Supplier 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 Supplier 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 Supplier

The Supplier, their agents and all workers and persons employed by them or under their control, shall use due care that no person or property is injured and that no rights are infringed in the prosecution of the work, and the Supplier shall be solely responsible for all damages by whomsoever claimable in respect of any injury to persons or to lands, buildings, structures, utilities, survey markers, fences, livestock, trees, crops, roads, ways, ditches, drains and in watercourses, whether natural or artificial, or property or whatever

description and in respect of any infringement of any right, privilege or easement whatever occasioned in the carrying on of the work or any part thereof, or by any neglect, misfeasance or nonfeasance on the Supplier's part or on the part of any of his agents, workers and persons employed by them or under their control shall bear the full cost thereof and shall at his own expense make such temporary provisions as may be necessary to ensure the avoidance of any such damage, injury or infringement.

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

14. Damage Reporting

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

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

15. Debriefing Requests

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

16. Default

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

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

17. Delay Claims

The Supplier shall be responsible for all deliverables including lead times. The bidder shall include in their bid price any costs associated with an extended schedule beyond the stated substantial completion date due to delayed deliveries of items. 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. Delivery and Transportation Charges

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

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

All asbestos work must be conducted by Suppliers 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, Suppliers must be certified as Asbestos Abatement Workers AAW (Trade code 253W) and Asbestos Abatement Supervisors AAS (Trade code 253S) by The Ministry of Training, Colleges and Universities as prescribed by Section 20 of O. Reg. 278/05.

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

II. Lead

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

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

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

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

III. Mercury

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

IV. Silica

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

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

V. Other Designated Substance

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

20. Dispute Resolution

All disputes arising out of or in connection with this Contract, or in respect of any legal relationship associated with or derived from this Contract, other than with respect to the 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 Supplier 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.

21. Electrical Safety Requirements

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

22. Emergency and Maintenance

The care of the Works until completed, delivered to and accepted by the Board rests solely with the Supplier 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 Supplier's negligence, Act of God, or any cause whatsoever.

Should the Supplier 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 Supplier.

23. 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.

24. 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.

25. Force Majeure

If either party is delayed in the performance of their obligations under this Contract by Force Majeure, then the Contract Time shall be extended for such reasonable time as the Owner and the Supplier shall agree. The extension of time shall not be less than the time lost 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 Supplier shall execute a Change Order indicating the length of the extension to the Contract Time and confirming that there are no costs payable by the either party for the extension of Contract Time. However, if at the time an event of Force Majeure arises a party is in default of its obligations under the Contract and has received a notice of default shall not excuse a party from its obligation to cure

the default(s). For greater certainty, the defaulting party, to the extent possible, must continue to address and cure the default notwithstanding an event of Force Majeure."

Any cause, unknown at the effective date of the Contract and beyond either party's control, other than financial difficulties, bankruptcy or insolvency, which prevents the performance by a party, or both, of any of their respective obligations under the Contract and the event of Force Majeure did not arise from a party's default and could not be avoided or mitigated by the exercise of reasonable effort or foresight. Force Majeure includes Labour Disputes; fire; unusual delay by common carriers or unavoidable casualties; delays in obtaining third-party licenses, permits, agreements, or approvals (excluding approvals of any Sub-contractors 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.

26. Hold Back or Set Off

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

27. 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.

27.1 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.

28. 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.

29. 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 Sub-contractors, 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.

30. Inspection of Supplier's Work.

The Board reserves the right to have all work including maintenance and repair work reviewed by a third-party Contractor, Agency or Consultant to confirm that work within this Contract is being completed satisfactorily.

31. Insurance Requirements

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

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

i. **Commercial General Liability Insurance** shall be in the name of the Supplier, and shall name the **Waterloo Region District School Board** and any other person or party identified in the contract documents, as an **additional insured**, with limits of not less

than $5,000,000.00 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. To achieve the desired limit, umbrella, or excess liability insurance may be used. The policy shall be endorsed to provide the *Owner* with not less than 30 days' notice, in writing, in advance of any cancellation and of change or amendment restricting coverage.

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

iii. **If applicable, Broad Form Contractor's Equipment Insurance**: The General Contractor shall provide and maintain during the term of the Agreement, coverage for construction machinery and equipment used by the Contractor for the performance of the work. Such insurance shall be in a form acceptable to the Board and shall not allow subrogation claims by the Insurer against the Board.

iv. **If applicable**, the General Contractor shall provide and maintain during the term of the Agreement an **All Risk Installation Floater Insurance** policy covering the installation of any machinery and equipment associated with the construction project. Coverage shall be in an amount equal to the value of the machinery and/or equipment and shall include coverage while it is in transit to, while stored at a temporary location, and awaiting installation at the work site.

v. **If applicable**, the General Contractor shall **ensure** its professional consultants, architects, landscape architects, planners, and engineers providing a professional service in connection with the contract, maintain until three (3) years after the Agreement, **Professional Liability Insurance** to a limit not less than $1,000,000 per claim providing coverage for acts, errors and omissions arising from their professional services performed under this Agreement. The policy SIR/deductible shall not exceed $100,000 per claim and if the policy has an aggregate limit, the amount of the aggregate shall be double the required per claim limit. Certificates evidencing such coverage shall be supplied to the Board prior to the completion of the project and in accordance with the provisions stated above.

vi. **If applicable, (i.e., for projects with environmental liability concerns)** the General Contractor shall take out and keep in force **Contractor's Pollution Liability** (CPL) coverage to ensure that its work does not exacerbate any pre-existing environmental

condition during construction. Coverage shall be in an amount of not less than $5,000,000 per claim or per occurrence, or such greater amount as the Board may from time to time require, naming the Board as an additional insured, whose coverage shall be maintained in force for 1 year following the termination of the Contract. The policy SIR/deductible shall not exceed $100,000 per claim and if the policy has an aggregate limit, the amount of the aggregate shall be double the required per occurrence limit.

vii. **Provisions:** Prior to the commencement of work, the Supplier shall forward a Certificate of Insurance evidencing this insurance with the executed Agreement. The Certificate shall state that coverage will not be suspended, voided, canceled, reduced in coverage or in limits except after thirty (30) days (ten (10) days if cancellation is due to non-payment of premium) prior written notice by certified mail to the 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 Supplier and to leave the resolution of the claim with the Supplier. 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 Supplier, either directly by a third party or through the Board shall be promptly investigated by the Supplier. The Supplier shall contact the third party claimant within 48 hours of receipt of notice of a claim. The Supplier shall initiate an investigation of the claim immediately upon notice, and advise the third party claimant in writing, with a copy to the Board, of its position regarding the claim within 21 calendar days of the notice. The Supplier shall include in its response the reasons for its position.

c. Should this position not resolve the claim and be accepted by the third party claimant, the Supplier shall immediately report the claim to its Insurer for further review. (Insurer for this purpose is defined as either the Claims Department of the Supplier's Insurance Company or the Claims Administrator at the Supplier's Insurance Broker.) The Supplier's Insurer upon receipt of this claim shall advise the third party claimant by letter, with a copy to the Board, that it is now investigating the claim. When a final position on the claim has been determined, the Supplier's Insurer shall advise the third party claimant by letter, with a copy to the 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 Supplier and/or its Insurer and to seek indemnification from the Supplier or to exercise any other rights under the Contract.

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

32. Invoicing and Payment Terms

a) **Submit all invoices** to finance-ap@wrdsb.ca for payment at the completion of the Work or after receipt of goods, unless otherwise stated. Not Applicable for Credit Card orders.

b) **Fiscal Year End**: All work scheduled within a single school year (Sept 1-Aug 31) must be completed and invoiced received by the Board no later than August 31 of that same school year, unless budgets dictate that work must extend into the following school year and/or mutually agreed upon both parties.

c) **New Account,** in advance of invoicing, upon request, Suppliers will provide:
   i. necessary company information to set up a WRDSB account and
   ii. banking information to receive payment by Electronic Funds Transfer (EFT).

d) **Requests to change company information** must be submitted in writing accompanied with a legal document/letter signed by a lawyer on the law firm's letterhead.

e) **Invoices must contain** the following information, where applicable, in order to be deemed complete:
   i. Purchase Order Number
   ii. Invoice Date
   iii. Unique Invoice Number
   iv. Supplier name and address
   v. Quantity, Unit Price, Unit of Measure and Extended Price
   vi. Description for each line item
   vii. Date of Service Call, if applicable

viii. HST
ix. Payment Terms
x. Work Order Number, if applicable
xi. WRDSB Project Lead, if available, and

f) **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. Suppliers are required to invoice promptly, without delay.

32.1 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 Supplier shall submit its invoices in the form of a Proper Invoice. For the purposes of this section, a "Proper Invoice" shall include the following:

i. the Supplier's name, address, telephone number and mailing address.
ii. the date of the Proper Invoice and the period during which the services or materials for which payment is being 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 Supplier's HST number.
x. invoices and time sheets from all subtrades whose work is included in the Proper Invoice, if required in the Contract.
xi. backup documentation to support any cash allowances and extra work claimed in the Proper Invoice.
xii. a schedule of values indicating:

a. for lump sum contracts, the percentage of work completed per division with each division further subdivided to show the percentage of work completed for each subtrade,
b. for unit price contracts, the tender quantity, unit of measure, previous quantity, current quantity, to-date quantity,
c. an updated list of change orders, showing the percentage of work completed under each change order, and
d. an updated cash allowance list, showing the percentage of work completed in respect of each cash allowance, if required by the Contract.

xiii. a Statutory Declaration where required by the Contract attesting to the truth of the statements made therein.

33. Licenses and Permits

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

34. Locates, if applicable

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

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

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

35. Log Reports

If required, the Supplier must submit a completed Log Report with invoices. The Board may request more frequent log submissions if deems necessary.

36. Materials - Specifications

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

37. 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.

38. 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.

39. No Branding

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

40. 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.

41. 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.

42. 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.

43. Non-Assignment

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

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

44. 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 Supplier will be subject to further privacy and security reviews as required. This agreement will be renewed on an annual basis.

45. 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 Sub-contractors.

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 Supplier 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.

46. 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).

47. Performance

i. Where the Supplier 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 Supplier 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 Supplier, 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 Supplier 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 Supplier shall be discharged before all the services contemplated hereunder have been completed, or the services are for any reason terminated, stopped or discontinued because of the inability of the Supplier to serve under this agreement they shall be paid only for that portion of the Work which shall have been satisfactorily completed at the time of termination.
vi. Where deemed appropriate, a performance evaluation shall be completed by the Board. The evaluation report shall be reviewed with Procurement Services, and a copy of the completed evaluation forwarded to the Supplier for their records. Dependent on the evaluation scoring, the Board may request a corrective action plan and/or project size/value may be affected on future bid opportunities for your company.

48. Permits and Licenses

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

49. 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.

50. Protection of Board Assets

The Supplier (the Supplier / Sub-contractor) 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 Supplier, at their expense, to the satisfaction of the Board. The Supplier shall not cause any inconvenience to Board operations, staff, public or users of the Board facilities, within reason. Communication between the successful Supplier 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.

51. 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

52. Records, Inspection, Audits

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

53. 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, significant or persistent deficiencies in performance of any substantive requirement or obligation under a prior agreement or agreements or claims by or against or otherwise involving either of the 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 Optional 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. Verify with any Bidder or with a third party any information set out in a Bid.
x. reject any, or any part of, any or all Bids, or cancel the bidding process at any stage and/or issue a new Bid call for the same or similar deliverables.
xi. disqualify any Bidder:
    a. whose Bid contains misrepresentations or any other, inaccurate, or misleading information, or any qualifications within its Bid,
    b. who has engaged in conduct prohibited by the Bid Solicitation Document,
    c. with inadequate credentials or due to unsatisfactory past performance,
xii. reject Bid(s) from Bidder who has engaged in lobbying or has contravened any of the terms of the Bid Solicitation Document.
xiii. reject a Bid based on:
    a. information provided by references or credit check or other due diligence efforts,
    b. the information provided by a Bidder pursuant to the Board exercising its clarification rights under the procurement process, or
    c. other relevant information that arises during the procurement process.
xiv. choose to reject a Bid if only a single Bid is received and cancel the bidding process or enter into direct negotiations with the sole Bidder.
xv. accept a Bid other than the lowest or highest scoring and/or to not accept any Bid for any reason whatsoever.
xvi. award the contract as split-order, lump sum or individual-item basis, or such combination as shall best serve the interests of the Board.
xvii. negotiate in circumstances permitted for in the Bid document or by relevant policies, or directives, and include additional terms and conditions during the process of negotiations.
xviii. no longer consider a Bidder if a satisfactory outcome is not reached as part of negotiation, as determined by the Board in their sole discretion and move to the next highest ranked Bid in such event.
xix. select a Bidder other than the Bidder whose Bid reflects the lowest cost to the Board and/or award the Contract to any Bidder.
xx. award any business/Work described in this Bid Solicitation to more than one (1) Bidder.

xxi. not award the Contract if the costs of completing the Work exceed budget funding; or do not respond to all requirements or do not represent fair market value or where necessary internal approvals are not obtained, and

xxii. If the Board receives a bid from a Supplier with Rates that are abnormally lower than the Rates in other Bids, the Board may verify with the Bidder that the Bidder satisfies the conditions for participation and is capable of fulfilling the Agreement.

These reserved rights are in addition to any other expressed rights or any other rights which may be implied in the circumstances. The 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.

54. Responsibilities of the Supplier

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 Supplier, which shall bind the Supplier on their part to furnish and deliver the goods, equipment and services at the prices given and in accordance with the conditions of the Bid solicitation document.

The Supplier shall:

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

ii. act in a professional manner 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 Supplier.

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).

55. 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 Sub-contractors, 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.

56. 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 Supplier relying on this or any other information or records.

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

57. 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 Supplier in written form

58. 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.

59. 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 Supplier.

The Board Authorized Representative must approve all repairs and replacements prior

to final payment.

60. 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.

61. 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.

62. Termination

If the Supplier 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 Supplier notice in writing of such failure. If the Supplier has not remedied its failure within ten (10) working days of the said notice, the 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 Supplier.
ii. The Board may withhold any payment due to the Supplier hereunder until the Supplier has remedied its failure.
iii. The Board may engage the services of another Bidder to remedy the Supplier's failure, and obtain reimbursement therefore from the Supplier. The said reimbursement may be obtained either through deduction from any amounts owing to the Supplier hereunder, or through any other legal means available to the 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.

63. 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 Supplier. The Board shall pay all reasonable costs incurred by the Supplier/Contract up to the date of termination considering the Work performed and/or services were provided in accordance with the Contract and to the complete satisfaction of the Board. Payment shall be in accordance with prices as per Contract. However, in no event shall the Supplier be paid an amount, which exceeds the Total Bid Price. The Supplier will not be reimbursed for any profits which may have been anticipated but which have not been earned up to the date of termination.

64. 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 Supplier receives thirty (30) days written notice of such termination from the Board.

65. 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 Supplier, 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 Supplier, in the event of a major mechanical equipment breakdown, to have available substitute equipment of similar capability. It shall be supplied and put into service to fulfill the 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 Supplier to ensure work continues and deadlines are met, despite any unforeseen interruption as a result of equipment failure.

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

The equipment must be in good working order and the Supplier is responsible for all general and preventative maintenance, fuel, and repair and those costs shall be included

in the bid. All preventative maintenance and repairs are to be conducted off peak hours. No other charges to the Board shall apply.

66. 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.

67. Traffic Control and Site use

Supplier'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 Supplier shall, at their own expense, remove any equipment or material, which, in the Board's opinion, constitutes a traffic hazard.

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

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

Should the Supplier be unable to 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 Supplier.

The Supplier 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 Supplier shall assure that all required forms are completed and on-site for inspection. In the event a traffic control company is contracted for the purpose of signage, information regarding the Supplier must be included in the quotation and included with the bid price.

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

68. Usage Reports

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

69. 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.

70. Volume and Exclusivity

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

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

71. 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.

72. Warranty and Maintenance

The Supplier, at the time of substantial completion, shall furnish a written warranty covering material, maintenance, and work performed under the contract for a minimum

period of two (2) years from the date of completion, unless otherwise stated. Individual sections may extend warranties beyond the two (2) year time frame. The Supplier is responsible for all required maintenance complete with materials and labour during the warranty period.

73. Work Continuity

The Supplier 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 Supplier, its Sub-contractors, sub-suppliers, agents, employees, officers, directors, and all other persons and other entities for whose acts the Supplier may be liable or for whom it is responsible in law and their respective officers, directors, agents and employees.

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

74. Work Requirements

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

75. Workplace Safety Insurance Board (WSIB) Certificate

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

Prior to a formal award and commencing the services covered by this 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") listing appropriate NAICS Code and Code Description stating that the Supplier/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 listing appropriate NAICS Code and Code Description shall be uploaded through the Bidding System within 72 hours of the expiration or replacement of the current certificate, without demand by the 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 30 day of August in the year 2025. .2 (if applicable) *Occupancy* by the31 day of August in the year 2025, and .3 *Ready-for-Takeover* by the 31 day of August in the year 2025."
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 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: 5.3.2 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. 5.3.7 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
2	Independent Testing & Inspection (soil, concrete, mortar, structural steel, air barrier, paving, painting) (As directed by the Consultant)	$2,000
3	Finishing Hardware	$25,000
4	Data cabling installation and network equipment (Including terminations)	$5,000
5	Voice cabling installation and telephone equipment	$2,500

6	Access Control & Intrusion Detection Systems (security systems) (Where not otherwise identified in the Contract Documents and including all cabling)	$2,500
7	Public Address (PA) systems. (Including all cabling and hardware)	$5,000
	Total of All Allowances:	**$52,000**

END OF SECTION

01 31 00 – Project Managing And Coordination

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 32 00 - Construction Progress Documentation.

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 01 53 00 – Temporary Construction Facilities

.4 Section 01 61 00 – Product Requirements

.5 Section 01 78 10 – Closeout Submittals and Requirements

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

1.2. PROJECT COORDINATION

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

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

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

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

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

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

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

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

1.3. SITE SUPERVISOR AND PROJECT MANAGER

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

.2 Performance of the Contractors Project Manager and Site Supervisor

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

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

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

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

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

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

1.4. PERMITS

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

1.5. CONSTRUCTION DOCUMENTS

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

1.6. PRE-CONSTRUCTION MEETING

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

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

1.7. ON-SITE DOCUMENTS

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

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

1.8. SCHEDULES

.1 Within three weeks following the award of the Contract, submit a detailed, trade by trade progress schedule for the work in a bar chart form acceptable to the Consultant.

.2 Submit preliminary construction progress schedule as specified in Section 01 32 00 to Consultant coordinated with Consultant's project schedule.

.3 After review, revise and resubmit schedule to comply with revised project schedule.

.4 During progress of Work revise and resubmit as directed by the Consultant.

.5 Provide schedule updates every month with request for Payment, for duration of Contract.

1.9. CONSTRUCTION PROGRESS MEETINGS

.1 Prior to the commencement of the Work, the Contractor together with the Consultant shall mutually agree to a sequence for holding regular "on site meetings".

.2 The Contractor will organize site meetings. Ensure persons, whose presence is required, are present and relative information is available to allow meetings to be conducted efficiently.

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

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

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

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

.7 Agenda to include following:

- .1 Review, approval of minutes of previous meeting.
- .2 Review of Work progress since previous meeting.
- .3 Field observations, problems, conflicts.
- .4 Problems which impede construction schedule.
- .5 Review of off-site fabrication delivery schedules.
- .6 Corrective measures and procedures to regain projected schedule.
- .7 Revision to construction schedule.
- .8 Progress schedule, during succeeding work period.
- .9 Review submittal schedules: expedite as required.
- .10 Maintenance of quality standards.
- .11 Review proposed changes for effect on construction schedule and on completion date.
- .12 Review site security issues.
- .13 Other business.

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

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

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

1.10. SUBMITTALS

.1 Prepare and issue submittals to Consultant for review.

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

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

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

.5 Process substitutions through Consultant.

.6 Process change orders through Consultant.

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

1.11. RECORD (AS-BUILT) DOCUMENTS AND SAMPLES

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

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

1.12. CLOSEOUT PROCEDURES

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

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

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

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

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

END OF SECTION

01 32 00 – Construction Progress Documentation

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

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

1.2. SCHEDULES

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

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

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

.4 Submit schedules as follows:

.1 Submittal Schedule for Shop Drawings and Product Data.

.2 Submittal Schedule for Samples.

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

.4 Product Delivery Schedule.

.5 Cash Allowance Schedule for acquiring Products and Installation.

.6 Shutdown or closure activity.

1.3. CONSTRUCTION PROGRESS SCHEDULING

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

.2 Schedule Format.

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

.2 Split horizontally for projected and actual performance.

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

.3 Schedule Submission.

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

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

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

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

.5 Distribute copies of revised schedule to:

.1 Job site office.

.2 Subcontractors.

.3 Other concerned parties.

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

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

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

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

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

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

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

.1 Site clearing.

.2 Site utilities.

.3 Foundation Work.

.4 Structural framing.

.5 Subcontractor Work.

.6 Equipment Installations.

.7 Finishes.

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

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

.12 Indicate changes occurring since previous submission of schedule:

.1 Major changes in scope.

.2 Activities modified since previous submission.

.3 Revised projections of progress and completion.

.4 Other identifiable changes.

.13 Provide a written report to define:

.1 Problem areas, anticipated delays, and impact on schedule.

.2 Corrective action recommended and its effect.

.3 Effect of changes on schedules of other subcontractors.

1.4. PROGRESS PHOTOGRAPHS

.1 Digital Photography:

.1 Submit electronic copy of progress photographs of project, Digital format, minimum 300 in megapixel resolution.

.2 Identification: Name and number of project and date of exposure indicated.

.3 Provide both interior and exterior photographs.

.4 Number of Viewpoints: Locations of viewpoints determined by Consultant.

.5 Frequency: Monthly with progress statement. Provide the required number of pictures to accurately reflect the submitted progress percentage.

1.5. SHOP DRAWING SUBMITTAL SCHEDULE

.1 Include schedule for submitting shop drawings, product data, samples

.2 Indicate dates for submitting, review time, resubmission time, and last date for meeting fabrication schedule.

.3 Include dates when shop drawings and samples will be required for Owner-furnished products.

.4 Include dates when reviewed submittals will be required from Consultant.

.5 Provide final signed off copies of the shop drawings in digital format to the Board.

END OF SECTION

01 33 00 – Submittal Procedures

1.0 GENERAL

1.1 RELATED SECTIONS

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

1.1 ADMINISTRATIVE

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

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

1.2 SHOP DRAWINGS AND PRODUCT DATA

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

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

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

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

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

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

.7 Accompany submissions with transmittal letter, containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification and quantity of each shop drawing, product data and sample.

.5 Other pertinent data.

.8 Submissions shall include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

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

.5 Details of appropriate portions of Work as applicable:

.1 Fabrication.

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

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Relationship to other parts of the Work.

.9 After Consultant's review, distribute copies.

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

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

.12 Delete information not applicable to project.

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

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

submission of corrected Shop Drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.15 Signed drawings shall be returned to and retained by Contractor who is then responsible for distribution of copies of corrected shop drawing to appropriate Subcontractors for appropriate action and to municipal building department for their records of those subjects required by authorities.

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

1.3 SAMPLES

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

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

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

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

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

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

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

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

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

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

1.4 MOCK-UP

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

1.5 ` CERTIFICATES AND TRANSCRIPTS

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

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

.3 A current WSIB clearance certificate

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

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

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

END OF SECTION

01 35 17 – Fire Safety Procedures

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 14 00 – Work Restrictions.

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

.3 Section 01 33 00 - Submittal Procedures.

.4 Section 01 35 23 – Health and Safety

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

.6 Appendix 01 35 17A Contractor Hot Work Permit

1.2. FIRE SAFETY PLAN

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

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

1.3. FIRE PROTECTION

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

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

1.4. HOT WORK

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.5. HOT WORK PERMIT

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

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

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

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

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

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

1.6. FIRE PROTECTION SYSTEMS

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

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

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

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

1.7. FIRE ALARM SHUT-DOWN PROCEDURE

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

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

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

.4 and schedule down time in unoccupied school hours.

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

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

.7 Procedure

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

.1 Inform both the principal and head custodian whenever the fire alarm system is to be disabled prior to any partial or whole system shut down. Where school staff are not available, ensure that the Project Coordinator and/or area supervisor are informed.

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

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

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

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

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

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

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

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

1.7.7.1.4.3. report any other problems they encounter,

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

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

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

.6 In the event that a fire alarm system is activated, whether by smoke, fire or accidentally, the system must not be reset until authorized by the Fire Department (verbally or in person) and the cause of the alarm has been investigated.

1.8. FIRE PROTECTION EQUIPMENT IMPAIRMENT

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

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

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

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

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

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

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

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

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

.1 Patrol all halls and high-risk areas affected.

.2 Fire patrol shall have access to a phone and call 911 if they see a fire.

.3 Report all other problems they encounter.

.4 Remain on patrol until the system is back on.

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

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

1.9. FIRE ALARM MODIFICATIONS AND MAINTENANCE

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

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

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

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

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

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

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

1.10. INSTALLATION AND/OR REPAIR OF ROOFING

.1 The Contractor will review with the Consultant and the Board's representative of the location of any asphalt kettles and the dates the kettles will be in use. The Contractor, in the course of performing roofing work, will ensure all personnel utilize the following precautions:

.1 Use only kettles equipped with thermometers or gauges in good working order.

.2 Locate kettles in a safe place outside of the building.

.3 Maintain continuous supervision while kettles are in operation and provide metal covers for the kettles to smother any flames in case of fire.

.4 All roofing materials stored in locations no closer than 15 meters to any structures.

1.11. FIRE DEPARTMENT ACCESS

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

1.12. SMOKING PRECAUTIONS

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

1.13. FLAMMABLE LIQUIDS

.1 The handling and storage on site of flammable liquids are to be governed by the current National Fire Code of Canada.

.2 Flammable liquids such as gasoline, kerosene and naphtha may be kept for ready use in quantities not exceeding 10 imperial gallons provided they are stored in approved safety cans bearing the Underwriter's Laboratory of Canada or Factory Mutual seal of approval.

.3 Transfer of flammable liquids is prohibited within buildings.

.4 Transfer of flammable liquids must not be carried out in the vicinity of open flame or any type of heat producing devices.

.5 Flammable liquids having a flashpoint below 100° F (37.7°C) such as naphtha or gasoline must not be used as solvents or cleaning agents.

.6 Flammable waste liquids, for disposal, must be stored in approved containers located in a safe ventilated area. Quantities are to be kept to a minimum.

END OF SECTION

Appendix 013517-A Contractor Hot Work Permit

Waterloo Region District School Board

Appendix - 013517-A

Facility Services

CONTRACTOR HOT WORK PERMIT

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

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

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

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

PART 1

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 1200 Hot Works/Fire Watch (Copies Available on Request)

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

01 35 23 – Health And Safety

1.0 GENERAL

1.1. RELATED SECTIONS

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

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 01 35 17 – Fire Safety Requirements

.4 Section 01 35 43 – Hazardous Materials

.5 Section 01 41 00 – Regulatory Requirements

.6 Section 01 53 00 – Temporary Construction Facilities

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

1.2. REFERENCES

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

1.3. SAFETY PLAN

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

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

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

1.4. TEMPORARY WORK

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

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

1.5. RESPONSIBILITY

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

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

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

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

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

1.6. SUBMITTALS

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

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

.1 Results of site specific safety hazard assessment.

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

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

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

.5 Submit copies of incident and accident reports.

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

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

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

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

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

1.7. SAFETY ACTIVITIES

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

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

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

1.8. HEALTH AND SAFETY COORDINATOR

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

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

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

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

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

.5 be on site during execution of Work.

1.9. POSTING OF DOCUMENTS

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

1.10. CORRECTION OF NON-COMPLIANCE

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

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

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

1.11. PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:

.1 Refer to Section 01 35 43 Hazardous Materials

1.12. HAZARDOUS WORK

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

1.13. WORK STOPPAGE

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

1.14. LOCKOUT PROCEDURES

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

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

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

1.15. OVERHEAD LIFTING

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

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

1.16. WARNING SIGNS AND NOTICES

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

1.17. FIRE PROTECTION

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

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

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

1.18. SCENT-FREE ENVIRONMENT

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

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

END OF SECTION

01 35 43 – Hazardous Materials

1.0 GENERAL

1.1. RELATED SECTIONS

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

.2 Section 01 41 00 – Regulatory Requirements.

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

1.2. REFERENCES

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

1.3. ASBESTOS and OTHER REGULATED SUBSTANCES

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

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

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

1.4. PROTOCOL FOR ABATEMENT WORK

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

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

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

.4 School Access

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

.5 Communication

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

.1 Principal / Vice Principal

.2 Area Facility Manager

.3 Head Custodian

.4 Environmental Officer

.5 Manager of Mechanical, Electrical and Environmental Services

.6 Manager of Health Safety & Security

.7 Contractor staff

.8 Consultant

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

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

.1 Principal / Vice-principal,

.2 Area Facility Manager, and

.3 Environmental Officer.

.4 Consultant

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

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

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

.7 Additionally, for Type 3 work also contact:

.1 Manager of Health, Safety & Security, and

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

.3 Consultant

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

.6 Asbestos Operations

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

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

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

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

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

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

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

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

1.5. SUBMITTALS

.1 Once the abatement is completed, forward a Letter of Completion to the Environmental Officer, (daniela_budure@wrdsb.on.ca). This letter shall be received no later than 72 hours after completion and shall include any sample results.

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

.3 Forward Air Clearance results to:

.1 Principal / Vice-principal,

.2 Facility Manager,

.3 Environmental Officer,

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

.5 Manager of Health, Safety & Security.

.6 Consultant

1.6. ACKNOWLEDGEMENT

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

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

END OF SECTION

Appendix 01 35 43A Asbestos Audit Report

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

Forest Heights Collegiate Institute

2021 Asbestos Audit Update Report

Project Location:
255 Fischer-Hallman Road, 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

July 26, 2021

MTE File No.: C34532-921

Engineers, Scientists, Surveyors.

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

July 26, 2021

MTE File No.: C34532-921

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

RE: 2021 Asbestos Audit Update – Forest Heights Collegiate Institute
255 Fischer-Hallman Road, Kitchener, Ontario

1.0 Introduction

MTE Consultants Inc. (MTE) was authorized by the Waterloo Region District School Board (WRDSB) to conduct the 2021 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 July 16, 19, 2021. The two-storey school was constructed in 1964 with additions in 1970 and 1987. The inspection did not include areas of post 1990 construction or renovation (where all building finishes have been removed and replaced), as applicable.

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

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

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

4.1 Analytical Results

During this inspection, no samples were collected.

4.2 Removed ACM

No ACM has been removed since the previous audit.

4.3 Discovery of Additional ACM

No additional ACM or suspect ACM was identified.

4.4 Damaged ACM

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

5.0 Recommendations

5.1 Remedial

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

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

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

5.2 Long Term Management

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

There are no requirements under current legislation to remove ACM from a building simply because it is present. However, O. Reg. 278/05 requires that an Asbestos Management Plan

be implemented and maintained. Asbestos awareness training should be provided for staff that may come in contact with ACM during routine duties or in emergency situations.

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

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

6.0 Limitations

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

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

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

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

All of which is respectfully submitted,

MTE Consultants Inc.

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Attach.
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Appendix A

Asbestos Management Database

School Name	Legend:	Notes:
Forest Heights Collegiate Institute	**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: 1964		
Addition(s): 1970, 1987		

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										
	Throughout Building	Structure	Deck	Steel	-	Non ACM	-	-	-	-
	Throughout Building	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
	Throughout Building	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	VC	-	-	-
	Throughout Building	Not Inspected	Not Inspected	Roofing Materials	NF	Suspect ACM	VC	Sample prior to disturbance	-	-
	Original Building	Wall Cavity	Vermiculite	-	F	ACM	HM	33752-200-S01	7-Jul-12	Amphibole
	Original Building	Windows	Interior Pane	Light Grey Sealant	-	Non ACM	SL	S07	13-Apr-18	ND
	Original Building	Windows	Interior Frames	White Sealant	-	Non ACM	SL	S08	13-Apr-18	ND
	Original Building	Windows	Exterior Pane	Beige Sealant	NF	ACM	SL	S10	13-Apr-18	1% Chrysotile
	Original Building	Doors	Exterior Frame	Grey Sealant	NF	ACM	SL	S06	13-Apr-18	7% Chrysotile
	Original Building	Doors	Interior Pane	Black Sealant	-	Non ACM	SL	S05	13-Apr-18	ND
	Original Building	Façade/Windows	Exterior Siding/Frames	Grey Sealant	-	Non ACM	SL	S09	13-Apr-18	ND
	Original Building	Mastic	Mastic	Floor Tile Mastic	NF	ACM	SL	S02	13-Apr-18	3% Chrysotile
	1970 Addition	Mastic	Mastic	Floor Tile Mastic	-	Non ACM	SL	S01	31-Oct-18	ND
	1970 Addition	Doors	Interior Pane	Black Sealant	-	Non ACM	SL	S05	13-Apr-18	ND
	Exterior	Overhang	Plaster	Textured	-	Non ACM	SL	34532-903-S01ABC	10-Jul-15	ND
Basement										
B6-0	Storage	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
B6-0	Storage	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
B6-0	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
B6-0	Storage	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
B6-0	Storage	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
B6-1	Exercise Room	Floor	Laminate	-	-	Non ACM	-	-	-	-
B6-1	Exercise Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B6-1	Exercise Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Post 1990)	-	Non ACM	-	-	-	-
B6-1	Exercise Room	Upper Ceiling	Drywall	Post 2008	-	Non ACM	-	-	-	-
B6-1	Exercise Room	Piping	Pipe Insulation	Fibreglass & PVC Fittings	-	Non ACM	-	-	-	-
B6-5	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Green	NF	ACM	SL	S10abc	21-Apr-08	0.3 Chrysotile
B6-5	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Mastic	NF	ACM	SL	S10abc	21-Apr-08	2.2 Chrysotile
B6-5	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-

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B6-5	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Post 1990)	-	Non ACM	SL	S11abc	21-Apr-08	ND
B6-5	Classroom	Above Ceiling	Texture Coat	Plaster	-	Non ACM	HM	S07	21-Apr-08	ND
B6-7	Exercise Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B6-7	Exercise Room	Floor	Rubber	-	-	Non ACM	-	-	-	-
B6-7	Exercise Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B6-7	Exercise Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Post 1990)	-	Non ACM	-	-	-	-
B6-7	Exercise Room	Above Ceiling	Texture Coat	Plaster	-	Non ACM	HM	S07	21-Apr-08	ND
B6-7	Exercise Room	Ducting	Duct Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
B6-8	Exercise Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B6-8	Exercise Room	Floor	Rubber	-	-	Non ACM	-	-	-	-
B6-8	Exercise Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B6-8	Exercise Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Post 1990)	-	Non ACM	-	-	-	-
B6-8	Exercise Room	Above Ceiling	Texture Coat	Plaster	-	Non ACM	HM	S07	21-Apr-08	ND
B6-8	Exercise Room	Ducting	Duct Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
B6-9	Storage	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
B6-9	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
B6-9	Storage	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
B6-10	Pump Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B6-10	Pump Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B6-10	Pump Room	Deck	Concrete	-	-	Non ACM	-	-	-	-
B6-10	Pump Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
B6-10	Pump Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
B6-10	Pump Room	Piping	Pipe Insulation	Mag Block	F	ACM	SL	S01abc	21-Apr-08	25% Amosite
B6-11	Tank Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B6-11	Tank Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B6-11	Tank Room	Deck	Concrete	-	-	Non ACM	-	-	-	-
B6-11	Tank Room	Tank	Hot Water Tank	Insulation	F	ACM	SL	1680.288-07	June, 1990	50-75% Chrysotile
B6-11	Tank Room	Tank	Hot Water Tank	Uninsulated	-	Non ACM	-	-	-	-
B6-11	Tank Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
B6-11	Tank Room	Piping	Pipe Insulation	Mag Block	F	ACM	HM	S01	21-Apr-08	25% Amosite
B6-12	Electrical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B6-12	Electrical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B6-12	Electrical Room	Above Ceiling	Texture Coat	Plaster	-	Non ACM	HM	S07	21-Apr-08	ND
B6-12	Electrical Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-

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B6-12	Electrical Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
B6-14	Corridor	Floor	Vinyl Floor Tile 12"x 12"	Grey Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
B6-14	Corridor	Wall	Concrete	Concrete Block	-	Non ACM	-	-	-	-
B6-14	Corridor	Ceiling	Drywall	Drywall Joint Compound (Post-2008)	-	Non ACM	-	-	-	-
B6-15	Corridor	Floor	Vinyl Floor Tile 12"x 12"	Grey Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
B6-15	Corridor	Floor	Concrete	Concrete Block	-	Non ACM	-	-	-	-
B6-15	Corridor	Ceiling	Drywall	Drywall Joint Compound (Post-2008)	-	Non ACM	-	-	-	-
B6-19	Boiler Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B6-19	Boiler Room	Floor	Vinyl Floor Tile 12"x 12"	Grey Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
B6-19	Boiler Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B6-19	Boiler Room	Deck	Concrete	-	-	Non ACM	-	-	-	-
B6-19	Boiler Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
B6-19	Boiler Room	Ducting	Flex Joint	-	NF	ACM	VC	Sample prior to disturbance.	-	-
C-B6	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C-B6	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
C-B6	Corridor	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C-B6	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Post 1990)	-	Non ACM	-	-	-	-
C-B6	Corridor	Ceiling	Ceiling Tile 2' x 4'	Textured Random Pinhole	-	Non ACM	SL	S04abc	21-Apr-08	ND
C-B6	Corridor	Ceiling	Ceiling Tile 2' x 4'	Textured Medium Pinhole	-	Non ACM	SL	S05abc	21-Apr-08	ND
C-B6	Corridor	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-
C-B6	Corridor	Piping	Pipe Insulation	Horsehair	-	Non ACM	-	-	-	-
C-B6A	Corridor	Floor	Vinyl Floor Tile 12"x 12"	Grey Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
C-B6A	Corridor	Floor	Concrete	Concrete Block	-	Non ACM	-	-	-	-
C-B6A	Corridor	Ceiling	Drywall	Drywall Joint Compound (Post-2008)	-	Non ACM	-	-	-	-
903	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
903	Stairwell	Wall	Concrete	Concrete Block	-	Non ACM	-	-	-	-
903	Stairwell	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
First Floor										
1	Gym	Floor	Wood	-	-	Non ACM	-	-	-	-
1	Gym	Wall	Concrete	-	-	Non ACM	-	-	-	-
1	Gym	Ceiling	Open to Structure	-	-	Non ACM	-	-	-	-
1	Gym	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-

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1	Gym	Piping	Pipe Fitting	Fibreglass/PVC	-	Non ACM	-	-	-	-
1-1	Custodian Room	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
1-1	Custodian Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-1	Custodian Room	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
1-1	Custodian Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
1-2	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
1-2	Girls Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-2	Washroom	Ceiling	Ceiling Tile 2 x 2	Short Fissure Random Pinhole 2005	-	Non ACM		-	-	-
1-2	Washroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
1-2	Washroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
1-4	Classroom	Floor	Vinyl Floor Tile 12"x 12"	White with Black Fleck	-	Non ACM	HM	S05	10-Jul-15	ND
1-4	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-4	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
1-4	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 1990)	-	Non ACM		-	-	-
1-4	Classroom	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
1-4	Classroom	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
1-4	Classroom	Ducting	Duct Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
1-4	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
1-4	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
1A	Storage	Floor	Vinyl Floor Tile 9"x 9"	Red	NF	ACM	HM	32523-FHSS-810-S25	21-Apr-08	7.5% Chrysotile
1A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
1A	Storage	Deck	Concrete	-	-	Non ACM	-	-	-	-
1B	Storage	Floor	Vinyl Floor Tile 9"x 9"	Red	NF	ACM	HM	32523-FHSS-810-S25	21-Apr-08	7.5% Chrysotile
1B	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
1B	Storage	Deck	Concrete	-	-	Non ACM	-	-	-	-
1-4A		Floor	Vinyl Floor Tile 9"x 9"	Green with White	NF	ACM	HM	32523-FHSS-B615-S02	21-Apr-08	3.2% Chrysotile
1-4A		Wall	Concrete	-	-	Non ACM	-	-	-	-
1-4A		Wall	Drywall	Drywall Joint Compound	-	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
1-4A		Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
1-4A		Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
1-4B	Alarmed Room	Floor	Ceramic Tile	-	-	-	-	-	-	-
1-4B	Alarmed Room	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
1-4B	Alarmed Room	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
1-4B	Alarmed Room	Wall	Concrete	Concrete Block	-	Non ACM		-	-	-

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1-4B	Alarmed Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 1990)	-	Non ACM		-	-	-
1-4C	Alarmed Room	Floor	Ceramic Tile	-	-	-	-	-	-	-
1-4C	Alarmed Room	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
1-4C	Alarmed Room	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
1-4C	Alarmed Room	Wall	Concrete	Concrete Block	-	Non ACM		-	-	-
1-4C	Alarmed Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 1990)	-	Non ACM		-	-	-
2	Gym	Floor	Wood	-	-	Non ACM	-	-	-	-
2	Gym	Wall	Concrete	-	-	Non ACM	-	-	-	-
2	Gym	Ceiling	Open to Structure	-	-	Non ACM	-	-	-	-
2	Gym	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
2	Gym	Piping	Pipe Fitting	Fibreglass/PVC	-	Non ACM	-	-	-	-
2	Gym	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
2A	Storage	Floor	Vinyl Floor Tile 9"x 9"	Red	NF	ACM	HM	32523-FHSS-810-S25	21-Apr-08	7.5% Chrysotile
2A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
2A	Storage	Deck	Concrete	-	-	Non ACM	-	-	-	-
2A	Storage	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
2B	Storage	Floor	Vinyl Floor Tile 9"x 9"	Red	NF	ACM	HM	32523-FHSS-810-S25	21-Apr-08	7.5% Chrysotile
2B	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
2B	Storage	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
2B	Storage	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2B	Storage	Deck	Concrete	-	-	Non ACM	-	-	-	-
2-2	Office	Floor	Vinyl Floor Tile 12"x 12"	Green	NF	ACM	HM	S10ABC	21-Apr-08	2% Chrysotile
2-2	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-2	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-2	Office	Ceiling	Ceiling Tile 1 x 1	Acoustic Ceiling Tile - Large Pinhole	NF	ACM	HM	S23ABC	21-Apr-08	2.5 Amosite
2-2	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2-2A	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
2-2A	Washroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-2A	Washroom	Ceiling	Ceiling Tile 1 x 1	Acoustic Ceiling Tile - Large Pinhole	NF	ACM	HM	S23ABC	21-Apr-08	2.5 Amosite
2-2A	Washroom	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2-2B	Staff Room	Floor	Vinyl Floor Tile 12"x 12"	Green	NF	ACM	HM	S10ABC	21-Apr-08	2% Chrysotile
2-2B	Staff Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
2-2B	Staff Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-2B	Staff Room	Ceiling	Ceiling Tile 1 x 1	Acoustic Ceiling Tile - Large Pinhole	NF	ACM	HM	S23ABC	21-Apr-08	2.5 Amosite

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2-2B	Staff Room	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2-4	Office	Floor	Vinyl Floor Tile 12"x 12"	Green	NF	ACM	HM	S10ABC	21-Apr-08	2% Chrysotile
2-4	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-4	Office	Ceiling	Ceiling Tile 1 x 1	Acoustic Ceiling Tile	NF	ACM	HM	32523-FHSS-B615-S03	21-Apr-08	2.3% Amosite
2-4	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2-4A	Office	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
2-4A	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-4A	Office	Ceiling	Ceiling Tile 1 x 1	Acoustic Ceiling Tile	NF	ACM	HM	32523-FHSS-B615-S03	21-Apr-08	2.3% Amosite
2-4A	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2-4B	Office Corridor	Floor	Vinyl Floor Tile 12"x 12"	Green	NF	ACM	HM	S10ABC	21-Apr-08	2% Chrysotile
2-4B	Office Corridor	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-4B	Office Corridor	Ceiling	Ceiling Tile 1 x 1	Acoustic Ceiling Tile	NF	ACM	HM	32523-FHSS-B615-S03	21-Apr-08	2.3% Amosite
2-4B	Office Corridor	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2-6	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2008)	-	Non ACM	HM	S34ABC	2011	ND
2-6	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-6	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-6	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (post 1990)	-	Non ACM	-	-	-	-
2-6	Classroom	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
2-6	Classroom	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2-6A	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2008)	-	Non ACM	HM	S34ABC	2011	ND
2-6A	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-6A	Office	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
2-6A	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2-6B	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2008)	-	Non ACM	HM	S34ABC	2011	ND
2-6B	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-6B	Office	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
2-6B	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2-6C	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2008)	-	Non ACM	HM	S34ABC	2011	ND
2-6C	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-6C	Office	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
2-6C	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2-6D	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2008)	-	Non ACM	HM	S34ABC	2011	ND
2-6D	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-6D	Office	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite

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WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
2-6D	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2-6E	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2008)	-	Non ACM	HM	S34ABC	2011	ND
2-6E	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-6E	Office	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
2-6E	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2-6F	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2008)	-	Non ACM	HM	S34ABC	2011	ND
2-6F	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-6F	Office	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
2-6F	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2-7	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2008)	-	Non ACM	HM	S34ABC	2011	ND
2-7	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-7	Office	Ceiling	Ceiling Tile 2 x 2	Short Fissure Random Pinhole (Post 2018)	-	Non ACM	-	-	-	-
2-7	Office	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
2-7	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
2-7A	Storage	Floor	Vinyl Floor Tile 9"x 9"	Beige, Burgundy White	NF	ACM	HM	S09	10-Jul-15	5.9% Chrysotile
2-7A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-7A	Storage	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-8	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2008)	-	Non ACM	HM	S34ABC	2011	ND
2-8	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-8	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
2-8	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (post 1990)	-	Non ACM	-	-	-	-
2-8	Classroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
3	Gym	Floor	Wood	-	-	Non ACM	-	-	-	-
3	Gym	Wall	Concrete	-	-	Non ACM	-	-	-	-
3	Gym	Ceiling	Open to Structure	-	-	Non ACM	-	-	-	-
3	Gym	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
3	Gym	Piping	Pipe Fitting	Fibreglass/PVC	-	Non ACM	-	-	-	-
3A	Storage	Floor	Vinyl Floor Tile 9"x 9"	Red	NF	ACM	HM	32523-FHSS-810-S25	21-Apr-08	7.5% Chrysotile
3A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
3A	Storage	Deck	Concrete	-	-	Non ACM	-	-	-	-
3B	Storage	Floor	Vinyl Floor Tile 9"x 9"	Red	NF	ACM	HM	32523-FHSS-810-S25	21-Apr-08	7.5% Chrysotile
3B	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
3B	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
3-2A	-	Floor	Vinyl Floor Tile 9"x 9"	Grey with Black and White Streaks	NF	ACM	HM	S19abc	21-Apr-08	2.8% Chrysotile

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3-2A	-	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-2A	-	Wall	Drywall	Drywall Joint Compound	-	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
3-2A	-	Ceiling	Ceiling Tile 1 x 1	Acoustic Ceiling Tile - Large Pinhole	NF	ACM	HM	S23ABC	21-Apr-08	2.5 Amosite
3-2A	-	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
3-2B	-	Floor	Vinyl Floor Tile 9"x 9"	Grey with Black and White Streaks	NF	ACM	HM	S19abc	21-Apr-08	2.8% Chrysotile
3-2B	-	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-2B	-	Wall	Drywall	Drywall Joint Compound	-	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
3-2B	-	Ceiling	Ceiling Tile 1 x 1	Acoustic Ceiling Tile - Large Pinhole	NF	ACM	HM	S23ABC	21-Apr-08	2.5 Amosite
3-2B	-	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
3-2	-	Floor	Vinyl Floor Tile 9"x 9"	Grey with Black and White Streaks	NF	ACM	SL	S19abc	21-Apr-08	2.8% Chrysotile
3-2	-	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-2	-	Wall	Drywall	Drywall Joint Compound	-	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
3-2	-	Ceiling	Ceiling Tile 1 x 1	Acoustic Ceiling Tile - Large Pinhole	NF	ACM	HM	S23ABC	21-Apr-08	2.5 Amosite
3-2	-	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
3-4	Classroom	Floor	12"x12" Floor Tile	Beige Dense Fleck (Post 2008)	-	Non ACM	-	-	-	-
3-4	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-4	Classroom	Ceiling	Ceiling Tile 2' x 4'	Thick Fissure Random Pinhole	-	Non ACM	SL	S22abc	21-Apr-08	ND
3-4	Classroom	Ceiling	Ceiling Tile 1' x 1'	Acoustic Ceiling Tile - Cellulose	-	Non ACM	-	-	-	-
3-4	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
3-5	Classroom	Floor	Vinyl Sheet Flooring	Grey (Post 2018)	-	Non ACM	-	-	-	-
3-5	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-5	Classroom	Ceiling	Acoustical Panels	Fibre	-	Non ACM	-	-	-	-
3-5	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
3-5	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
3-6	Classroom	Floor	12"x12" Floor Tile	Beige Dense Fleck (Post 2008)	-	Non ACM	-	-	-	-
3-6	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-6	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	HM	S16	21-Apr-08	ND
3-6	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
3-8	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Beige	NF	ACM	HM	S09	10-Jul-15	5.9% Chrysotile
3-8	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-8	Classroom	Wall	Drywall	Drywall Joint Compound	-	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
3-8	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Post 1990)	-	Non ACM	SL	S16abc	21-Apr-08	ND
3-8	Classroom	Ceiling	Ceiling Tile 1' x 1'	Acoustic Ceiling Tile - Cellulose	-	Non ACM	-	-	-	-
3-9	Classroom	Floor	Carpet	-	-	Non ACM	-	-	-	-

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3-9	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-9	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	SL	S17abc	21-Apr-08	ND
3-9	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
3-9	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
3-10	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
3-10	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-10	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Post 1990)	-	Non ACM	-	-	-	-
3-10	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-10	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Post 1990)	-	Non ACM	-	-	-	-
3-10	Washroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
4-2	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Grey with Black & White Streaks	NF	ACM	HM	32523-FHSS-B63-S06ABC	21-Apr-08	2.3% Chrysotile
4-2	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2008)	-	Non ACM		-	-	-
4-2	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-2	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 1990)	-	Non ACM		-	-	-
4-2A	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2008)	-	Non ACM		-	-	-
4-2A	Classroom	Wall	Concrete	Beige Dense Fleck (Post 2008)	-	Non ACM	-	-	-	-
4-2A	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 1990)	-	Non ACM		-	-	-
4-2B	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2008)	-	Non ACM		-	-	-
4-2B	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-2B	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 1990)	-	Non ACM		-	-	-
4-2C	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2008)	-	Non ACM		-	-	-
4-2C	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-2C	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 1990)	-	Non ACM		-	-	-
4-3	Tuck Shop	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
4-3	Tuck Shop	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-3	Tuck Shop	Deck	Concrete	-	-	Non ACM	-	-	-	-
4-4	Storage	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
4-4	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-4	Storage	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
4-5	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
4-5	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-5	Washroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 1990)	-	Non ACM		-	-	-
4-5	Washroom	Deck	Concrete	-	-	Non ACM	-	-	-	-
4-5	Washroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
4-5	Washroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
4-6	Kitchen	Floor	Concrete	-	-	Non ACM	-	-	-	-

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4-6	Kitchen	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-6	Kitchen	Ceiling	Ceiling Tile 2' x 2'	Metal	-	Non ACM	-	-	-	-
4-6	Kitchen	Deck	Concrete	-	-	Non ACM	-	-	-	-
4-6A	Kitchen	Floor	Concrete	-	-	Non ACM	-	-	-	-
4-6A	Kitchen	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-6A	Kitchen	Ceiling	Ceiling Tile 2' x 2'	Metal	-	Non ACM	-	-	-	-
4-6A	Kitchen	Deck	Concrete	-	-	Non ACM	-	-	-	-
4-6B	Kitchen - Not Inspected									
4-6C	Kitchen	Floor	Concrete	-	-	Non ACM	-	-	-	-
4-6C	Kitchen	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-6C	Kitchen	Ceiling	Ceiling Tile 2' x 2'	Metal	-	Non ACM	-	-	-	-
4-6C	Kitchen	Deck	Concrete	-	-	Non ACM	-	-	-	-
4-6D	Kitchen	Floor	Concrete	-	-	Non ACM	-	-	-	-
4-6D	Kitchen	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-6D	Kitchen	Ceiling	Ceiling Tile 2' x 2'	Metal	-	Non ACM	-	-	-	-
4-6D	Kitchen	Deck	Concrete	-	-	Non ACM	-	-	-	-
4-6E	Kitchen	Floor	Concrete	-	-	Non ACM	-	-	-	-
4-6E	Kitchen	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-6E	Kitchen	Ceiling	Ceiling Tile 2' x 2'	Metal	-	Non ACM	-	-	-	-
4-6E	Kitchen	Deck	Concrete	-	-	Non ACM	-	-	-	-
4-7	Library	Floor	Carpet	-	-	Non ACM	-	-	-	-
4-7	Library	Wall	Drywall	Drywall Joint Compound	-	Non ACM	SL	S03	13-Apr-18	ND
4-7	Library	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1992)	-	Non ACM	-	-	-	-
4-7B	Computer Lab	Floor	Vinyl Floor Tile 12"x 12"	Light Beige Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
4-7B	Computer Lab	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
4-7B	Computer Lab	Floor	Vinyl Floor Tile 12"x 12"	Dark Beige Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
4-7B	Computer Lab	Wall	Drywall	Drywall Joint Compound	-	Non ACM	SL	S03	13-Apr-18	ND
4-7B	Computer Lab	Wall	Brick	-	-	Non ACM	-	-	-	-
4-7B	Computer Lab	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1992)	-	Non ACM	-	-	-	-
4-7C	Library Entrance	Floor	Vinyl Floor Tile 12"x 12"	Light Beige Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
4-7C	Library Entrance	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
4-7C	Library Entrance	Floor	Vinyl Floor Tile 12"x 12"	Dark Beige Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
4-7C	Library Entrance	Wall	Drywall	Drywall Joint Compound	-	Non ACM	SL	S03	13-Apr-18	ND
4-7C	Library Entrance	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	SL	S03	13-Apr-18	ND

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4-7D	Storage	Floor	Vinyl Floor Tile 12"x 12"	Dark Beige Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
4-7D	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S03	13-Apr-18	ND
4-7D	Storage	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1992)	-	Non ACM	-	-	-	-
4-7E	Seminar	Floor	Carpet	-	-	Non ACM	-	-	-	-
4-7E	Seminar	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S03	13-Apr-18	ND
4-7E	Seminar	Ceiling	Ceiling Tile 2' x 2'	Fibreglass	-	Non ACM	-	-	-	-
4-7E	Seminar	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1992)	-	Non ACM	-	-	-	-
4-7F	Computer Lab	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
4-7F	Computer Lab	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-7F	Computer Lab	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S03	13-Apr-18	ND
4-7F	Computer Lab	Ceiling	Ceiling Tile 2' x 2'	Fibreglass	-	Non ACM	-	-	-	-
4-7F	Computer Lab	Ducting	Duct Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
4-8	Office	Floor	Vinyl Sheet Flooring	Beige Dense Fleck (Post 2005)	-	Non ACM	HM	S34ABC	2011	ND
4-8	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
4-8	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
4-8	Office	Wall	Wood Panels	Wood	-	Non ACM	-	-	-	-
4-8	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1992)	-	Non ACM	-	-	-	-
4-8	Office	Ceiling	Ceiling Tile 1 x 1	Medium and Small Pinhole	NF	ACM	HM	32523-FHSS-812-S23	21-Apr-08	2.5% Amosite
4-8	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
4-8A	Office	Floor	Vinyl Sheet Flooring	Blue (Post 2018)	-	Non ACM	-	-	-	-
4-8A	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
4-8A	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-8A	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1992)	-	Non ACM	-	-	-	-
4-8B	Office	Floor	Vinyl Sheet Flooring	Blue (Post 2018)	-	Non ACM	-	-	-	-
4-8B	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
4-8B	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-8B	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1992)	-	Non ACM	-	-	-	-
4-8C	Office	Floor	Vinyl Sheet Flooring	Blue (Post 2018)	-	Non ACM	-	-	-	-
4-8C	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
4-8C	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-8C	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1992)	-	Non ACM	-	-	-	-
4-8D	Washroom	Floor	Vinyl Sheet Flooring	Blue (Post 2018)	-	Non ACM	-	-	-	-
4-8D	Washroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
4-8D	Washroom	Ceiling	Ceiling Tile 1 x 1	Medium and Small Pinhole	NF	ACM	HM	32523-FHSS-812-S23	21-Apr-08	2.5% Amosite

School Name	Legend:	Notes:
Forest Heights Collegiate Institute	**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: 1964		
Addition(s): 1970, 1987		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
4-8D	Washroom	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
4-8E	Washroom	Floor	Vinyl Sheet Flooring	Blue (Post 2018)	-	Non ACM	-	-	-	-
4-8E	Washroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
4-8E	Washroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
4-8F	Kitchen	Floor	Vinyl Sheet Flooring	Blue (Post 2018)	-	Non ACM	-	-	-	-
4-8F	Kitchen	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
4-8F	Kitchen	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
4-8G	Storage	Floor	Vinyl Floor Tile 9"x 9"	Brown with White, Orange	NF	ACM	HM	S06	10-Jul-15	3.65% Chrysotile
4-8G	Storage	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
4-8G	Storage	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
4-8H	Washroom	Floor	Vinyl Sheet Flooring	Blue (Post 2018)	-	Non ACM	-	-	-	-
4-8H	Washroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
4-8H	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1992)	-	Non ACM	-	-	-	-
4-8J	Washroom	Floor	Vinyl Sheet Flooring	Blue (Post 2018)	-	Non ACM	-	-	-	-
4-8J	Washroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
4-8J	Washroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-1	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
5-1	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-1	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-1	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2004)	-	Non ACM	-	-	-	-
5-1	Office	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
5-1	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-1A	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
5-1A	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-1A	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-1A	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2004)	-	Non ACM	-	-	-	-
5-1A	Office	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
5-1A	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-2	Computer Lab	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2005)	-	Non ACM	HM	S34ABC	2011	ND
5-2	Computer Lab	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-2	Computer Lab	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
5-2	Computer Lab	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
5-2	Computer Lab	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
5-2A	Computer Lab	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2005)	-	Non ACM	HM	S34ABC	2011	ND

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Date Built:		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**
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WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
5-2A	Computer Lab	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-2A	Computer Lab	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
5-2A	Computer Lab	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
5-2A	Computer Lab	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
5-3	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
5-3	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-3	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-3	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2004)	-	Non ACM	-	-	-	-
5-3	Office	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
5-3	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-3A	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
5-3A	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-3A	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-3A	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2004)	-	Non ACM	-	-	-	-
5-3A	Office	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
5-3A	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-3B	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
5-3B	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-3B	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-3B	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2004)	-	Non ACM	-	-	-	-
5-3B	Office	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
5-3B	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-3C	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
5-3C	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-3C	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-3C	Office	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
5-3C	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-3D	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
5-3D	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-3D	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-3D	Office	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
5-3D	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-3E	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
5-3E	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-

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WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
5-3E	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-3E	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2004)	-	Non ACM	-	-	-	-
5-3E	Office	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
5-3E	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-3F	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
5-3F	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-3F	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-3F	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2004)	-	Non ACM	-	-	-	-
5-3F	Office	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
5-3F	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-3G	Office	Floor	Vinyl Floor Tile 12"x 12"	Green with White Streaks	NF	ACM	HM	32523-FHSS-812-S23	21-Apr-08	3.2% Chrysotile
5-3G	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-3G	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-3G	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2004)	-	Non ACM	-	-	-	-
5-3G	Office	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
5-3G	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-3H	Office	Floor	Vinyl Floor Tile 12"x 12"	Green with White Streaks	NF	ACM	HM	32523-FHSS-812-S23	21-Apr-08	3.2% Chrysotile
5-3H	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-3H	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-3H	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2004)	-	Non ACM	-	-	-	-
5-3H	Office	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
5-3H	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-3J	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
5-3J	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-3J	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-3J	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2004)	-	Non ACM	-	-	-	-
5-3J	Office	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
5-3J	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-4	Office	Floor	Vinyl Floor Tile 9"x 9"	Green with White Streaks	NF	ACM	HM	32523--FHSS-B615-S02ABC	21-Apr-08	3.2 Chrysotile
5-4	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-4	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
5-4	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
5-4	Office	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
5-5	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige with Brown Specks	NF	ACM	HM	S11	10-Jul-15	0.79% Chrysotile

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Date Built:		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**
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WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
5-5	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-5	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2004)	-	Non ACM	-	-	-	-
5-5	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
5-5	Classroom	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-5	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
5-5A	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige with Brown Specks	NF	ACM	HM	S11	10-Jul-15	0.79% Chrysotile
5-5A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-5A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2004)	-	Non ACM	-	-	-	-
5-5A	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
5-6	Classroom	Floor	Beige Dense Fleck	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
5-6	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-6	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-6	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2004)	-	Non ACM		-	-	-
5-6	Classroom	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
5-6	Classroom	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-7	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige with Brown Specks	NF	ACM	HM	S11	10-Jul-15	0.79% Chrysotile
5-7	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-7	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-7	Office	Ceiling	Ceiling Tile 2' x 2'	Fibreglass	-	Non ACM	-	-	-	-
5-7A	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige with Brown Specks	NF	ACM	HM	S11	10-Jul-15	0.79% Chrysotile
5-7A	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-7A	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-7A	Office	Ceiling	Ceiling Tile 2' x 2'	Fibreglass	-	Non ACM	-	-	-	-
5-7B	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige with Brown Specks	NF	ACM	HM	S11	10-Jul-15	0.79% Chrysotile
5-7B	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-7B	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-7B	Office	Ceiling	Ceiling Tile 2' x 2'	Fibreglass	-	Non ACM	-	-	-	-
5-7C	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige with Brown Specks	NF	ACM	HM	S11	10-Jul-15	0.79% Chrysotile
5-7C	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-7C	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-7C	Office	Ceiling	Ceiling Tile 2' x 2'	Fibreglass	-	Non ACM	-	-	-	-
5-7D	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige with Brown Specks	NF	ACM	HM	S11	10-Jul-15	0.79% Chrysotile
5-7D	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-7D	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile

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5-7D	Office	Ceiling	Ceiling Tile 2' x 2'	Fibreglass	-	Non ACM	-	-	-	-
5-7E	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige with Brown Specks	NF	ACM	HM	S11	10-Jul-15	0.79% Chrysotile
5-7E	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-7E	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-7E	Office	Ceiling	Ceiling Tile 2' x 2'	Fibreglass	-	Non ACM	-	-	-	-
5-8	Classroom	Floor	Beige Dense Fleck	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
5-8	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-8	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-8	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2004)	-	Non ACM		-	-	-
5-8	Classroom	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
5-8	Classroom	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-9	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige with Brown Specks	NF	ACM	HM	S11	10-Jul-15	0.79% Chrysotile
5-9	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-9	Office	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-9	Office	Ceiling	Ceiling Tile 2' x 2'	Fibreglass	-	Non ACM	-	-	-	-
5-10	Classroom	Floor	Beige Dense Fleck	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
5-10	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-10	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-10	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 2008)	-	Non ACM		-	-	-
5-10	Classroom	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
5-10	Classroom	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-12	Classroom	Floor	Beige Dense Fleck	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
5-12	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-12	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-12	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM		-	-	-
5-12	Classroom	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
5-12	Classroom	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
5-14	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
5-14	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
5-14	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
5-14	Washroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
5-14	Washroom	Piping	Pipe Insulation	Horsehair	-	Non ACM	-	-	-	-
5-14	Washroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
5-14	Washroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile

School Name	Legend:	Notes:
Forest Heights Collegiate Institute	**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: 1964		
Addition(s): 1970, 1987		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
6-1	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-1	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-1	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-1A	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-1A	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-1A	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-1B	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-1B	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-1B	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-1C	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-1C	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-1C	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-2	Weight Room	Floor	Concrete		-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-2	Weight Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-2	Weight Room	Ceiling	Open to Structure	-	-	Non ACM	-	-	-	-
6-2	Weight Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
6-2	Weight Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
6-3	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-3	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-3	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-3A	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-3A	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-3A	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-3B	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-3B	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-3B	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-3C	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-3C	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-3C	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-5	Storage	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-5	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-5	Storage	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-5A	Storage	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-5A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-

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WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
6-5A	Storage	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-7	Storage	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2008)	-	Non ACM	-	-	-	-
6-7	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-7	Storage	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-9A	Storage	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-9A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-9A	Storage	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-9A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-9A	Storage	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-11	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-11	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-11	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-11A	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-11A	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-11A	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-11B	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-11B	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-11B	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-13	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-13	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-13	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-13A	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-13A	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-13A	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-13B	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-13B	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-13B	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-13C	Changeroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-13C	Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-13C	Changeroom	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-13D	Custodial	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-13D	Custodial	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-13D	Custodial	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-13D	Custodial	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
6-13D	Custodial	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
6-15	Receiving	Floor	Concrete	-	-	Non ACM	-	-	-	-

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6-15	Receiving	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-15	Receiving	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-15	Receiving	Deck	Concrete	-	-	Non ACM	-	-	-	-
6-15A	Washroom	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
6-15A	Washroom	Wall	Drywall	Post 2008 Renovation	-	Non ACM	-	-	-	-
6-15A	Washroom	Ceiling	Drywall	Post 2008 Renovation	-	Non ACM	-	-	-	-
6-17	Custodian Office	Floor	Vinyl Floor Tile 12"x 12"	Grey Dense Fleck (Post 2008)	-	Non ACM	-	-	-	-
6-17	Custodian Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-17	Custodian Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (Post 2008)	-	Non ACM	-	-	-	-
6-20	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Beige/Burgundy/White	NF	ACM	HM	S09	10-Jul-15	5.9% Chrysotile
6-20	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-20	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 2008)	-	Non ACM		-	-	-
6-20	Classroom	Ceiling	Ceiling Tile 1' x 1'	Medium & Small Pinhole	-	Non ACM	SL	S07	10-Jul-15	ND
6-20	Classroom	Ducting	Duct Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
6-22	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Flock	-	Non ACM	HM	S34abc	18-Nov-11	ND
6-22	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-22	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
6-22	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 2008)	-	Non ACM		-	-	-
6-22A	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Flock	-	Non ACM	HM	S34abc	18-Nov-11	ND
6-22A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-22A	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
6-22A	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 2008)	-	Non ACM		-	-	-
6-24	Custodial Office	Floor	Concrete	-	-	Non ACM	-	-	-	-
6-24	Custodial Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-24	Custodial Office	Deck	Concrete	-	-	Non ACM	-	-	-	-
6-25	Classroom	Floor	12"x12" Floor Tile	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
6-25	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-25	Classroom	Wall	Plaster	-	-	Non ACM	SL	S20	21-Apr-08	ND
6-25	Classroom	Ceiling	Ceiling Tile 2' x 4'	Thick Fissure Random Pinhole	-	Non ACM	SL	S22abc	21-Apr-08	ND
6-25	Classroom	Ceiling	Ceiling Tile 1 x 1	Acoustic Ceiling Tile - Large Pinhole	NF	ACM	HM	S23ABC	21-Apr-08	2.5 Amosite
6-25	Classroom	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
6-25	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
6-25A		Floor	12"x12" Floor Tile	Beige Dense Fleck (Post 2005)	-	Non ACM	-	-	-	-
6-25A	-	Wall	Concrete	-	-	Non ACM	-	-	-	-

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6-25A	-	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
6-25A	-	Ceiling	Ceiling Tile 1 x 1	Acoustic Ceiling Tile - Large Pinhole	NF	ACM	HM	S23ABC	21-Apr-08	2.5 Amosite
6-25A	-	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
6-27	Lab	Floor	Vinyl Floor Tile 12"x 12"	Beige with Brown Fleck	NF	ACM	SL	S15abc	21-Apr-08	0.75% Chrysotile
6-27	Lab	Floor	Floor Tile Mastic	Yellow/Black Mastic	-	Non ACM	SL	S15abc	21-Apr-08	Trace
6-27	Lab	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-27	Lab	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-27	Lab	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2004)	-	Non ACM	-	-	-	-
6-27	Lab	Ceiling	Ceiling Tile 1 x 1	Acoustic Ceiling Tile - Large Pinhole	NF	ACM	HM	S23ABC	21-Apr-08	2.5 Amosite
6-27	Lab	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
6-27	Lab	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
6-28	Class Room	Floor	Vinyl Floor Tile 9"x 9"	Grey with White and Black	NF	ACM	SL	S06	10-Jul-15	3.65% Chrysotile
6-28	Class Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-28	Class Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
6-28	Class Room	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
6-28	Class Room	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
6-30	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck	-	Non ACM	HM	S34abc	18-Nov-11	ND
6-30	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-30	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-30	Classroom	Ceiling	Ceiling Tile 2' x 4'	Pinhole (Post 2008)	-	Non ACM	-	-	-	-
6-30	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
6-30	Classroom	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
6-32	Office	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck	-	Non ACM	HM	S34abc	18-Nov-11	ND
6-32	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-32	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
6-32	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
6-32	Office	Ceiling	Ceiling Tile 1' x 1'	Medium & Small Pinhole	-	Non ACM	HM	S07	10-Jul-15	ND
7-0	Custodial Room	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
7-0	Custodial Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-0	Custodial Room	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
7-0A	Storage	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense fleck	-	Non ACM	HM	S34ABC	2011	ND
7-0A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-0A	Storage	Counter	Transite	Transite	NF	ACM	VC	Sample prior to disturbance.		
7-0A	Storage	Ceiling	Ceiling Tile 1 x 1	Acoustic Ceiling Tile - Large Pinhole	NF	ACM	HM	S23ABC	21-Apr-08	2.5 Amosite

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7-0A	Storage	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
7-1	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense fleck (Post 2008)	-	Non ACM	-	-	-	-
7-1	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-1	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
7-1	Classroom	Ceiling	Ceiling Tile 2' x 4'	Pinhole	-	Non ACM	-	-	-	-
7-1	Classroom	Above Ceiling	Fire Proofing	Sprayed	-	Non ACM	-	-	-	-
7-2	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense fleck	-	Non ACM	HM	S34ABC	2011	ND
7-2	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-2	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
7-2	Classroom	Ceiling	Ceiling Tile 2' x 4'	Thick Fissure Random Pinhole	NF	ACM	SL	S29abc	21-Apr-08	2.7% Amosite
7-2A	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense fleck	-	Non ACM	HM	S34ABC	2011	ND
7-2A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-2A	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
7-2A	Classroom	Counters	Counter Top	Transite	NF	ACM	VC	Sample prior to disturbance.	-	-
7-2A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Thick Fissure Random Pinhole	NF	ACM	SL	S29abc	21-Apr-08	2.7% Amosite
7-3	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense fleck (Post 2008)	-	Non ACM	-	-	-	-
7-3	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-3	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
7-3	Classroom	Ceiling	Ceiling Tile 2' x 4'	Pinhole (Post 2005)	-	Non ACM	-	-	-	-
7-3	Classroom	Above Ceiling	Fire Proofing	Sprayed	-	Non ACM	-	-	-	-
7-4	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense fleck	-	Non ACM	HM	S34ABC	2011	ND
7-4	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-4	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
7-4	Classroom	Ceiling	Ceiling Tile 2' x 4'	Pinhole (Post 2005)	-	Non ACM	-	-	-	-
7-4	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large Pinhole - Cellulose	-	Non ACM	-	-	-	-
7-4A	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense fleck	-	Non ACM	HM	S34ABC	2011	ND
7-4A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-4A	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
7-4A	Classroom	Counters	Counter Top	Transite	NF	ACM	VC	Sample prior to disturbance.	-	-
7-4A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Pinhole (Post 2005)	-	Non ACM	-	-	-	-
7-4A	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large Pinhole - Cellulose	-	Non ACM	-	-	-	-
7-5	Lab	Floor	Vinyl Floor Tile 12"x 12"	Blue Dense Fleck (post 2008)	-	Non ACM	-	-	-	-
7-5	Lab	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-5	Lab	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-

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WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
7-5	Lab	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
7-5	Lab	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
7-5	Lab	Counters	Counter Top	Transite	NF	ACM	VC	Sample prior to disturbance.	-	-
7-6	Custodial Room	Floor	Vinyl Floor Tile 9"x 9"	Beige Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
7-6	Custodial Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-6	Custodial Room	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
7-7	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
7-7	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
7-7	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
7-7	Washroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
7-7	Washroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
7-8	Electrical	Floor	Concrete	-	-	Non ACM	-	-	-	-
7-8	Electrical	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-8	Electrical	Ceiling	Drywall	Drywall Joint Compound (Post 2008)	-	Non ACM	-	-	-	-
8-1	Classroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
8-1	Classroom	Floor	Vinyl Floor Tile 12"x12"	Beige Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
8-1	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-1	Classroom	Ceiling	Acoustical Panels	Fibre	-	Non ACM	-	-	-	-
8-1	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
8-1	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
8-3	Classroom	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-3	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-3	Classroom	Ceiling	Acoustical Panels	Fibre	-	Non ACM	-	-	-	-
8-3	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
8-3	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
8-5	Communication	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-5	Communication	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-5	Communication	Ceiling	Acoustical Panels	Fibre	-	Non ACM	-	-	-	-
8-5	Communication	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
8-5	Communication	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
8-5B	Storage	Floor	Carpet	-	-	Non ACM	-	-	-	-
8-5B	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-5B	Storage	Ceiling	Acoustical Panels	Fibre	-	Non ACM	-	-	-	-
8-5B	Storage	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-

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WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
8-5B	Storage	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
8-5B	Storage	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
8-6	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
8-6	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-6	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole 2005	-	Non ACM	-	-	-	-
8-6	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
8-6	Classroom	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
8-6	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
8-7	Classroom	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-7	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-7	Classroom	Ceiling	Acoustical Panels	Fibre	-	Non ACM	-	-	-	-
8-7	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
8-7	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
8-7A	Classroom	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-7A	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
8-7A	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
8-7B	Classroom	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-7B	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
8-7B	Classroom	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
8-7C	Stairwell	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-7C	Stairwell	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
8-7C	Stairwell	Deck	Steel	-	-	Non ACM	-	-	-	-
8-7D	Classroom	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-7D	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
8-7D	Classroom	Ceiling	Wood Framing	Wood	-	Non ACM	-	-	-	-
8-8	Classroom	Floor	Vinyl Sheet Flooring	Grey (Post 2018)	-	Non ACM	-	-	-	-
8-8	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-8	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
8-8	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	HM	S16	21-Apr-08	ND
8-8	Classroom	Ceiling	Ceiling Tile 1' x 1'	Acoustic Ceiling Tile - Cellulose	-	Non ACM	-	-	-	-
8-8	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
8-9	Classroom	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-9	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
8-9	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-

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WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
8-9	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
8-9	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S28	21-Apr-08	ND
8-9	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
8-9	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
8-9A	Classroom	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-9A	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
8-9A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-9A	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
8-9A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S28	21-Apr-08	ND
8-10	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Red and Brown	NF	ACM	SL	S25abc	21-Apr-08	7.5% Chrysotile
8-10	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-10	Classroom	Ceiling	Ceiling Tile 1 x 1	Large Random Pinhole	NF	ACM	HM	S23	21-Apr-08	2.5% Amosite
8-10	Classroom	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
8-11	Computer Lab	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-11	Computer Lab	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
8-11	Computer Lab	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
8-11	Computer Lab	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-11	Computer Lab	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	HM	S28	21-Apr-08	ND
8-11A	Classroom	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-11A	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
8-11A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-11A	Classroom	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
8-11A	Classroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	Non ACM	SL	S28abc	21-Apr-08	ND
8-11A	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
8-12	Kiln Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
8-12	Kiln Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-12	Kiln Room	Ceiling	Ceiling Tile 1 x 1	Large Random Pinhole	NF	ACM	SL	S23abc	21-Apr-08	2.5% Amosite
8-12	Kiln Room	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
8-12A	Workroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense fleck	-	Non ACM	HM	S34ABC	2011	ND
8-12A	Workroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-12A	Workroom	Counter	Transite	Transite	NF	ACM	VC	Sample prior to disturbance.		
8-12A	Workroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
8-13	Classroom	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-13	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND

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8-13	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-13	Classroom	Wall	Wood Panel	-	-	Non ACM	-	-	-	-
8-13	Classroom	Ceiling	Acoustical Panels	Fibre	-	Non ACM	-	-	-	-
8-13	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
8-13	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
8-14	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
8-14	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-14	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole	-	Non ACM	HM	S16	21-Apr-08	ND
8-14	Classroom	Ceiling	Ceiling Tile 1' x 1'	Acoustic Ceiling Tile - Cellulose	-	Non ACM	-	-	-	-
8-15	Classroom	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-15	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
8-15	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-15	Classroom	Wall	Wood Panel	-	-	Non ACM	-	-	-	-
8-15	Classroom	Wall	Pegboard	Transite	NF	ACM	VC	Sample prior to disturbance.		
8-15	Classroom	Ceiling	Acoustical Panels	Fibre	-	Non ACM	-	-	-	-
8-15	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
8-15	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
8-15A	Office	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-15A	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
8-15A	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-15A	Office	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
8-15B	Office	Floor	Hardwood	Wood	-	Non ACM	-	-	-	-
8-15B	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
8-15B	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-15B	Office	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
9-1	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Cream Oatmeal	-	Non ACM	SL	S30abc	21-Apr-08	ND
9-1	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
9-1	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
9-1	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
9-1	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
9-2	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense fleck	-	Non ACM	-	-	-	-
9-2	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
9-2	Classroom	Wall	Plaster	-	-	Non ACM	SL	S27abcd	21-Apr-08	ND
9-2	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-

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9-2	Classroom	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	HM	S07	10-Jul-15	ND
9-2	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
9-3	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Cream Oatmeal	-	Non ACM	HM	S30	21-Apr-08	ND
9-3	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
9-3	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
9-3	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
9-3	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large Pinhole - Cellulose	-	Non ACM	-	-	-	-
9-4	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense fleck	-	Non ACM	-	-	-	-
9-4	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
9-4	Classroom	Wall	Plaster	-	-	Non ACM	SL	S27abcd	21-Apr-08	ND
9-4	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
9-4	Classroom	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	HM	S07	10-Jul-15	ND
9-5	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense fleck	-	Non ACM	-	-	-	-
9-5	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
9-5	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
9-5	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
9-5	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large Pinhole - Cellulose	-	Non ACM	-	-	-	-
9-6	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense fleck	-	Non ACM	-	-	-	-
9-6	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
9-6	Classroom	Wall	Plaster	-	-	Non ACM	SL	S27abcd	21-Apr-08	ND
9-6	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
9-6	Classroom	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	HM	S07	10-Jul-15	ND
9-7	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
9-7	Washroom	Wall	Ceramic Tile	Green	-	Non ACM	-	-	-	-
9-7	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
9-7	Washroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
9-7	Washroom	Piping	Pipe Fitting	Fibreglass/PVC	-	Non ACM	-	-	-	-
9-8	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense fleck	-	Non ACM	-	-	-	-
9-8	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
9-8	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
9-8	Classroom	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	HM	S07	10-Jul-15	ND
9-8	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
C1	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C1	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-

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C1	Corridor	Ceiling	Ceiling Tile 2 x 2	Short Fissure Random Pinhole 2005	-	Non ACM		-	-	-
C1	Corridor	Ceiling	Ceiling Tile 2 x 2	Long Fissure Random Pinhole	NF	ACM	SL	S35acb	11/18/2011	2.5% Amosite
C1	Corridor	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
C1	Corridor	Ducting	Duct Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
C1	Corridor	Piping	Pipe Insulation	Horsehair	-	Non ACM	-	-	-	-
C1	Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
C1	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
C2	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C2	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
C2	Corridor	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
C2	Corridor	Ceiling	Ceiling Tile 2 x 2	Short Fissure Random Pinhole	-	Non ACM	HM	S33abc	18-Nov-11	ND
C2	Corridor	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
C2	Corridor	Ducting	Duct Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
C2	Corridor	Piping	Pipe Insulation	Horsehair	-	Non ACM	-	-	-	-
C2	Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
C3	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C3	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
C3	Corridor	Ceiling	Ceiling Tile 2 x 2	Short Fissure Random Pinhole	-	Non ACM	SL	S24ABC	21-Apr-08	ND
C3	Corridor	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-
C4	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C4	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
C4	Corridor	Ceiling	Ceiling Tile 2 x 2	Short Fissure Random Pinhole 2005	-	Non ACM		-	-	-
C4	Corridor	Ceiling	Ceiling Tile 2 x 2	Long Fissure Random Pinhole	NF	ACM	SL	S35acb	11/18/2011	2.5% Amosite
C4	Corridor	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
C4	Corridor	Ducting	Duct Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
C4	Corridor	Piping	Pipe Insulation	Horsehair	-	Non ACM	-	-	-	-
C4	Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
C4	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
C4A	Entrance	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C4A	Entrance	Wall	Concrete	-	-	Non ACM	-	-	-	-
C4A	Entrance	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
C4A	Entrance	Wall	Stone	-	-	Non ACM	-	-	-	-
C4A	Entrance	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
C4A	Entrance	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole 2005	-	Non ACM	-	-	-	-

School Name	Legend:	Notes:
Forest Heights Collegiate Institute	**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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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
C4B	Gym Entrances	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C4B	Gym Entrances	Wall	Concrete	-	-	Non ACM	-	-	-	-
C4B	Gym Entrances	Deck	Concrete	-	-	Non ACM	-	-	-	-
C4B	Gym Entrances	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
C4B	Gym Entrances	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
C4C	Gym Entrances	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C4C	Gym Entrances	Wall	Concrete	-	-	Non ACM	-	-	-	-
C4C	Gym Entrances	Deck	Concrete	-	-	Non ACM	-	-	-	-
C4C	Gym Entrances	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
C4C	Gym Entrances	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
C5	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C5	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
C5	Corridor	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
C5	Corridor	Ceiling	Ceiling Tile 2 x 2	Short Fissure Random Pinhole	-	Non ACM	HM	S33abc	18-Nov-11	ND
C5	Corridor	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
C5	Corridor	Ducting	Duct Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
C5	Corridor	Piping	Pipe Insulation	Horsehair	-	Non ACM	-	-	-	-
C5	Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
C5	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
C6	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C6	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
C6	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 2008)	-	Non ACM		-	-	-
C6	Corridor	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
C6	Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
C6	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
C7	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C7	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
C7	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 2008)	-	Non ACM		-	-	-
C7	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
C8	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C8	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
C8	Corridor	Ceiling	Ceiling Tile 2' x 2'	Gypsum	-	Non ACM	-	-	-	-
C9	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
C9	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-

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C9	Corridor	Ceiling	Ceiling Tile 2' x 2'	Gypsum	-	Non ACM	-	-	-	-
C9	Corridor	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-
CFI	Cafeteria	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck	-	Non ACM	HM	S34abc	18-Nov-11	ND
CFI	Cafeteria	Wall	Concrete	-	-	Non ACM	-	-	-	-
CFI	Cafeteria	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
CFI	Cafeteria	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
CF2	Cafeteria	Floor	Vinyl Floor Tile 12"x12"	Beige Dense Fleck (Post 2015)	-	Non ACM	-	-	-	-
CF2	Cafeteria	Wall	Concrete	-	-	Non ACM	-	-	-	-
CF2	Cafeteria	Ceiling	Ceiling Tile 2 x 2	Short Fissure Random Pinhole	-	Non ACM	HM	34532-400-FHSS-C4-S33	18-Nov-11	ND
CF2	Cafeteria	Ceiling	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
CF2	Cafeteria	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
CF2	Cafeteria	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
F1	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
F1	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
F1	Washroom	Ceiling	Ceiling Tile 2' x 2'	Large & Small (Gypsum)	-	Non ACM	-	-	-	-
F1	Washroom	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-
F1	Washroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
F1	Washroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
F2	Cafeteria	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck	-	Non ACM	HM	S34abc	18-Nov-11	ND
F2	Cafeteria	Wall	Concrete	-	-	Non ACM	-	-	-	-
F2	Cafeteria	Wall	Texture Coat	-	F	ACM	HM	S32abcde	21-Apr-08	3.5% Chrysotile
F2	Cafeteria	Ceiling	Texture Coat	-	F	ACM	SL	S32abcde	21-Apr-08	3.5% Chrysotile
F2	Cafeteria	Ducting	Duct Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
F2	Cafeteria	Ceiling	Ceiling Tile 1 x 1	Acoustic Ceiling Tile	NF	ACM	HM	32523-FHSS-B615-S03	21-Apr-08	2.3% Amosite
F2A	Storage	Floor	Vinyl Floor Tile 9"x 9"	Beige, Burgundy White	NF	ACM	HM	S09	10-Jul-15	5.9% Chrysotile
F2A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
F2A	Storage	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
F2A	Storage	Ceiling	Ceiling Tile 2 x 2	Long Fissure Random Pinhole	-	Non ACM	HM	S11	10-Jul-15	ND
F2A-B	Storage	Floor	Vinyl Floor Tile 9"x 9"	Beige, Burgundy White	NF	ACM	HM	S09	10-Jul-15	5.9% Chrysotile
F2A-B	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
F2A-B	Storage	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
F2A-B	Storage	Ceiling	Ceiling Tile 2 x 2	Long Fissure Random Pinhole	-	Non ACM	HM	S11	10-Jul-15	ND
F2B	Storage	Floor	Vinyl Floor Tile 9"x 9"	Beige, Burgundy White	NF	ACM	HM	S09	10-Jul-15	5.9% Chrysotile
F2B	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-

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F2B	Storage	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
F2B	Storage	Ceiling	Ceiling Tile 2 x 2	Long Fissure Random Pinhole	-	Non ACM	HM	S11	10-Jul-15	ND
F2C	Facilities Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
F2C	Facilities Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
F2C	Facilities Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
F2C	Facilities Office	Ceiling	Ceiling Tile 2 x 4	Long Fissure Random Pinhole (2010)	-	Non ACM		-	-	-
F2C-D	Washroom	Floor	Vinyl Floor Tile 9"x 9"	Beige Dense Fleck (Post 2018)	-	Non ACM	-	-	-	-
F2C-D	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
F2C-D	Washroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
F2C-D	Washroom	Ceiling	Ceiling Tile 2 x 4	Long Fissure Random Pinhole (2010)	-	Non ACM		-	-	-
F2E	Bookroom	Floor	Vinyl Floor Tile 9"x 9"	Brown with White Streaks	NF	ACM	HM	S11	10-Jul-15	0.79% Chrysotile
F2E	Bookroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
F2E	Bookroom	Ceiling	Ceiling Tile 1 x 1	Large and Small Pinhole	NF	ACM	HM	S03	21-Apr-08	2.3% Amosite
F2E	Bookroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
F2E	Bookroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
F2F	Not Inspected									
F2G	Stage	Floor	Wood	-	-	Non ACM	-	-	-	-
F2G	Stage	Wall	Concrete	-	-	Non ACM	-	-	-	-
F2G	Stage	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
F2G	Stage	Ducting	Duct Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
F2H	Cafeteria	Floor	Vinyl Floor Tile 12"x 12"	Beige Dense Fleck	-	Non ACM	HM	S34abc	18-Nov-11	ND
F2H	Cafeteria	Wall	Concrete	-	-	Non ACM	-	-	-	-
F2H	Cafeteria	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (Post 2008)	-	Non ACM	-	-	-	-
F3	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
F3	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
F3	Washroom	Ceiling	Ceiling Tile 2' x 2'	Large & Small (Gypsum)	-	Non ACM	-	-	-	-
F3	Washroom	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-
F3	Washroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
F3	Washroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
901	Stairwell/Exit	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
901	Stairwell/Exit	Floor	Ceramic Tile	6" x 6" Brown	-	Non ACM	-	-	-	-
901	Stairwell/Exit	Wall	Concrete	-	-	Non ACM	-	-	-	-
901	Stairwell/Exit	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
902	Stairwell/Exit	Floor	Terrazzo	-	-	Non ACM	-	-	-	-

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902	Stairwell/Exit	Floor	Ceramic Tile	6" x 6" Brown	-	Non ACM	-	-	-	-
902	Stairwell/Exit	Wall	Concrete	-	-	Non ACM	-	-	-	-
903	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
903	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
903	Stairwell	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
904	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
904	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
904	Stairwell	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
904	Stairwell	Ceiling	Texture Coat	-	F	ACM	SL	S32abcde	21-Apr-08	3.5% Chrysotile
905	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
909	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
909	Stairwell	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
909	Stairwell	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
909	Stairwell	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
909	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
909	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
909	Stairwell	Deck	Concrete	-	-	Non ACM	-	-	-	-
910	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
910	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
910	Stairwell	Ceiling	Ceiling Tile 2 x 2	Large Fissured Random Pinhole	-	Non ACM	HM	S10	10-Jul-15	ND
Second Floor										
S-3	Fan Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
S-3	Fan Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
S-3	Fan Room	Deck	Concrete	-	-	Non ACM	-	-	-	-
S-3	Fan Room	Piping	Insulation	Fibreglass	-	Non ACM	-	-	-	-
S-3	Fan Room	Ducting	Flex Joint	-	NF	ACM	VC	Sample prior to disturbance.	-	-
S-3	Fan Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
S-3	Fan Room	Ducting	Duct Parging	-	F	ACM	SL	S14abc	21-Apr-08	70% Chrysotile
S-3	Fan Room	Piping	Piping	Pipe Insulation	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite
S-3	Fan Room	Insulation	Vermiculite	-	-	Non ACM	SL	S13ABC	21-Apr-08	ND
S-3	Fan Room	Insulation	Building Paper	-	-	Non ACM	SL	S12ABC	21-Apr-08	ND
S4-2	Gym Stands	Floor	Concrete	-	-	Non ACM	-	-	-	-

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S4-2	Gym Stands	Wall	Concrete	-	-	Non ACM	-	-	-	-
S4-2	Gym Stands	Ceiling	Steel Deck	-	-	Non ACM	-	-	-	-
S4-6	Mechanical Equipment Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
S4-6	Mechanical Equipment Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
S4-6	Mechanical Equipment Room	Deck	Concrete	-	-	Non ACM	-	-	-	-
S4-6	Mechanical Equipment Room	Piping	Piping	Pipe Insulation	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite
S4-6A	Mechanical Equipment Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
S4-6A	Mechanical Equipment Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
S4-6A	Mechanical Equipment Room	Deck	Concrete	-	-	Non ACM	-	-	-	-
S4-6B	Mechanical Equipment Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
S4-6B	Mechanical Equipment Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
S4-6B	Mechanical Equipment Room	Deck	Concrete	-	-	Non ACM	-	-	-	-
S5	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
S5	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
S5	Corridor	Ceiling	Ceiling Tile 2' x 2'	Large & Small (Gypsum)	-	Non ACM	-	-	-	-
S5	Corridor	Upper Ceiling	Drywall	No Drywall Joint Compound	-	Non ACM	-	-	-	-
S5	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
S5	Corridor	Upper Walls	Troweled Insulation	Fireproofing	-	Non ACM	HM	34532-903-S02ABC	3/20/2015	ND
S5-1	Fan Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
S5-1	Fan Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
S5-1	Fan Room	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S5-1	Fan Room	Ducting	Flex Joint	-	NF	ACM	-	-	-	-
S5-2	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Burgundy	NF	ACM	HM	S08	21-Apr-08	3.5% Chrysotile
S5-2	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S5-2	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S5-2	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S5-2	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S5-3	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S5-3	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S5-3	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S5-3	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S5-3	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole	NF	ACM	HM	S03ABC	21-Apr-08	2.3 Amosite
S5-3	Classroom	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
S5-3A	Office	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND

School Name	Legend:	Notes:
Forest Heights Collegiate Institute	**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: 1964		
Addition(s): 1970, 1987		

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
S5-3A	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
S5-3A	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S5-3A	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S5-3A	Office	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole	NF	ACM	HM	S03ABC	21-Apr-08	2.3 Amosite
S5-3A	Office	Ceiling	Ceiling Tile 1 x 1	Mastic	NF	ACM	HM	S01	13-Apr-18	3% Amosite
S5-4	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S5-4	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S5-4	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S5-4	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S5-4	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S5-5	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S5-5	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S5-5	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S5-5	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S5-5	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S5-6	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S5-6	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S5-6	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S5-6	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S5-6	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S5-7	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
S5-7	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S5-7	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S5-7	Washroom	Ceiling	Drywall	No Drywall Joint Compound	-	Non ACM	-	-	-	-
S5-8	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
S5-8	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S5-8	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S5-8	Washroom	Ceiling	Drywall	No Drywall Joint Compound	-	Non ACM	-	-	-	-
S6	Hallway	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
S6	Hallway	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6	Hallway	Ceiling	Ceiling Tile 2' x 2'	Large & Small (Gypsum)	-	Non ACM	-	-	-	-
S6	Hallway	Ceiling	Drywall	No Drywall Joint Compound	-	Non ACM	-	-	-	-
S6	Hallway	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
S6	Hallway	Upper Walls	Troweled Insulation	Fireproofing	-	Non ACM	SL	34532-903-S02ABC	3/20/2015	ND

School Name	Legend:	Notes:
Forest Heights Collegiate Institute	**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.**
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WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
S6A	Custodial Room	Terrazzo	-	Floor	-	Non ACM	-	-	-	-
S6A	Custodial Room	Concrete	-	Wall	-	Non ACM	-	-	-	-
S6A	Custodial Room	Plaster	-	Ceiling	-	Non ACM	S20, S27	21-Apr-08	ND	Non ACM
S6A	Custodial Room	Pipe Insulation	Fibreglass insulation	Above Ceiling	-	Non ACM	-	-	-	-
S6B	Custodial Room	Terrazzo	-	Floor	-	Non ACM	-	-	-	-
S6B	Custodial Room	Concrete	-	Wall	-	Non ACM	-	-	-	-
S6B	Custodial Room	Plaster	-	Ceiling	-	Non ACM	S20, S27	21-Apr-08	ND	Non ACM
S6B	Custodial Room	Piping	Piping	Pipe Insulation	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite
S6B	Custodial Room	Pipe Insulation	Fibreglass insulation	Above Ceiling	-	Non ACM	-	-	-	-
S6-1	Mechanical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
S6-1	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-1	Mechanical Room	Deck	Concrete	-	-	Non ACM	-	-	-	-
S6-1	Mechanical Room	Ducting	Flex Joint	-	NF	ACM	VC	-	-	-
S6-1	Mechanical Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
S6-1	Mechanical Room	Piping	Piping	Pipe Insulation	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite
S6-2	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S6-2	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-2	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-2	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-2	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-3	Classroom	Floor	Vinyl Floor Tile 9"x 9"	Burgundy	NF	ACM	HM	S08	21-Apr-08	3.5% Chrysotile
S6-3	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-3	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-3	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-3	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-4	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	SL	S09abc	21-Apr-08	ND
S6-4	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-4	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-4	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-4	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-5	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S6-5	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-5	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-5	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-

School Name	Legend:	Notes:
Forest Heights Collegiate Institute	**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: 1964		
Addition(s): 1970, 1987		

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
S6-5	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-6	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S6-6	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-6	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-6	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-6	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-7	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S6-7	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-7	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-7	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-7	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-8	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S6-8	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-8	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-8	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-8	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-9	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S6-9	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-9	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-9	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-9	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-9A	Office	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S6-9A	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-9A	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-9A	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-9A	Office	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-11	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S6-11	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-11	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-11	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-11	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-11B	Office	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S6-11B	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-11B	Office	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND

School Name	Legend:	Notes:
Forest Heights Collegiate Institute	**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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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
S6-11B	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-11B	Office	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-12	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S6-12	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-12	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-12	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-12	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-13	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S6-13	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-13	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-13	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-13	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-14	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S6-14	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-14	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-14	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-14	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-15	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S6-15	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-15	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-15	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-15	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-16	Classroom	Floor	Vinyl Floor Tile 12"x 12"	Brown	-	Non ACM	HM	S09	21-Apr-08	ND
S6-16	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-16	Classroom	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-16	Classroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1994)	-	Non ACM	-	-	-	-
S6-16	Classroom	Ceiling	Ceiling Tile 1' x 1'	Large and Small Random Pinhole (Cellulose)	-	Non ACM	-	-	-	-
S6-18	Fan Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
S6-18	Fan Room	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
S6-18	Fan Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-18	Fan Room	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-18	Fan Room	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-18	Fan Room	Ducting	Flex Joint	-	NF	ACM	VC	Sample prior to disturbance.	-	-
S6-18A	Fan Room Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-

School Name	Legend:	Notes:
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Date Built:		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**
Original: 1964		
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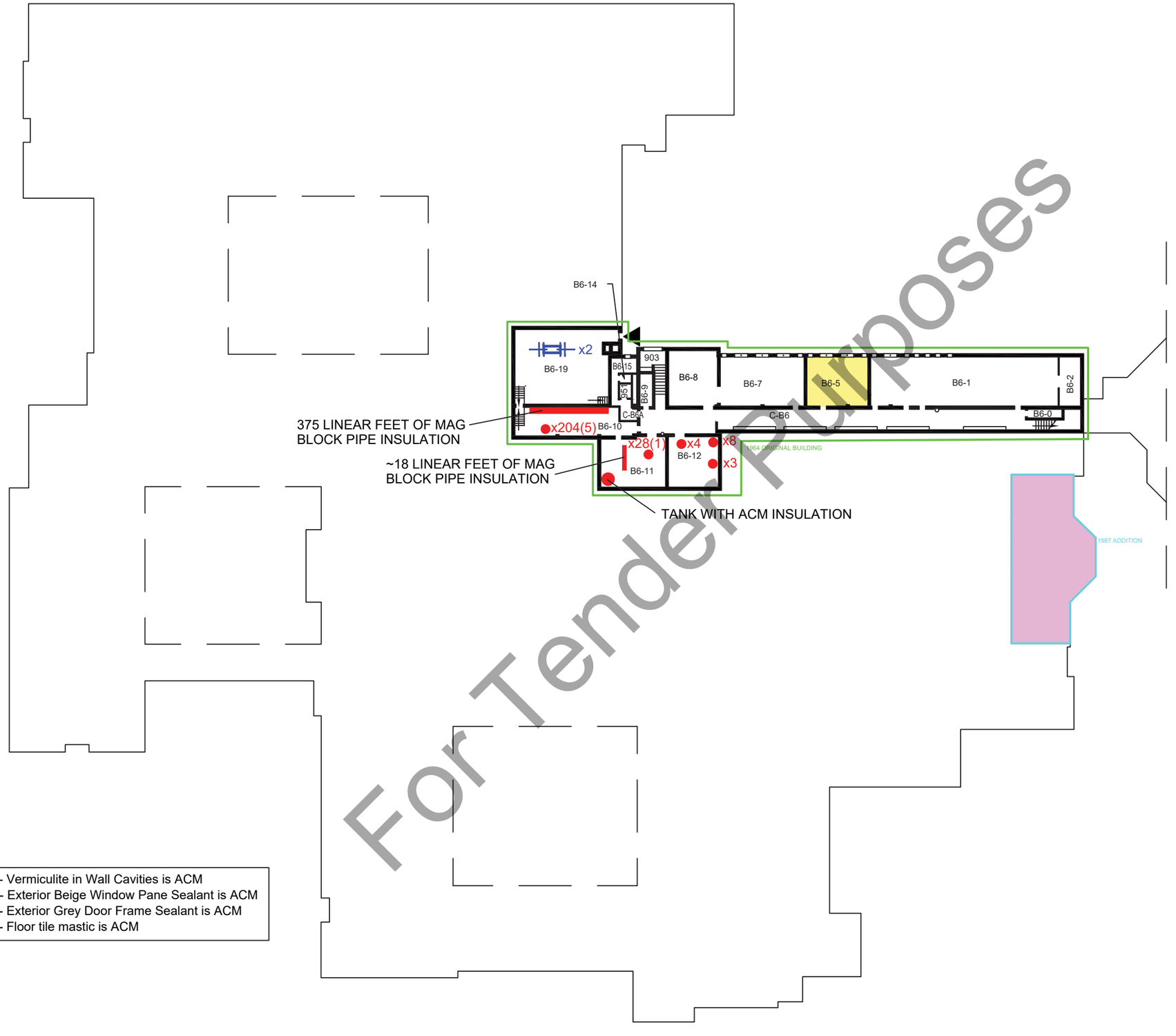
WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
S6-18A	Fan Room Storage	Wall	Drywall	Drywall Joint Compound	NF	ACM	HM	S04	13-Apr-18	1 - 3% Chrysotile
S6-18A	Fan Room Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
S6-18A	Fan Room Storage	Wall	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S6-18A	Fan Room Storage	Ceiling	Plaster	-	-	Non ACM	HM	S20, S27	21-Apr-08	ND
S-8	Fan Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
S-8	Fan Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
S-8	Fan Room	Deck	Concrete	-	-	Non ACM	-	-	-	-
S-8	Fan Room	Piping	Insulation	Fibreglass	-	Non ACM	-	-	-	-
S-8	Fan Room	Ducting	Flex Joint	-	NF	ACM	-	-	-	-
S-8	Fan Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite, 1-5% Chrysotile
S-8	Fan Room	Ducting	Duct Parging	-	F	ACM	SL	S14abc	21-Apr-08	70% Chrysotile
S-8	Fan Room	Piping	Piping	Pipe Insulation	F	ACM	HM	1680.288-06	13-Jun-90	50-75% Amosite
S-8	Fan Room	Insulation	Vermiculite	-	-	Non ACM	SL	S13ABC	21-Apr-08	ND
S-8	Fan Room	Insulation	Building Paper	-	-	Non ACM	SL	S12ABC	21-Apr-08	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



Original Building - Vermiculite in Wall Cavities is ACM
Original Building - Exterior Beige Window Pane Sealant is ACM
Original Building - Exterior Grey Door Frame Sealant is ACM
Original Building - Floor tile mastic is ACM

NOTES:

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

ALL KNOWN OR SUSPECT ASBESTOS-CONTAINING MATERIALS AND/OR DESIGNATED MATERIALS ARE NOT DEPICTED ON THIS DRAWING. REFER TO THE REPORT FOR A COMPLETE LIST OF IDENTIFIED MATERIALS.

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

Legend

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

Asbestos-Containing Materials (ACM):

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

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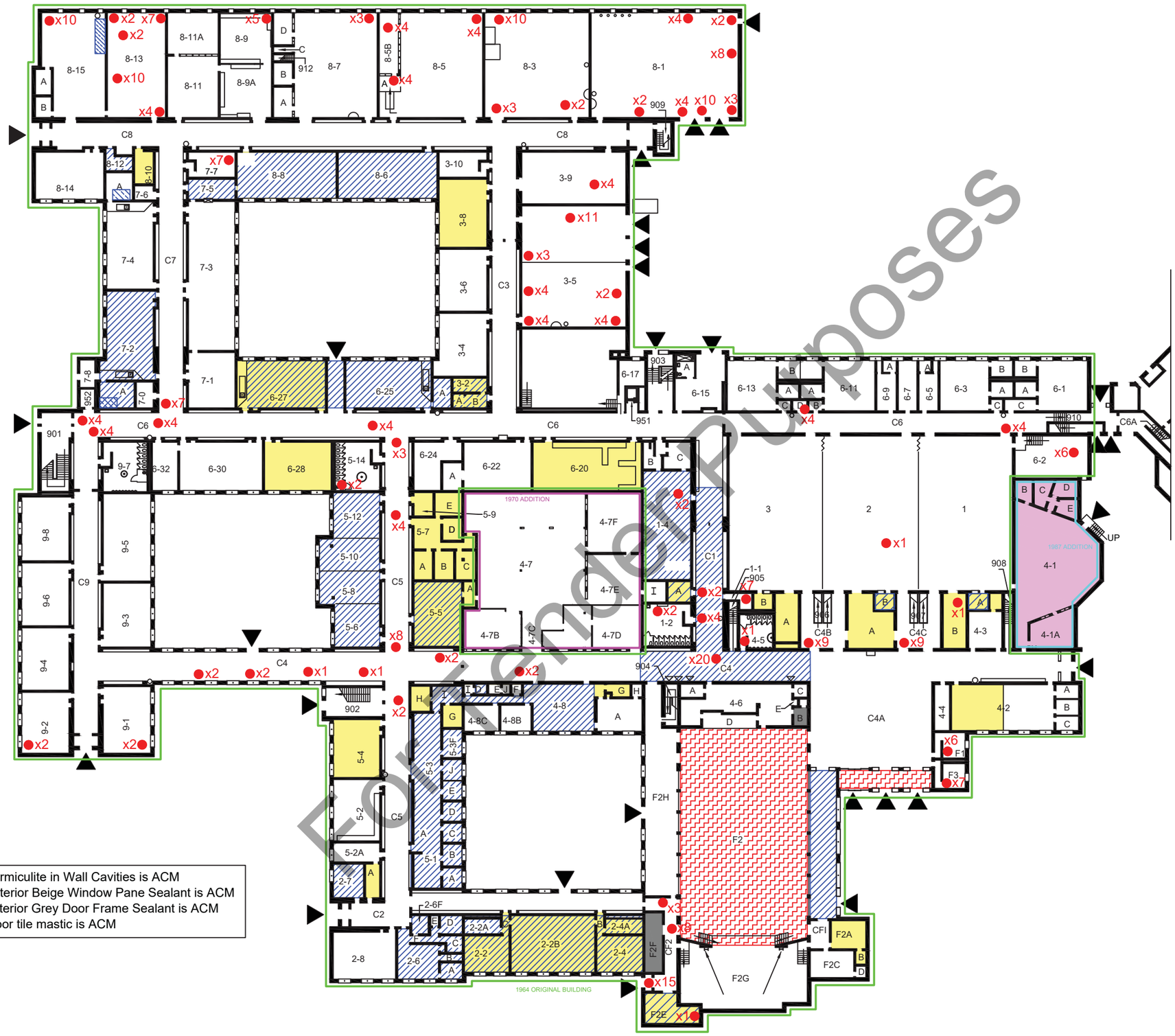
WATERLOO REGION DISTRICT SCHOOL BOARD

PROJECT
2021 ASBESTOS AUDIT UPDATE

DRAWING
FOREST HEIGHTS COLLEGIATE INSTITUTE

BASEMENT

Project Manager P. Semeniuk	Date November 2021
Design By WRDSB	Project No. 34532-921
Drawn By P. Semeniuk	Drawing No. 1.0
Scale N.T.S.	



Original Building - Vermiculite in Wall Cavities is ACM
Original Building - Exterior Beige Window Pane Sealant is ACM
Original Building - Exterior Grey Door Frame Sealant is ACM
Original Building - Floor tile mastic is ACM

NOTES:

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

ALL KNOWN OR SUSPECT ASBESTOS-CONTAINING MATERIALS AND/OR DESIGNATED MATERIALS ARE NOT DEPICTED ON THIS DRAWING. REFER TO THE REPORT FOR A COMPLETE LIST OF IDENTIFIED MATERIALS.

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

Legend

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

Asbestos-Containing Materials (ACM):

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

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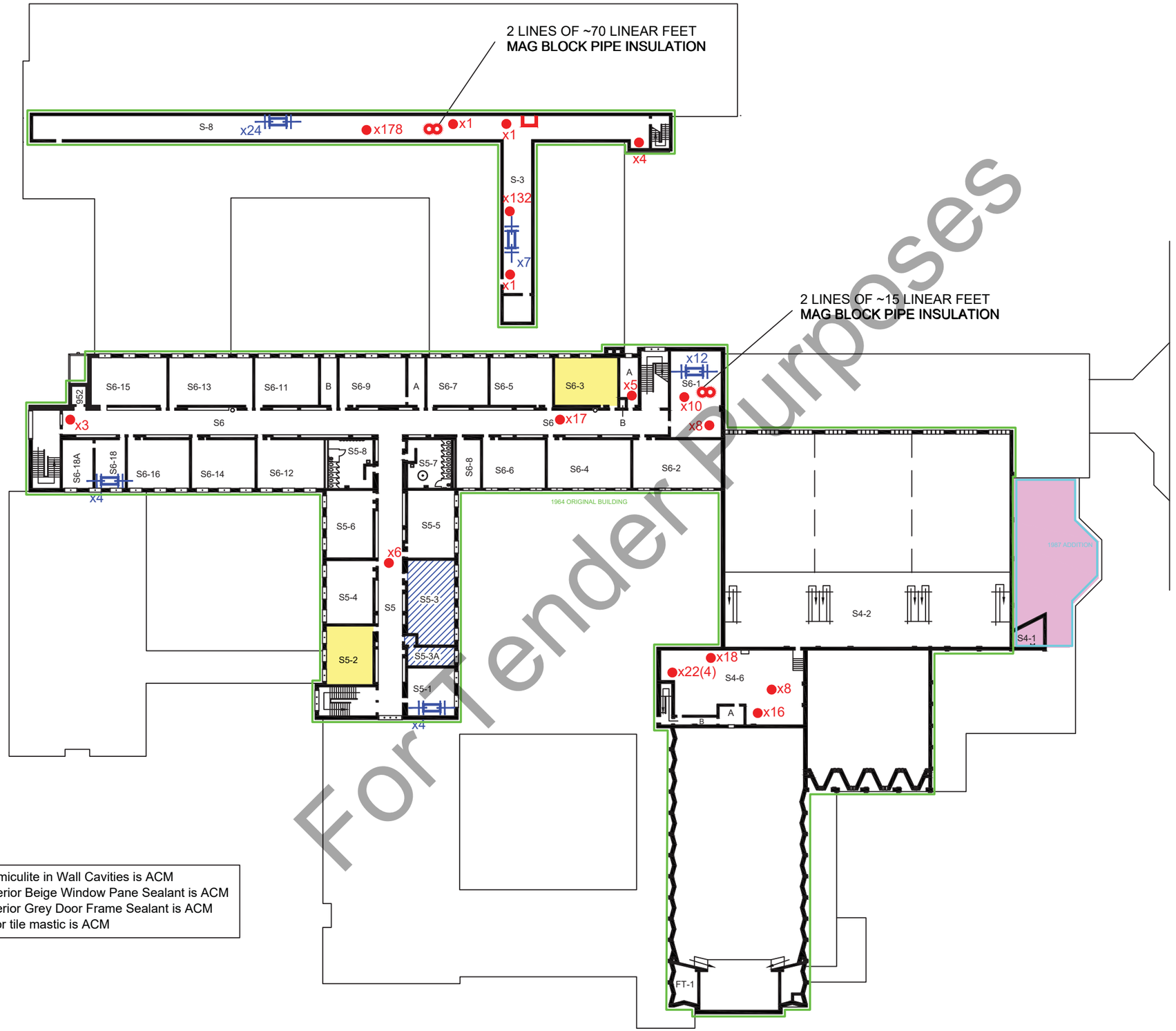
PROJECT
2021 ASBESTOS AUDIT UPDATE

DRAWING
FOREST HEIGHTS COLLEGIATE INSTITUTE

LEVEL ONE

Project Manager: P. Semeniuk	Date: November 2021
Design By: WRDSB	Project No.: 34532-921
Drawn By: P. Semeniuk	Drawing No.: 2.0
Scale: N.T.S.	



Original Building - Vermiculite in Wall Cavities is ACM
Original Building - Exterior Beige Window Pane Sealant is ACM
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NOTES:

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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.

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Legend

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

Asbestos-Containing Materials (ACM):

- Floor Tile
- Rolled Flooring
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- x2(1) — Pipe Fitting Insulation w Quantity (Brackets Indicate # of Damaged Fittings)
- Pipe Insulation (Vertical and Horizontal)
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- x2(1) — Duct Expansion Joints w Quantity (Brackets Indicate # of Damaged Joints)
- Friable Debris

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PROJECT
2021 ASBESTOS AUDIT UPDATE

DRAWING
FOREST HEIGHTS COLLEGIATE INSTITUTE

SECOND FLOOR

Project Manager: P. Semeniuk	Date: November 2021
Design By: WRDSB	Project No.: 34532-921
Drawn By: P. Semeniuk	Drawing No.: 3.0
Scale: N.T.S.	

Appendix C

Tables

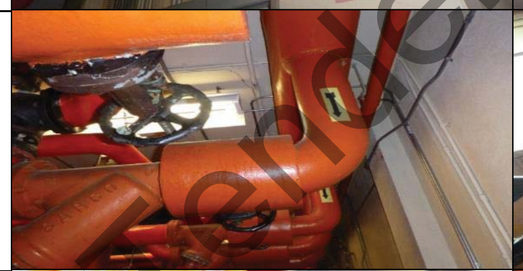
TABLE 1 - INTERNAL ABATEMENT MANAGEMENT						
Forest Heights Collegiate Institute						
Material	**WRDSB Fixed Reference Number**	**Material Description**	**Approximate Quantity**	**Photograph - Context**	**Photograph - Detail**	**Required Action**
Asbestos Friable	B6-11	Insulation on Pipe Fittings	1 Fitting			Monitor Annually
Asbestos Friable	B6-10	Insulation on Pipe Fittings	1 Fitting			Monitor Annually
Asbestos Friable	B6-10	Insulation on Pipe Fittings	2 Fittings			Monitor Annually
Asbestos Friable	B6-10	Insulation on Pipe Fittings	2 Fittings			Monitor Annually

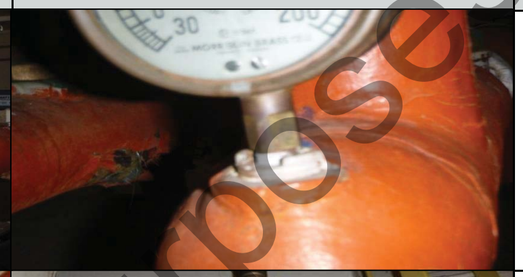
TABLE 1 - INTERNAL ABATEMENT MANAGEMENT						
Forest Heights Collegiate Institute						
Material	**WRDSB Fixed Reference Number**	**Material Description**	**Approximate Quantity**	**Photograph - Context**	**Photograph - Detail**	**Required Action**
Asbestos Friable	S4-6	Insulation on Pipe Fittings	3 Fittings			Monitor Annually
Asbestos Friable	S4-6	Insulation on Pipe Fittings	1 Fitting			Monitor Annually
Asbestos Non-Friable	F2A	9"x9" Brown Floor Tiles	5 Tiles			Monitor Annually
Asbestos Non-Friable	F2E	2'x4' Ceiling Tile pinhole	3 Tiles			Monitor Annually

TABLE 1 - INTERNAL ABATEMENT MANAGEMENT						
Forest Heights Collegiate Institute						
Material	**WRDSB Fixed Reference Number**	**Material Description**	**Approximate Quantity**	**Photograph - Context**	**Photograph - Detail**	**Required Action**
Asbestos Non-Friable	F2	Soft Texture Coat	<1m			Monitor Annually
Asbestos Non-Friable	1-4A	2'x4' Ceiling Tile Long Fissure Random Pinhole	1 Tile			Monitor Annually
Asbestos Non-Friable	1A	9"x9" Brown with White Floor Tile	2 Tiles			Monitor Annually
Asbestos Non-Friable	4-3	9"x9" Green with White Floor Tile	1 Tile			Monitor Annually

TABLE 1 - INTERNAL ABATEMENT MANAGEMENT						
Forest Heights Collegiate Institute						
Material	**WRDSB Fixed Reference Number**	**Material Description**	**Approximate Quantity**	**Photograph - Context**	**Photograph - Detail**	**Required Action**
Asbestos Non-Friable	2-7A	9"x9" Brown Floor Tile	1 Tile			Monitor Annually
Asbestos Non-Friable	3A	9"x9" Brown with White Floor Tile	5 Tiles			Monitor Annually
Asbestos Non-Friable	6-27	12"x12" Tan with brown and white Floor Tile	5 Tiles			Monitor Annually
Asbestos Non-Friable	7-2	2'x4' Ceiling Tile Long Fissure Random Pinhole	25 Tiles			Monitor Annually

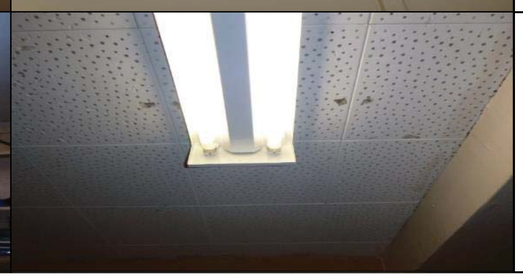
TABLE 1 - INTERNAL ABATEMENT MANAGEMENT						
Forest Heights Collegiate Institute						
Material	**WRDSB Fixed Reference Number**	**Material Description**	**Approximate Quantity**	**Photograph - Context**	**Photograph - Detail**	**Required Action**
Asbestos Non-Friable	7-2	2'x4' Ceiling Tile Long Fissure Random Pinhole	1 Tile			Repair/Removal in accordance with O. Reg. 278/05 as a Type 1 Operation
Asbestos Non-Friable	F2	1'x1' Ceiling Tiles - Large and Small Pinhole	Throughout Room			Monitor Annually
Asbestos Non-Friable	1-4A	1'x1' Ceiling Tiles - Large and Small Pinhole	1 Tile			Monitor Annually
Asbestos Non-Friable	2B	1'x1' Ceiling Tiles - Large and Small Pinhole	3 Tiles			

TABLE 1 - INTERNAL ABATEMENT MANAGEMENT						
Forest Heights Collegiate Institute						
Material	**WRDSB Fixed Reference Number**	**Material Description**	**Approximate Quantity**	**Photograph - Context**	**Photograph - Detail**	**Required Action**
Asbestos Non-Friable	2-6B	1'x1' Ceiling Tiles - Large and Small Pinhole	1 Tile			Monitor Annually
Asbestos Non-Friable	2-6C	1'x1' Ceiling Tiles - Large and Small Pinhole	3 Tiles			Monitor Annually
Asbestos Non-Friable	2-6D	1'x1' Ceiling Tiles - Large and Small Pinhole	1Tile			Monitor Annually
Asbestos Non-Friable	3-2	1'x1' Ceiling Tiles - Large and Small Pinhole	3 Tiles			Monitor Annually

TABLE 1 - INTERNAL ABATEMENT MANAGEMENT						
Forest Heights Collegiate Institute						
Material	**WRDSB Fixed Reference Number**	**Material Description**	**Approximate Quantity**	**Photograph - Context**	**Photograph - Detail**	**Required Action**
Asbestos Non-Friable	3-2B	1'x1' Ceiling Tiles - Large and Small Pinhole	1 Tile			Monitor Annually
Asbestos Non-Friable	7-2A	1'x1' Ceiling Tiles - Large and Small Pinhole	15 Tiles			Monitor Annually
Asbestos Non-Friable	7-4A	1'x1' Ceiling Tiles - Large and Small Pinhole	6 Tiles			Monitor Annually
Asbestos Non-Friable	8-12	1'x1' Ceiling Tiles - Large and Small Pinhole	11 Tiles			Monitor Annually

TABLE 1 - INTERNAL ABATEMENT MANAGEMENT

Forest Heights Collegiate Institute

Material	WRDSB Fixed Reference Number	Material Description	Approximate Quantity	Photograph - Context	Photograph - Detail	Required Action
Asbestos Non-Friable	Throughout	1'x1' Ceiling Tiles - Large and Small Pinhole (Damaged at Drop Ceiling Hanger Locations)	-			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

Forest Heights Collegiate Institute

Material	WRDSB Fixed Reference 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**
2008 Asbestos Audit Update					
32523-FHSS-B619-S01a	**B009**	**Insulation - Mag Block**	**25**	**Amosite**	**Yes**
32523-FHSS-B619-S01b	**B009**		**NA**	**Amosite**	**Yes**
32523-FHSS-B619-S01c	**B009**		**NA**	**Amosite**	**Yes**
32523-FHSS-B615-S02a	**-**	**9”x9" Floor Tile -Green**	**3.2**	**Chrysotile**	**Yes**
32523-FHSS-B615-S02b	**-**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-B615-S02c	**-**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-B615-S03a	**-**	**1' x 1' Ceiling Tile**	**2.3**	**Amosite**	**Yes**
32523-FHSS-B615-S03b	**-**		**NA**	**Amosite**	**Yes**
32523-FHSS-B615-S03c	**-**		**NA**	**Amosite**	**Yes**
32523-FHSS-CB6-S04a	B004	2' x 4' Ceiling Tile	ND	-	No
32523-FHSS-CB6-S04b	B004		ND	-	No
32523-FHSS-CB6-S04c	B004		ND	-	No
32523-FHSS-CB6-S05a	B004	2' x 4' Ceiling Tile	ND	-	No
32523-FHSS-CB6-S05b	B004		ND	-	No
32523-FHSS-CB6-S05c	B004		ND	-	No
32523-FHSS-B63-S06a	**B001**	**9”x9" Floor Tile -Grey**	**2.3**	**Chrysotile**	**Yes**
32523-FHSS-B63-S06b	**B001**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-B63-S06c	**B001**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-B62-S07a	B001	Plaster - Texture Coat Finish	ND	-	No
32523-FHSS-B62-S07b	B001		ND	-	No
32523-FHSS-B62-S07c	B001		ND	-	No
32523-FHSS-B64-S08a	**B001**	**9”x9" Floor Tile - Burgundy**	**3.5**	**Chrysotile**	**Yes**
32523-FHSS-B64-S08b	**B001**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-B64-S08c	**B001**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-B64-S09a	B001	12"x12" Floor Tile - Brown	ND	-	No
32523-FHSS-B64-S09b	B001		ND	-	No
32523-FHSS-B64-S09c	B001		ND	-	No
32523-FHSS-B65-S10a	**B002**	**12"x12" Floor Tile - Green**	**0.3**	**Chrysotile**	**Yes**
32523-FHSS-B65-S10b	**B002**		**Layer 1: Trace Layer 2 (mastic): 2.2**	**Chrysotile**	**Yes**
32523-FHSS-B65-S10c	**B002**		**0.3**	**Chrysotile**	**Yes**
32523-FHSS-B65-S11a	B002	2' x 4' Ceiling Tile	ND	-	No
32523-FHSS-B65-S11b	B002		ND	-	No
32523-FHSS-B65-S11c	B002		ND	-	No
32523-FHSS-58-S12a	1157	Insulation - Paper	ND	-	No
32523-FHSS-58-S12b	1157		ND	-	No
32523-FHSS-58-S12c	1157		ND	-	No
32523-FHSS-58-S13a	1157	Insulation - Vermiculite	ND	-	No
32523-FHSS-58-S13b	1157		ND	-	No
32523-FHSS-58-S13c	1157		ND	-	No
32523-FHSS-58-S14a	**1157**	**Insulation - Duct Parging**	**70**	**Chrysotile**	**Yes**
32523-FHSS-58-S14b	**1157**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-58-S14c	**1157**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-627-S15a	**1161**	**Floor Tile - Olive**	**Layer 1: 0.75 Layer 2: Trace**	**Chrysotile**	**Yes**
32523-FHSS-627-S15b	**1161**		**Layer 2:Trace**	**Chrysotile**	**Yes**
32523-FHSS-627-S15c	**1161**		**Layer 2: Trace**	**Chrysotile**	**Yes**
32523-FHSS-38-S16a	1035	2' x 4' Ceiling Tile	ND	-	No
32523-FHSS-38-S16b	1035		ND	-	No
32523-FHSS-38-S16c	1035		ND	-	No

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY					
Sample #	**Location**	**Material Description**	**Asbestos Content (%)**	**Fibre Type**	**Is Material ACM**
32523-FHSS-39-S17a	1026	2' x 4' Ceiling Tile	ND	-	No
32523-FHSS-39-S17b	1026		ND	-	No
32523-FHSS-39-S17c	1026		ND	-	No
32523-FHSS-C6-S18a	1105	Plaster - Texture Coat	ND	-	No
32523-FHSS-C6-S18b	1105		ND	-	No
32523-FHSS-C6-S18c	1105		ND	-	No
32523-FHSS-32-S19a	**1031**	**9”x9" Floor Tile - Grey**	**2.8**	**Chrysotile**	**Yes**
32523-FHSS-32-S19b	**1031**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-32-S19c	**1031**		Layer 2: ND	-	No
32523-FHSS-625-S20a	1063	Plaster - Wall plaster	ND	-	No
32523-FHSS-625-S20b	1063		ND	-	No
32523-FHSS-625-S20c	1063		ND	-	No
32523-FHSS-71-S21a	**1053**	**Floor Tile - Olive/Green**	**1.2**	**Chrysotile**	**Yes**
32523-FHSS-71-S21b	**1053**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-71-S21c	**1053**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-34-S22a	1033	2' x 4' Ceiling Tile	ND	-	No
32523-FHSS-34-S22b	1033		ND	-	No
32523-FHSS-34-S22c	1033		ND	-	No
32523-FHSS-812-S23a	**1043**	**1' x 1'Ceiling Tile**	**2.5**	**Amosite**	**Yes**
32523-FHSS-812-S23b	**1043**		**NA**	**Amosite**	**Yes**
32523-FHSS-812-S23c	**1043**		**NA**	**Amosite**	**Yes**
32523-FHSS-C3-S24a	1029	2' x 2' Ceiling Tile	ND	-	No
32523-FHSS-C3-S24b	1029		ND	-	No
32523-FHSS-C3-S24c	1029		ND	-	No
32523-FHSS-810-S25a	**1042**	**9”x9" Floor Tile - Red/Brown**	**7.5**	**Chrysotile**	**Yes**
32523-FHSS-810-S25b	**1042**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-810-S25c	**1042**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-627A-S26a	1161	1' x 1' Ceiling Tile	ND	-	No
32523-FHSS-627A-S26b	1161		ND	-	No
32523-FHSS-627A-S26c	1161		ND	-	No
32523-FHSS-92-S27a	1063	Plaster - Wall plaster	ND	-	No
32523-FHSS-92-S27b	1063		ND	-	No
32523-FHSS-92-S27c	1063		ND	-	No
32523-FHSS-92-S27d	1063		ND	-	No
32523-FHSS-8-11a-S28a	1014	2' x 4' Ceiling Tile	ND	-	No
32523-FHSS-8-11a-S28b	1014		ND	-	No
32523-FHSS-8-11a-S28c	1014		ND	-	No
32523-FHSS-72-S29a	**1048**	**2' x 4' Ceiling Tile**	**2.7**	**Amosite**	**Yes**
32523-FHSS-72-S29b	**1048**		**NA**	**Amosite**	**Yes**
32523-FHSS-72-S29c	**1048**		**NA**	**Amosite**	**Yes**
32523-FHSS-91-S30a	1064	12”x12” Floor Tile - Crème/Oatmeal	ND	-	No
32523-FHSS-91-S30b	1064		ND	-	No
32523-FHSS-91-S30c	1064		ND	-	No
32523-FHSS-811-S31a	**1011**	**12”x12” Floor Tile - Beige/Dark Brown**	**0.75**	**Chrysotile**	**Yes**
32523-FHSS-811-S31b	**1011**		Layer 2: ND	-	No
32523-FHSS-811-S31c	**1011**		Layer 2: ND	-	No
32523-FHSS-F2-S32a	**1095**	**Plaster - Texture Coat Finish**	**3.5**	**Chrysotile**	**Yes**
32523-FHSS-F2-S32b	**1095**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-F2-S32c	**1095**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-F2-S32d	**1095**		**NA**	**Chrysotile**	**Yes**
32523-FHSS-F2-S32e	**1095**		**NA**	**Chrysotile**	**Yes**

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY					
Sample #	**Location**	**Material Description**	**Asbestos Content (%)**	**Fibre Type**	**Is Material ACM**
2011 Asbestos Audit Update					
34532-400-FHSS-C4-S33a	1062	2'x2' Ceiling Tile - Short Fissure Random Pinhole	ND	-	No
34532-400-FHSS-C4-S33b	1062		ND	-	No
34532-400-FHSS-C4-S33c	1062		ND	-	No
34532-400-FHSS-F-2-S34a	1095	12"x12" Floor Tile - Beige oatmeal	ND	-	No
34532-400-FHSS-F-2-S34b	1095		ND	-	No
34532-400-FHSS-F-2-S34c	1095		ND	-	No
34532-400-FHSS-C-4-S35a	**1062**	**2'x2' Ceiling Tile - Long Fissure Random Pinhole**	**2.5**	**Amosite**	**Yes**
34532-400-FHSS-C-4-S35b	**1062**		**NA**	**Amosite**	**Yes**
34532-400-FHSS-C-4-S35c	**1062**		**NA**	**Amosite**	**Yes**
34532-400-FHSS-8-14-S36a	**1045**	**9"x9" Floor Tile - Beige with brown streaks**	**Layer 1: 7.5 Layer 2: 1.9**	**Chrysotile**	**Yes**
34532-400-FHSS-8-14-S36b	**1045**		**NA**	**Chrysotile**	**Yes**
34532-400-FHSS-8-14-S36c	**1045**		**NA**	**Chrysotile**	**Yes**
2012 Asbestos Audit Update					
33752-200-S01	**1048**	**Vermiculite - 9-8/7-2 Wall Cavity**	**Present**	**Amphibole Asbestos**	**Yes**
2015 Asbestos Audit Update					
34532-903-S01A	Exterior	Plaster Overhang - Texture	ND	-	No
34532-903-S01B	Exterior		ND	-	No
34532-903-S01C	Exterior		ND	-	No
34532-903-S02A	2001	Fire Proofing - Trowel Applied	ND	-	No
34532-903-S02B	2001		ND	-	No
34532-903-S02C	2001		ND	-	No
2015 Asbestos Audit Update - June 10, 2015					
B000 - S01A	B000	Drywall Joint Compound	ND	-	No
B001 - S01B	B001		ND	-	No
B001 -S01C	B001		ND	-	No
1035-S02A	**1035**	**9"x9" Floor Tile - Brown and White**	**3.72**	**Chrysotile**	**Yes**
1035 -S02B	**1035**		**NA**	**Chrysotile**	**Yes**
1035 - S02C	**1035**		**NA**	**Chrysotile**	**Yes**
1035 - S03A	1035	Mastic	<0.5	Chrysotile	No
1035 - S03B	1035		<0.5	Chrysotile	No
1035 - S03C	1035		<0.5	Chrysotile	No
1024 - S04A	1024	12"x12" Floor Tile - Brown Dense Fleck	ND	-	No
1024 - S04B	1024		ND	-	No
1024 - S04C	1024		ND	-	No
1038 - S05A	1038	12"x12" Floor Tile - White with Blue Specks	ND	-	No
1038 - S05B	1038		ND	-	No
1038 - S05C	1038		ND	-	No
1098 - S06A	**1098**	**9"x9" Floor Tile - Brown with White, Orange**	**3.65**	**Chrysotile**	**Yes**
1098 - S06B	**1098**		**NA**	**Chrysotile**	**Yes**
1098 - S06C	**1098**		**NA**	**Chrysotile**	**Yes**
1100 - S07A	1100	1x1 Ceiling Tile - Medium & Small Pinhole	ND	-	No
1100 - S07B	1100		ND	-	No
1100 - S07C	1100		ND	-	No
1101 - S08A	**1101**	**9"x9" Floor Tile - Grey with White and Black**	**5.99**	**Chrysotile**	**Yes**
1101 - S08B	**1101**		**NA**	**Chrysotile**	**Yes**
1101 - S08C	**1101**		**NA**	**Chrysotile**	**Yes**
1104 - S09A	**1104**	**9"x9" Floor Tile - Beige, Burgundy, White**	**5.9**	**Chrysotile**	**Yes**
1104 - S09B	**1104**		**NA**	**Chrysotile**	**Yes**
1104 - S09C	**1104**		**NA**	**Chrysotile**	**Yes**

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY					
Sample #	**Location**	**Material Description**	**Asbestos Content (%)**	**Fibre Type**	**Is Material ACM**
1072 - S10A	1072	2x2 Ceiling Tile - Long Fissure Random Pinhole	ND	-	No
1072 - S10B	1072		ND	-	No
1072 - S10C	1072		ND	-	No
1154 - S11A	**1154**	**12”x12” Floor Tile - Beige with Brown Specks**	**0.79**	**Chrysotile**	**Yes**
1154 - S11B	**1154**		**NA**	**Chrysotile**	**Yes**
1154 - S11C	**1154**		**NA**	**Chrysotile**	**Yes**
January 18, 2017 Sampling					
S01A	1098	Mastic	ND	-	No
S01B	1098		ND	-	No
S01C	1098		ND	-	No
S02A	1098	Gypsum/Plaster Board	ND	-	No
S02B	1098		ND	-	No
S02C	1098		ND	-	No
2018 Asbestos Audit Update					
S01A	**1083**	**1'x1' Ceiling Tile Mastic**	ND	-	No
S01B			**3**	**Amosite**	**Yes**
S01C			**NA**	**Amosite**	**Yes**
S02A	**1160**	**1964 Floor Tile Mastic**	ND	-	No
S02B	**1104**		**3**	**Chrysotile**	**Yes**
S02C	**1162**		**NA**	**Chrysotile**	**Yes**
S02D	**1154**		**NA**	**Chrysotile**	**Yes**
S02E	**1059**		**3**	**Chrysotile**	**Yes**
S02F	**1042**		**NA**	**Chrysotile**	**Yes**
S02G	**1038**		**NA**	**Chrysotile**	**Yes**
S03A	1151	1970 Drywall Joint Compound	ND	-	No
S03B			ND	-	No
S03C			ND	-	No
S04A	**1154**	**1964 Drywall Joint Compound**	**3**	**Chrysotile**	**Yes**
S04B	**1154**		**NA**	**Chrysotile**	**Yes**
S04C	**1147**		**NA**	**Chrysotile**	**Yes**
S04D	**1146**		**1**	**Chrysotile**	**Yes**
S04E	**1038**		**NA**	**Chrysotile**	**Yes**
S05A	Corridor	Interior Door Window Pane Black Sealant	ND	-	No
S05B			ND	-	No
S05C			ND	-	No
S06A	**Classroom**	**Interior Door Grey Sealant**	**7**	**Chrysotile**	**Yes**
S06B			**NA**	**Chrysotile**	**Yes**
S06C			**NA**	**Chrysotile**	**Yes**
S07A	Corridor	Interior Light Grey on Window Pane	ND	-	No
S07B			ND	-	No
S07C			ND	-	No
S08A	Corridor	Interior Door Frame White Sealant	ND	-	No
S08B			ND	-	No
S08C			ND	-	No
S09A	Exterior	Façade Grey Sealant	ND	-	No
S09B			ND	-	No
S09C			ND	-	No

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY					
Sample #	**Location**	**Material Description**	**Asbestos Content (%)**	**Fibre Type**	**Is Material ACM**
S10A	**Exterior**	**Beige Window Pane Sealant**	**1**	**Chrysotile**	**Yes**
S10B			**NA**	**Chrysotile**	**Yes**
S10C			**NA**	**Chrysotile**	**Yes**
S01A	1151	Interior Black Door Pane Sealant (1970)	ND	-	No
S01B	1151		ND	-	No
S01C	1151		ND	-	No
S02A	1152	Floor Tile Mastic (1970)	ND	-	No
S02B	1152		ND	-	No
S02C	1152		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.

Appendix 01 35 34B– Lead Report

PROJECT-SPECIFIC
DESIGNATED SUBSTANCE &
HAZARDOUS MATERIALS ASSESSMENT

Forest Heights Collegiate Institute
255 Fischer-Hallman Road,
Kitchener, Ontario

Prepared for:
Jeff Cull,
Environmental Officer – Facility Services

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

Prepared by:
Safetech Environmental Limited

Per: Alyssa Nagy, B.Sc.,
Occupational Health & Safety Technician

Per: Shannon Deline, B.A.,
Project Coordinator

Reviewed by: Jeremy J. Gore, C.E.T., EP
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EXECUTIVE SUMMARY

Safetech Environmental Limited (Safetech) was retained by Jeff Cull with the Waterloo Region District School Board (WRDSB), to conduct a project-specific designated substance and hazardous materials (DSHM) assessment in preparation of upcoming renovation work within Forest Heights Collegiate Institute located at 255 Fischer-Hallman Road, in Kitchener, Ontario. The building will herein be referred to as the "site".

The objective of our assessment was to determine the presence, location, condition, and approximate quantities (where possible) of designated substances and other hazardous materials within project-specific assessment areas that have the potential to be disturbed as part of upcoming renovation activities so that appropriate abatement and other control measures can be implemented to protect workers during work and control/classify waste materials, as mandated by Ontario regulations. It is Safetech's understanding that the proposed renovation work is limited to interior renovations within three (3) classrooms and the staff room as identified by marked-up floor plans provided by the Waterloo Region District School Board.

A summary of the designated substances and hazardous materials identified is provided below. This should be considered a summary only. Please refer to the Results (Section 3) and Conclusions and Recommendations (Section 4) of our report for additional details.

Asbestos

Asbestos was confirmed present in the following building materials observed within project-specific assessment areas:

- Parging cement on mechanical pipe fittings within rooms 8-3, 8-5, 8-5B, and 8-7;
- Joint compound associated with drywall finishes within rooms 8-7A and 8-7B;
- 1'x1' large pinhole patterned fixed-in-place ceiling tiles and associated mastic present above the lay-in ceiling in room 2-2B;
- 12" x12" green vinyl floor tiles within room 2-2B;
- 9"x9" grey with white and black streets vinyl floor tiles within room 8-7;
- Floor mastic associated with vinyl floor tiles throughout the original building;
- Asbestos-contaminated vermiculite present within wall cavities throughout the building; and,
- Textured plaster wall panels at the mezzanine level of rooms 8-5 and 8-7.

Additionally, asbestos-containing Mag Block is present on mechanical pipe straights within the subject building. Although not visually identified within project-specific assessment areas, asbestos-containing Mag Block may be present in concealed locations (i.e. wall cavities, above solid ceilings).

No other asbestos-containing materials were identified or are suspected present within the project-specific assessment areas. This assessment was limited to sampling of materials that have the potential to be impacted by planned renovation work, as reported by the WRDSB. Assessment of other areas or materials within the building was not conducted.

Asbestos-containing materials and other designated substances are present in other areas of the building, which are not identified in this report. If the scope of work expands beyond the limit of our assessment then stop work immediately and assess, as needed. Refer to Figure AS01 in Appendix B for the extent of this assessment.

Lead

Results of paint chip analysis for the determination of lead content indicated that all paints collected for analysis were found to have a *'de minimis'* or 'virtually safe' level of lead in paint in accordance with the Environmental Abatement Council of Canada (EACC) "Lead Guideline" (October 2014).

Lead is suspected present in minor quantities as solder in pipe fittings and electrical equipment and in lead-acid batteries of emergency light fixtures. Any disturbance of lead materials should be conducted in accordance with the procedures outlined in the EACC "Lead Guideline" (October 2014) and the Ministry of Labour, Immigration, Training and Skills Development (MLITSD) "Lead on Construction Projects" guideline (April 2011). The extent of procedures required depends on the type of work to be conducted.

Mercury

Mercury is deemed present in the form of mercury vapour within sealed fluorescent lamps. Lamps should be handled with care and kept intact to avoid potential exposure to mercury. R.R.O 1990 Regulation 347, waste mercury produced in amounts less than 5 kilograms (kg) are exempt from hazardous waste registration, treatment and disposal requirements and can be disposed of in landfill as regular waste.

Silica

Silica is deemed present in drywall and associated joint compounds, plaster finishes, lay-in acoustic ceiling tiles, mastics, brick and associated mortar and all concrete materials and finishes. Work involving the disturbance of silica-containing materials should follow the procedures outlined in the MLITSD "Silica on Construction Projects" Guideline (April 2011). The appropriate engineering controls, work practices, hygiene practices, personal protective measures and training necessary to conduct the work in a safe manner are provided in this guideline.

This assessment satisfies the Owner's requirements under Section 30 of the Ontario Occupational Health and Safety Act (OHSA), Revised Statues of Ontario 1990, as amended.

Should you have any questions regarding the information contained in the report, please contact our office at 519.954.2732.

Safetech Environmental Limited

Per: Alyssa Nagy, B.Sc.,
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Per: Shannon Deline, B.A.
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December 20, 2024

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

Attention: **Jeff Cull,**
Environmental Officer – Facility Services
Jeff_cull@wrdsb.ca

RE: Project-Specific Designated Substance & Hazardous Materials Assessment
Forest Heights Collegiate Institute
255 Fischer-Hallman Road, Kitchener, Ontario

1.0 INTRODUCTION

1.1 Background and Objectives

Safetech Environmental Limited (Safetech) was retained by Jeff Cull with the Waterloo Region District School Board (WRDSB), to conduct a project-specific designated substance and hazardous materials (DSHM) assessment in preparation of upcoming renovation work within Forest Heights Collegiate Institute located at 255 Fischer-Hallman Road, in Kitchener, Ontario (site). The objective of our assessment was to determine the presence, location, condition and approximate quantities of designated substances and other hazardous materials within project-specific assessment areas that have the potential to be disturbed as part of upcoming renovation activities so that appropriate abatement and other control measures can be implemented to protect workers during work and control/classify waste materials, as mandated by Ontario regulations.

This assessment satisfies the requirements under Section 30 of the Ontario Occupational Health and Safety Act (OHSA), Revised Statues of Ontario 1990, as amended. Section 30(1) requires an assessment to determine if there are any designated substances present at a project site prior to construction or demolition activity. Sections 30(2), (3) and (4) require the constructor for a project to provide the findings in this report as part of the tendering information for any tendered project or to prospective contractors (and subcontractors) of a project before entering into a binding contract.

This report documents the findings of our on-site inspection that was conducted on November 21, 2024, and provides conclusions and recommendations based on our findings and knowledge of the planned renovation project.

1.2 Scope of Work

Our scope of work included the following activities:

- A review of existing environmental assessment report(s) provided by Jeff Cull of the WRDSB.
- A visual assessment of all project areas specific to the renovation project to identify the presence, location, condition and approximate quantities of designated substances and other hazardous building materials that may be present. The extent of our assessment area was defined by marked-up floor plans provided by the WRDSB on November 7, 2024.
- Collection, analysis and interpretation of representative bulk samples of suspect asbestos-containing building materials for the determination of asbestos content and material classification (limited to the project-specific assessment areas) only where deemed necessary if a data gap was identified by past environmental reports or a material was noted that does not match a reported description.
- Collection, analysis and interpretation of representative paint chip samples of suspect lead-containing paint for the determination of lead content and material classification (limited to the project-specific assessment areas).
- Preparation of a report to document findings and provide recommendations regarding control measures and/or special handling procedures for designated substances or specific hazardous materials that may be removed or disturbed as part of planned demolition activities.

This assessment only identified designated substances and hazardous materials that were deemed to be part of the building or somehow otherwise incorporated into the building structure and its finishes. Assessing occupant items such as stored products, furnishings, and items, etc., were beyond the scope of this assessment. In addition, our assessment did not include an investigation for underground materials or equipment (vessels, drums, underground storage tanks, pipes, cables, etc.). Furthermore, this assessment was limited to the areas investigated, and more specifically, to those materials that are readily accessible without demolition or alteration of building components for access.

1.3 Past Environmental Reports

Data from past environmental surveys was referenced in terms of understanding previous assessment results and obtaining a general understanding of the overall asbestos-containing material conditions. Where possible, Safetech relied upon results indicated in past surveys and only collected confirmatory samples as necessary.

The following environmental report was provided to Safetech:

- *'2021 Asbestos Audit Update Report – Forest Heights Collegiate Institute, 255 Fischer-Hallman Road, Kitchener Ontario'* completed by MTE Consultants, dated July 26, 2021.

Based on our review of the previous asbestos reassessment report, the following asbestos-containing materials are present within the project-specific work areas:

- Parging cement on mechanical pipe fittings;
- Ceiling tile mastic associated with 1'x1' fixed-in-place ceiling tiles;
- Joint compound associated with drywall finishes;
- 1'x1' large pinhole patterned fixed-in-place ceiling tiles;
- 12" x12" green vinyl floor tiles;
- 9"x9" grey with white and black streaks vinyl floor tiles;
- Asbestos-contaminated vermiculite; and,
- Floor mastic associated with vinyl floor tiles.

2.0 METHODOLOGY

The presence of hazardous materials was assessed by visual inspection. For the purpose of this assessment and this document, hazardous materials include designated substances as well as other chemical, biological and environmental hazards as defined below:

- **Designated Substances (as prescribed by Ontario Regulation 490/09):**
  - Acrylonitrile, Arsenic, Asbestos, Benzene, Coke Oven Emissions, Ethylene Oxide, Isocyanates, Lead, Mercury, Silica and Vinyl Chloride.

- **Other Hazardous Materials:**
  - ***Chemical Hazards*** – Urea Formaldehyde Foam Insulation (UFFI) and other obvious potential chemical hazards
  - ***Biological Hazards*** – Mould Contamination
  - ***Environmental Hazards*** – Polychlorinated Biphenyls (PCBs) and Ozone Depleting & Global Warming Substances

For background information regarding the above hazardous materials, please refer to Appendix E.

Destructive testing was not conducted as part of this assessment. Concealed locations such as above solid ceilings, within wall cavities, enclosed mechanical/pipe shafts and bulkheads, etc. were not investigated. Similarly, motors, blowers, electrical panels, etc., were not de-energized or disassembled to examine concealed conditions.

Building materials that are not detailed within this assessment due to inaccessibility at the time of our site visit and/or uncovered during renovation activities should be assessed by a qualified person prior to their disturbance.

Bulk sampling followed by laboratory analysis was also conducted to confirm the presence/absence of selected hazardous materials. Bulk sampling was limited to asbestos in building materials and lead in paint. All other hazardous materials were identified by visual inspection only.

Where possible, observations regarding the location, quantity and condition of the hazardous materials identified were made in order to determine the potential for exposure and provide appropriate recommendations for remedial action, if necessary. Specific methodology for each individual hazardous material assessed is further detailed below.

2.1 Designated Substances

2.1.1 Asbestos

A visual inspection for the presence of both friable and non-friable asbestos-containing material (ACM) was performed within the assessment area. The condition of ACM was rated as Good, Fair or Poor based on our assessment criteria provided in Appendix A.

Although destructive testing was not conducted, details regarding the possible presence of ACM in enclosed locations were provided on a case-by-case basis where our visual inspection indicated this possibility. Materials that may be present in the surveyed area(s) that were not tested intrusively should be considered asbestos-containing until proven otherwise. This includes materials such as elevator brakes, roofing felts, mastics, high voltage wiring, mechanical packing and gaskets, vermiculite inside wall cavities or inaccessible ceiling spaces, and underground services or piping. These materials are recommended to be sampled immediately prior to renovation work if they are to be removed or have a potential to be disturbed.

Bulk samples of building materials were retrieved for all accessible building materials within the investigated areas that were suspected to be asbestos-containing, based on the historical use of the material and surveyor knowledge and experience. Bulk samples were retrieved in accordance with Section 3 and Table 1 of Ontario Regulation 278/05, *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations (O. Reg. 278/05),* made under the Occupational Health and Safety Act. The number of samples collected for each material was based on the type and quantity of the material present within the area(s) investigated.

Each individual sample was placed in a labelled, sealable, plastic bag for transportation to an independent laboratory (EMC Scientific Inc.). EMC Scientific Inc. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for bulk asbestos fibre analysis.

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

In accordance with O. Reg. 278/05, an asbestos-containing material is defined as material that contains 0.5 per cent or more asbestos by dry weight. The laboratory was instructed to conduct “stop-positive” analysis for all materials. If a sample was found to be asbestos-containing no further analysis was conducted for samples taken from the same homogeneous material. The Laboratory Certificate of Analysis is included in Appendix C. Locations where ACM have been identified are detailed in this report. Recommendations pertaining to ACM were made based on the friability, accessibility, and condition of the material.

2.1.2 Lead

An assessment for lead in paint was conducted by retrieving paint chip samples from representative surfaces within the areas assessed. The condition of the painted surface from which each sample was taken was also visually assessed for signs of deterioration such as cracking, chipping, flaking, bubbling and deterioration due to friction. The condition of these surfaces were assessed as good, fair or poor based on the degree and extent of deterioration. The paint chip sample was retrieved by scraping the paint down to the base material substrate to ensure collection of all layers of paint. Care was taken to avoid collection of the underlying substrate to reduce analytical substrate matrix interference.

Upon completion of our assessment, the paint chip samples were submitted to an independent laboratory (Caduceon Environmental Laboratories) for the determination of lead content. This laboratory participates in and is accredited by the EPA (U.S. Environmental Protection Agency) for analysis of lead in paint chips through the American Industrial Hygiene Association (AIHA) Environmental Lead Laboratory Accreditation Program (ELLAP). Analysis was conducted by the laboratory following the EPA Method 6010. Result of analysis was reported by the laboratory in micrograms per gram (µg/g). The Laboratory Certificate of Analysis is included in Appendix C.

The presence of lead in other materials, such as lead sheeting, pigmented mortar, lead piping, lead solder, etc. were noted where observed but were not sampled to verify lead content. Lead can be present in these materials to varying degrees, depending on their age of application (refer to Appendix E for additional details) and should be considered lead-containing until proven otherwise.

2.1.3 Mercury

The type, quantity, and location of mercury-containing equipment and devices within the areas assessed were determined by visual inspection based on appearance, age and knowledge of historical uses. Sampling for mercury-containing building materials and dismantling of suspect mercury-containing equipment was not performed. Where possible, attempts were made to verify the presence/absence of mercury by gathering additional information such as equipment model number, serial number, etc.

2.1.4 Silica

The presence of crystalline silica in building materials was determined through visual inspection of building materials only, based on knowledge of the historic use of silica-containing materials in certain building materials. Sampling to verify the presence/absence of silica in building materials was not performed.

2.1.5 Other Designated Substances

Other designated substances (i.e. acrylonitrile, arsenic, benzene, coke oven emissions, ethylene oxide, isocyanates, and vinyl chloride) are typically not expected to be encountered in building materials as significant constituents or in a form that would represent an exposure concern. These substances were not included in our assessment unless specific information regarding their use (e.g. in a manufacturing process) was provided to us. Please refer to Appendix E for information regarding where these designated substances are typically found or used. No sampling for these designated substances was performed.

2.2 Other Hazardous Materials

2.2.1 Chemical Hazards

Urea Formaldehyde Foam Insulation (UFFI)

A visual inspection to evaluate the possible presence of Urea Formaldehyde Foam Insulation (UFFI) was conducted within the area(s) assessed. Our visual inspection was limited to looking for evidence of possible UFFI installation (i.e. repaired nozzle holes in walls) and overspray at wall/ceiling joints, etc. No material sampling was conducted as part of our assessment.

2.2.2 Biological Hazards

Mould Contamination

A visual inspection to determine the possibility of indoor mould growth was conducted within the area assessed. Our assessment was limited to looking for evidence of mould growth and water damage (staining, material deterioration, efflorescence, etc.) on the surface of building materials, which may be an indicator of hidden mould growth. No moisture content readings of building materials were taken to determine their current condition. Additionally, destructive testing to confirm the presence/absence of hidden mould growth and material sampling to verify the presence/absence of mould on suspect surfaces was beyond the scope of this assessment.

2.2.3 Environmental Hazards

Polychlorinated Biphenyls (PCBs)

The presence of PCB-containing electrical equipment within the area(s) assessed was identified through visual inspection and knowledge of the timeline of historical use.

For stand-alone transformers and capacitors, information from the manufacturer nameplate (such as the date of manufacture, dielectric fluid trade name or "Type Number", etc.) was gathered, where possible, to further evaluate if the equipment may contain PCBs. This information was then compared to the information provided in the Environment Canada document entitled "*Handbook on PCB's in Electrical Equipment*" (Third Edition, April 1988) to aid in identification. Transformers and capacitors confirmed to be manufactured after 1979 were assumed to not contain PCBs. If appropriate information could not be obtained it was assumed that the transformer or capacitor contained PCBs.

No sampling of materials or fluids within equipment was conducted to verify the presence/absence of PCBs. Inspection and testing of other materials for PCB content, including (but not limited to) caulking, asphalt, oil-based paint, plastics, switches, oil residue, electric cables and hydraulic fluids was beyond the scope of our assessment.

Ozone Depleting and Global Warming Substances

The presence of fixed equipment likely to contain ozone-depleting substances (ODS) and/or global-warming substances (GWS) was identified through visual inspection and knowledge of the timeline of historical use. This included equipment such as chillers, air-conditioners and fixed dry-chemical fire extinguishers, where chemicals such as hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs) or halons may be present. Where possible, information regarding the type and quantity of refrigerant present was obtained from the manufacturer nameplate.

Our visual assessment was limited to fixed equipment within the area(s) assessed and did not include portable equipment such as stand-alone refrigerators, freezers, water coolers, air-conditioners and fire extinguishers, etc.

3.0 RESULTS

Results of our visual assessment and bulk sample analytical findings are summarized in the sections below. Photographs of conditions observed are referenced in the appropriate section where applicable (as **P#**) and are included in Appendix D.

3.1 Designated Substances

3.1.1 Asbestos

Results of bulk sample analysis for the determination of asbestos content are summarized in Table 1. Materials have been classified as “ACM” or “Non-ACM” based on analytical results. Please refer to the Limitations section of this report (Section 5.0) for additional details. The Laboratory Certificate of Analysis is included in Appendix C.

TABLE 1
Bulk Sample Analytical Results for Determination of Asbestos Content
255 Fischer-Hallman Road, Kitchener, Ontario
Sample Collection Date: November 21, 2024

Sample No.	Material Description	Sample Location	Asbestos Content	Material Classification
S01A	**Textured Plaster Wall Panels**	**Room 8-5B**	**a) 1% Chrysotile**	**ACM**
			b) None Detected	
S01B	**2 Phases:**		**a) Not Analyzed**	
			b) None Detected	
S01C	**a) Green, Primer**		**a) Not Analyzed**	
	b) Grey, Plaster		b) None Detected	

[1] As per O. Reg. 278/05, ACM contains ≥0.5% asbestos by dry weight.
[2] Not Analyzed = Not analyzed due to positive asbestos result in previous sample.

Materials assessed for asbestos content are summarized in Table 2 based on the type/use of the material. The condition and friability of materials confirmed or suspected to be asbestos-containing (based on our visual assessment and results of bulk sample analysis) is provided. Condition (Cond.) ratings are provided as Good (G), Fair (F) or Poor (P) based on our Assessment Criteria provided in Appendix A. Estimates of quantity have only been provided for confirmed or suspected asbestos-containing materials that were deemed to have a potential to be disturbed as part of the upcoming renovation project. Any quantities provided should be considered rough estimates only and only apply to the limited project-specific assessment areas.

TABLE 2
Results of Assessment for Asbestos-Containing Materials
255 Fischer-Hallman Road, Kitchener, Ontario
Date of Assessment: November 21, 2024

Sprayed and Loose Fill Insulating Materials	Location/Description	Cond.	Est. Quantity	Friability
Sprayed Fireproofing	None identified in project-specific work areas.	N/A	N/A	N/A
Sprayed Insulation	None identified in project-specific work areas.	N/A	N/A	N/A
Loose Fill / Vermiculite Insulation	Asbestos-contaminated vermiculite was identified within the wall cavities of the original building during a previous environmental survey (refer to the report referenced in Section 1.3). This material was not visually identified at the time of assessment due to inaccessibility, however, is presumed in all wall cavities of the original building.	**N/D**	**N/D**	**Friable**
Thermal System Insulation	**Location/Description**	**Cond.**	**Est. Quantity**	**Friability**
Mechanical Pipe Insulation – Straights	Mechanical pipe straights within the areas assessed were observed to be uninsulated or insulated with non-asbestos fibreglass.	N/A	N/A	N/A
Mechanical Pipe Insulation – Fittings (elbows, valves, tees, hangars, etc.)	Parging cement was identified on mechanical pipe fittings within rooms 8-3, 8-5, 8-5B, and 8-7 of the areas assessed (**P1**). The material was sampled during a previous environmental survey and was determined to be asbestos-containing (refer to the report referenced in Section 1.3). Additional asbestos-containing parged cement fittings may be present in concealed locations of the project-specific assessment area (i.e. wall cavities, above solid ceilings).	**Good**	**~27**	**Friable**
	All other mechanical pipe fittings within the areas assessed were observed to be uninsulated or insulated with non-asbestos PVC.	N/A	N/A	N/A
HVAC Duct Insulation	HVAC ducts within the areas assessed were observed to be uninsulated.	N/A	N/A	N/A
Breeching / Exhaust Insulation	None identified in project-specific work areas.	N/A	N/A	N/A
Tank Insulation	None identified in project-specific work areas.	N/A	N/A	N/A
Boiler Insulation	None identified in project-specific work areas.	N/A	N/A	N/A
Other Mechanical Equipment Insulation	None identified in project-specific work areas.	N/A	N/A	N/A

Architectural Finishes & Finishing Materials	Location/Description	Cond.	Est. Quantity	Friability
Sprayed Texture / Stucco Finishes	None identified in project-specific work areas.	N/A	N/A	N/A
Plaster Finishes	Plaster finishes were identified throughout the areas assessed. This material was sampled during a previous environmental survey and been determined to not contain asbestos (refer to the report referenced in Section 1.3).	N/A	N/A	N/A
	Textured plaster panels were identified along the wall at mezzanine level within classrooms 8-5 and 8-7 (**P2**). This material was sampled and determined to contain 1% Chrysotile asbestos (refer to sample S01 in Table 1).	**Good**	**~30m²**	**Friable**
Drywall Joint Compound	Drywall ceiling finishes were identified in classrooms 8-7A and 8-7B (**P3**). The associated joint compound was sampled during a previous environmental survey and was determined to be asbestos-containing (refer to the report referenced in Section 1.3).	**Good**	**~30m²**	**Non-Friable**
Ceiling Tiles	**Location/Description**	**Cond.**	**Est. Quantity**	**Friability**
Lay-in Acoustic Ceiling Tiles	2'x4' small fissure random pinhole patterned lay-in acoustic ceiling tiles were identified in staff room 2-2B. The tiles contained manufacturer's stamps indicating they were manufactured in 1990 when asbestos was no longer in use for this material.	N/A	N/A	N/A
Fixed-in-Place Ceiling Tiles	1'x1' fixed-in-place pinhole patterned ceiling tiles were observed above the ceiling in in staff room 2-2B (**P4**). This material was sampled during a previous environmental survey and was determined to be asbestos-containing (refer to the report referenced in Section 1.3).	**Good**	**~50m²**	**Non-Friable**
Transite Ceiling Panels	None identified in project-specific work areas.	N/A	N/A	N/A
Ceiling Tile Mastic	Mastic associated with fixed-in-place ceiling tiles was identified above the lay-in ceiling in room 2-2B (**P4**). This material was sampled during a previous environmental survey and was determined to be asbestos-containing (refer to the report referenced in Section 1.3).	**Good**	**20 m²**	**Non-Friable**

Flooring	Location/Description	Cond.	Est. Quantity	Friability
Vinyl Floor Tiles	12”x12” green vinyl floor tiles were identified within staff room 2-2B (**P5**). The tiles were sampled during a previous environmental survey and were determined to be asbestos-containing (refer to the report referenced in Section 1.3).	**Good**	**~ 10m^2**	**Non-Friable**
	9”x9” grey with white and black streak vinyl floor tiles were identified within classroom 8-7(**P6**). The tiles were sampled during a previous environmental survey and were determined to be asbestos-containing (refer to the report referenced in Section 1.3).	**Good**	**~ 8m^2**	**Non-Friable**
	12”x12” beige dense fleck vinyl floor tiles were identified within classroom 8-5. These tiles were noted during a previous environmental survey to be installed post 2015 when asbestos was no longer in use for this material.	N/A	N/A	N/A
Vinyl Sheet Flooring	None identified in project-specific work areas.	N/A	N/A	N/A
Floor Mastic	Mastic associated with vinyl floor tiles throughout the original building was sampled during a previous environmental survey and was determined to be asbestos-containing (refer to the report referenced in Section 1.3).	**Good**	**30 m^2**	**Non-Friable**
Asbestos Cement Products	**Location/Description**	**Cond.**	**Est. Quantity**	**Friability**
Piping	None identified in project-specific work areas.	N/A	N/A	N/A
Roofing, Siding, Wallboard	None identified in project-specific work areas.	N/A	N/A	N/A
Other Cement Products	None identified in project-specific work areas.	N/A	N/A	N/A
Misc. Materials	**Location/Description**	**Cond.**	**Est. Quantity**	**Friability**
Other Materials	Asbestos may be a component of other materials within the areas assessed which were not sampled due to inaccessibility. Any additional materials uncovered that are suspected of containing asbestos must be sampled prior to proceeding with any work.	**N/D**	**N/D**	**N/D**

Notes: N/A=Not Applicable; N/D=Not Determined

3.1.2 Lead

Laboratory analytical results for paints and surface coatings tested to determine lead content are summarized below in Table 3. The Laboratory Certificate of Analysis is included in Appendix C.

TABLE 3
Results of Paint Condition and Lead Content Assessment
255 Fischer-Hallman Road, Kitchener, Ontario
Sample Collection Date: November 21, 2024

Sample No.	Location	Surface	Paint Colour	Condition	Lead Conc. (µg/g)	EACC Classification
LP01	Staff Room 2-2B	Concrete Block Wall	Blue	Good	109	'*de minimis*' level of lead
LP02	Classroom 8-3	Concrete Block Wall	Beige	Good	114	'*de minimis*' level of lead
LP03	Classroom 8-5	Concrete Block Wall	White	Good	<5	'*de minimis*' level of lead

All paint samples collected for lead content analysis were found to have lead concentrations below 1000 µg/g (0.1% Lead by Weight) and are considered to have a '*de minimis*' level of lead in paint (virtually safe) in accordance with the October 2014 Environmental Abatement Council of Canada (EACC) publication *Lead Guideline for Construction, Renovation, Maintenance or Repair*.

Additional minor lead-containing materials suspected present within project-specific work areas include the following:

- Lead solder used in pipe fittings or electrical equipment; and,
- In lead-acid batteries of emergency light fixtures.

3.1.3 Mercury

Mercury is deemed present in vapour form within fluorescent light tubes located throughout the areas assessed. No other equipment suspected of containing mercury was identified within the assessed areas.

3.1.4 Silica

A number of building materials were identified within the surveyed areas that are suspected to contain crystalline silica. This includes the following materials:

- Drywall and associated joint compounds;
- Plaster finishes;
- Lay-in acoustic ceiling tiles;
- Mastics;
- Brick and associated mortar; and,
- All concrete finishes and materials.

3.1.5 Other Designated Substances

Acrylonitrile, arsenic, benzene, coke oven emissions, ethylene oxide, isocyanates, and vinyl chloride were not included in our assessment as these substances are not expected to be a significant component of building materials or present in a form that would represent an exposure concern. Additionally, no specific information regarding their use was provided to us.

3.2 Other Hazardous Materials

3.2.1 Chemical Hazards

No visible evidence of UFFI installation (i.e. injection openings) or overspray of foam insulation at wall/ceiling joints was identified. In addition, UFFI insulation within interior wall cavities is not suspected. No other hazardous materials were identified nor are they suspected present.

3.2.2 Biological Hazards

Mould Contamination

No visual evidence of mould contamination was observed within the areas assessed.

3.2.3 Environmental Hazards

Polychlorinated Biphenyls (PCBs)

Fluorescent light fixtures were identified throughout the areas assessed. Lamp types that are ballast dependent were noted to be retrofitted with newer T8 lamps, Therefore, fluorescent light ballasts are not suspected of containing PCBs.

Ozone Depleting and Global Warming Substances

No Ozone Depleting / Global Warming Substances were identified within the assessed areas at the time of the assessment.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Designated Substances

4.1.1 Asbestos

Results of our assessment indicated that the following asbestos-containing materials are present within project-specific assessment areas that may be disturbed as part of the planned renovation project:

Friable Asbestos-Containing Materials

- Parging cement on mechanical pipe fittings identified within rooms 8-3, 8-5, 8-5B, and 8-7;
- Textured plaster wall panels identified at mezzanine level within classrooms 8-5 and 8-7; and,
- Asbestos-contaminated vermiculite present within wall cavities throughout the building.

Non-Friable Asbestos-Containing Materials

- Joint compound associated with drywall finishes within rooms 8-7A and 8-7B;
- 1'x1' large pinhole patterned fixed-in-place ceiling tiles and associated mastic identified above the lay-in ceiling in room 2-2B;
- 12" x12" green vinyl floor tiles within room 2-2B;
- 9"x9" grey with white and black streaks vinyl floor tiles within room 8-7; and,
- Floor mastic associated with vinyl floor tiles throughout the original building.

Additionally, asbestos-containing Mag Block is present on mechanical pipe straights within the subject building. Although not visually identified within project-specific assessment areas, asbestos-containing Mag Block may be present in concealed locations (i.e. wall cavities, above solid ceilings).

No other asbestos-containing materials were identified or are suspected present within the project-specific assessment areas. This assessment was limited to sampling of materials that have the potential to be impacted by planned renovation work, as reported by the WRDSB. Assessment of other areas or materials within the building was not conducted. Asbestos-containing materials and other designated substances are present in other areas of the building, which are not identified in this report. If the scope of work expands beyond the limit of our assessment then stop work immediately and assess, as needed.

Non-friable asbestos-containing materials in GOOD condition can be managed in place until all activities which could result in disturbance of this material. Prior to scheduled renovation work, non- friable asbestos-containing materials must be removed. Removal

of non-friable asbestos-containing materials shall be performed following Type 1 operations, provided that the material is wetted down and removed using non-powered hand-held tools, as outlined in Ontario Regulation 278/05, Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations, made under the Ontario Occupational Health and Safety Act. If the material cannot be adequately wetted, Type 2 operations apply.

As per O. Reg. 278/05, removal or disturbance of less than 1 square meter of friable ACM is classified as a Type 2 operation provided the removal is performed using non-powered hand tools only. Removal of greater than 1 square meter of friable ACM shall be conducted as a Type 3 operation

As per the requirements of O. Reg. 278/05, the removal of <1 square metre of drywall with asbestos-containing joint compound is considered a Type 1 asbestos procedure. The removal of >1 square metre of drywall with asbestos-containing joint compound is considered a Type 2 procedure.

The removal or disturbance of ACM must follow the measures and procedures indicated in Ontario Regulation 278/05. This work should be conducted by workers who have received proper training by a “competent person” in the hazards of asbestos exposure, personal hygiene and work practices, and the use and care of respirators and protective clothing. Any worker/supervisor who works in a Type 3 operation must successfully complete the Asbestos Abatement Worker or Supervisor Training Program approved by the Ministry of Training, Colleges and Universities.

It is recommended that work involving the removal or disturbance of ACM be subject to inspection and testing to document conformance with Ontario Regulation 278/05 requirements. The degree of inspection and testing is dependent on site-specific conditions such as the type, duration, size and location of the work.

4.1.2 Lead

All paint samples collected for lead content analysis were found to have a ‘*de minimis*’ level of lead in paint (virtually safe) in accordance with the October 2014 EACC Lead Guideline. Provided these materials are disturbed in a non-aggressive manner and the work is performed using normal dust control procedures, then worker protection from the inhalation of lead is not required. General health and safety precautions must still be implemented, such as prohibiting eating, drinking, smoking and chewing in the work area, implementing dust suppression techniques and providing washing facilities for workers to wash hands and face.

Lead may also be present as a component in solder in pipe fittings and electrical equipment, and in lead-acid batteries of emergency light fixtures. Removal or disturbance of these materials, if applicable, should be performed using non-powered hand tools and no hot work should be performed on pipes containing solder.

If practicable, all bulk lead waste materials should be separated from other wastes and sent to a recycling facility. If not practicable, lead-containing waste should be handled and disposed of according to R.R.O. 1990 Regulation 347 (Reg. 347), *General – Waste Management*, made under the Environmental Protection Act. Under this regulation (and depending on the quantity of waste generated) the waste may be subject to analysis following the Toxicity Characteristic Leaching Procedure (TCLP) to determine if it is a "leachate toxic waste" based on the leachate quality criteria provided in Schedule 4 of the regulation. Such wastes must meet specific treatment requirements (Schedule 5) or undergo alternative treatment for hazardous debris (Schedule 8) prior to land disposal.

4.1.3 Mercury

Fluorescent light fixtures should be handled with care and kept intact to avoid potential exposure to mercury vapour present within the lamps/bulbs. Under Reg. 347, waste mercury produced in amounts less than 5 kilograms (kg) are exempt from hazardous waste registration, treatment and disposal requirements and can be disposed of in landfill as regular waste. Larger quantities of waste mercury must be treated and disposed of in accordance with the requirements of Reg. 347.

Although no mercury was visibly identified in other equipment, dismantling of equipment (if present) was not conducted to verify the presence/absence of mercury. It is cautioned that thermometers, barometers, and other measuring devices (pressure gauges/sensors, vacuum gauges, manometers, etc.), thermostats, and a variety of other electrical switches (temperature sensitive, tilt switches, float switches, etc.) may contain mercury that may not be visible without dismantling the equipment. Such devices should be assumed to contain mercury until proven otherwise and similar precautions to those outlined above should be taken if any of those items are to be disturbed or taken out of service in the future.

4.1.4 Silica

Suspect silica-containing materials were identified throughout the assessed areas. In their current state, building materials containing silica do not represent a risk to building occupants or construction workers. Risks associated with exposure to silica arise during demolition activities that cause silica dust to be created (particularly grinding, drilling or cutting operations and during major demolition), resulting in a crystalline silica inhalation hazard.

If any materials suspected to contain silica are to be removed or otherwise disturbed as a result of renovation or demolition activities it is recommended that procedures be put in place to control the generation of dust (such as routine water misting) and thus reduce the potential for worker exposure. Workers that have the potential to be exposed to airborne silica should also wear appropriate protective clothing and respiratory protection.

Any work involving the disturbance of silica-containing materials should follow the procedures outlined in the MLITSD *"Silica on Construction Projects"* guideline (April 2011). The appropriate engineering controls, work practices, hygiene practices, personal protective measures and training necessary to conduct the work in a safe manner are provided in this guideline. The general measures and procedures (or Type of operation) necessary depends on the type of work to be conducted.

4.1.5 Other Designated Substances

No other designated substances are expected to be a component of building materials within the surveyed area in a form that would represent an exposure concern. Therefore, no protective measures or procedures specific to acrylonitrile, arsenic, benzene, coke oven emissions, ethylene oxide, isocyanates, and vinyl chloride are considered necessary.

4.2 Other Hazardous Materials

4.2.1 Chemical Hazards

As no UFFI was identified or is suspected to be present within the surveyed area no further action is required. However, although intrusive testing was conducted, there is a remote possibility that UFFI could be hidden within locations such as exterior wall cavities that were not investigated. If suspect foam insulation is identified during demolition activities work should be stopped and the area should be re-assessed to evaluate conditions and determine appropriate control measures and worker protection, if necessary.

4.2.2 Biological Hazards

Mould Contamination

No mould growth was visually identified in the areas assessed, no action required.

4.2.3 Environmental Hazards

Polychlorinated Biphenyls (PCBs)

None identified in the areas assessed, no action required.

Ozone Depleting and Global Warming Substances

None identified in the areas assessed, no action required.

5.0 LIMITATIONS

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

In preparation of this report, Safetech Environmental Limited (Safetech) relied on information supplied by others, including without limitation, information pertaining to the history and operation of the site, and testing services provided by independent laboratories. Except as expressly set out in this report, Safetech has not made any independent verification of information provided by independent entities.

The collection of samples at the location noted was consistent with the scope of work agreed-upon with the person or entity to whom this report is addressed and the information obtained concerning prior site investigations. As conditions between samples may vary, the potential remains for the presence of unknown additional contaminants for which there were no known indicators.

The analytical method used for determination of asbestos content meets the requirements of O.Reg. 278/05. However, small asbestos fibres may be missed by PLM due to resolution limitations of the optical microscope. Interfering binder/matrix and/or low asbestos content may also hinder positive identification by PLM. These conditions are common for vermiculite attic insulation (VAI) and non-friable organically bound (NOB) materials such as vinyl floor tiles, roofing materials, mastics and caulking and can lead to “false negative” results. If PLM analytical results for these types of materials indicate no asbestos detected they have been reported as “Presumed Non-ACM”. Due to limitations of the analytical method we cannot confirm that low quantities of asbestos are not present in these samples using solely PLM analysis. Additional analytical procedures should be considered for such materials to rule out false negative results.

Conclusions are based on site conditions at the time of inspection and can only be extrapolated to an undefined limited area around inspected locations. The extent of the limited area depends on building construction and conditions. Building materials that are not detailed within this survey due to inaccessibility during the time of survey and/or are uncovered during demolition activities should be properly assessed by a qualified person prior to their disturbance. Safetech cannot warrant against undiscovered environmental liabilities. If any information becomes available that differs from the findings in this report, we request that we be notified immediately to reassess the conclusions provided herein.

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

Appendix A

Condition Assessment Criteria for Asbestos-Containing Materials

The condition of asbestos-containing materials identified within the surveyed area(s) was assessed as Good (G), Fair (F) or Poor (P). The assessment criteria used to determine condition is dependent on material characteristics, such as friability. The following Table summarizes the criteria used by Safetech to evaluate the condition of ACM.

Condition Assessment Criteria for Asbestos-Containing Materials

Sprayed Fireproofing, Sprayed Insulation and Sprayed Texture Finishes	
Good	• Surface shows no significant signs of damage, deterioration, or delamination (i.e. <1%). • Unencapsulated or unpainted fireproofing or texture finishes, where no delamination or damage is observed. • Encapsulated fireproofing or texture finishes where encapsulation applied after damage or fallout.
Fair	• Not utilized as part of condition assessment for these materials.
Poor	• Greater than 1% damage, delamination, or deterioration to surface.
In areas where damage exists in isolated locations, both Good and Poor may be applicable.	
Mechanical Insulation (boilers, breeching, ductwork, piping, tanks, equipment, etc.)	
Good	• Insulation completely covered in jacketing and exhibits no evidence of damage or deterioration. • Jacketing may have minor damage (i.e. scuffs or stains), but is not penetrated.
Fair	• Minor penetrating damage to jacketed insulation (cuts, tears, nicks, deterioration or delamination). • Undamaged insulation that had never been jacketed. • Insulation is exposed but not showing surface disintegration. • Extent of missing insulation ranges from minor to none. • Damage that can be repaired.
Poor	• Original insulation jacket is missing, damaged, deteriorated, or delaminated. • Insulation is exposed and significant areas have been dislodged. • Damage that cannot be easily repaired.
Non-Friable and Potentially Friable Materials (includes materials such as plaster finishes, drywall compound, ceiling tiles, asbestos cement products, vinyl asbestos tile and asbestos paper backed vinyl sheet flooring, etc., which have the potential to become friable when handled)	
Good	• No significant damage. • Material may be cracked or broken but is stable and not likely to become friable upon casual contact. • No friable debris present
Fair	• Not utilized as part of condition assessment for these materials.
Poor	• Material is severely damaged. • Debris is present or binder has disintegrated to the point where the material has become friable.
Asbestos-Containing Debris (noted separately from the presumed source material)	
Poor	• Debris is always considered to be in Poor condition.

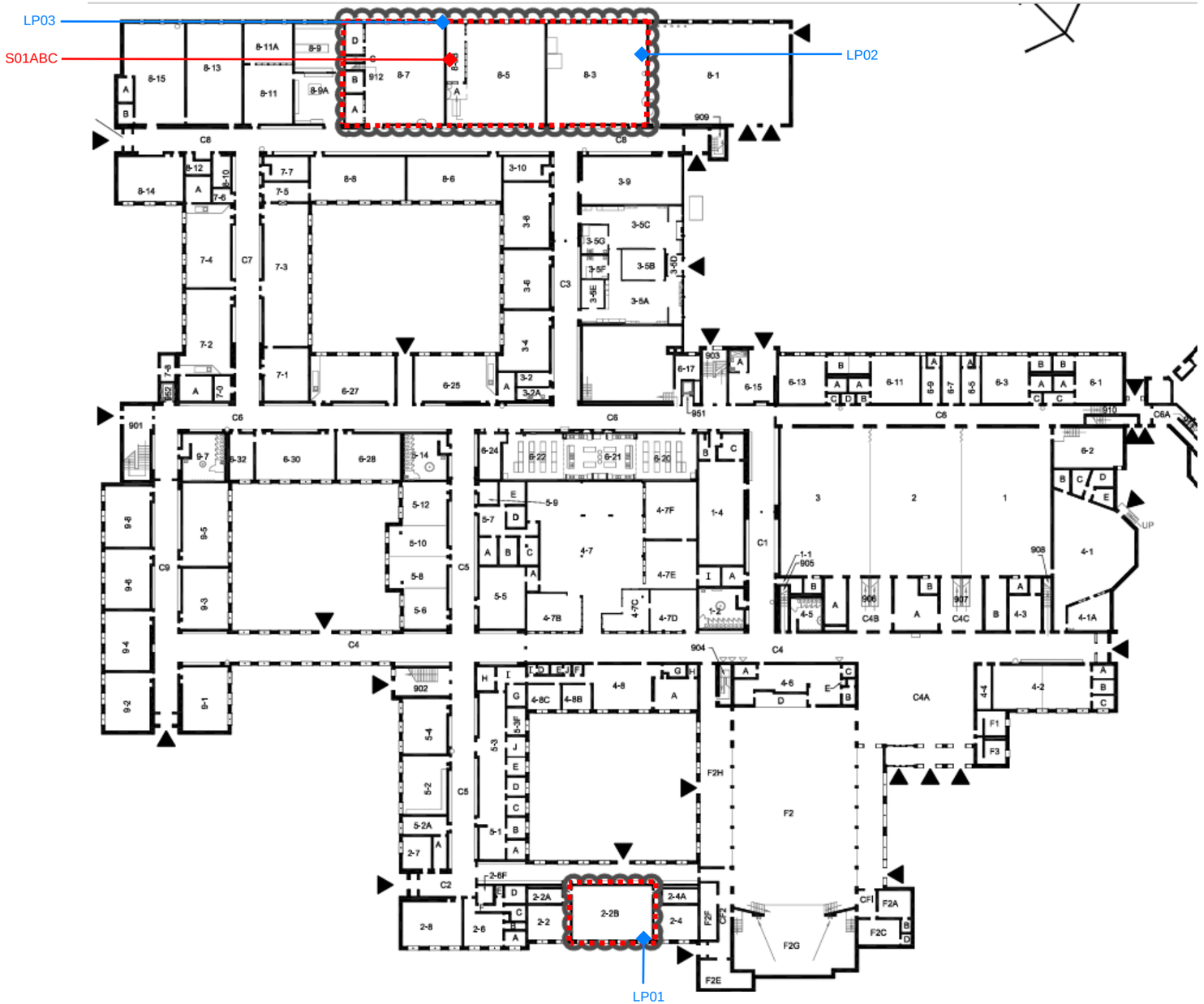
Appendix B
Figure AS01

NOTES:

1. Refer to the report titled "Project-Specific Designated Substance & Hazardous Materials Assessment, Forest Heights Colligate Institute, 255 Fischer-Hallman Road, Kitchener, Ontario" for complete details.
2. Figure to be referenced with the report.
3. Figure is not to scale.
4. Floor plans provided by Waterloo Region District School Board.
5. Figure is colour dependent; photocopies may alter interpretations of the figure.
6. Sample locations are approximate.
7. The project-specific assessment area was defined by the Waterloo Region District School Board.
8. Asbestos-containing materials and other designated substances are present in other areas of the building which are not identified in these figures of the report. If the scope of work expands beyond the limit of our assessment area then stop work immediately and assess as needed.

<u>The following asbestos-containing materials are present within project-specific work areas:</u>

- Parging cement on mechanical pipe fittings within rooms 8-3, 8-5, 8-5B, and 8-7;
- Joint compound associated with drywall finishes within rooms 8-7A and 8-7B;
- 1'x1' large pinhole patterned fixed-in-place ceiling tiles and associated mastic present above the lay-in ceiling in room 2-2B;
- 12" x12" green vinyl floor tiles within room 2-2B;
- 9"x9" grey with white and black streets vinyl floor tiles within room 8-7;
- Floor mastic associated with vinyl floor tiles throughout the original building;
- Asbestos-contaminated vermiculite present within wall cavities throughout the building; and,
- Textured plaster wall panels at the mezzanine level of rooms 8-5 and 8-7.



Ground Floor

LEGEND:

- S01A Asbestos Bulk Sample and Sample Identification Number
- LP01 Lead Bulk Sample and Sample Identification Number
- Extent of Project Specific Assessment Area

PROJECT:		**DRAWING NAME:**		**Prepared for:**	**Prepared by:**
Project Specific DSHM Assessment Forest Heights Collegiate Institute Renovation Project		Extent of Assessment and Designated Substance & Hazardous Materials Sample Locations for the Forest Heights Collegiate Institute Renovation Project			
Safetech Project No.:	2-3240093	SURVEY DATE:	November 21, 2024	**Waterloo Region District School Board** 51 Ardelt Avenue Kitchener, Ontario N2C 2R5	**Safetech Environmental Limited** 100 Hanson Avenue, Unit 2, Kitchener, ON N2C 2E2
		DRAWING BY:	AN		
Building Address:	255 Fischer-Hallman Road, Kitchener, Ontario	DRAWING #:	AS-01		
		APPROVED BY:	JJG		

Appendix C

Laboratory Certificates of Analysis – Asbestos & Lead

emcscientific
INCORPORATED

Laboratory Analysis Report

To:

Alyssa Nagy
Safetech Environmental Ltd.
100 Hanson Avenue, Unit 2
Kitchener, Ontario
N2C 2E2

EMC LAB REPORT NUMBER: A112216
Job/Project Name: Forest Heights Colligate Institute
Analysis Method: Polarized Light Microscopy – EPA 600
Date Received: Nov 25/24 **Date Analyzed:** Dec 2/24
Analyst: Rahul Patel
Reviewed By: Malgorzata Sybydlo

No. of Phases Analyzed: 4
Job No: 2-3240093
Number of Samples: 3
Date Reported: Dec 2/24

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
S01a	A112216-1	Textured plaster wall panels	2 Phases: a) Green, primer b) Grey, plaster	**Chrysotile** **ND**	**1**		99 100
S01b	A112216-2	Textured plaster wall panels	2 Phases: a) NA b) Grey, plaster	**NA** **ND**			 100
S01c	A112216-3	Textured plaster wall panels	2 Phases: a) NA b) Grey, plaster	**NA** **ND**			 100

Note:
1. Bulk samples are analyzed using Polarized Light Microscopy (PLM) and dispersion staining techniques. The analytical procedures are in accordance with EPA 600/R-93/116 method.
2. The results are only related to the samples analyzed. **ND** = None Detected (no asbestos fibres were observed), **NA** = Not Analyzed (analysis stopped due to a previous positive result)
3. This report may not be reproduced, except in full without the written approval of EMC Scientific Inc. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
4. The Ontario Regulatory Threshold for asbestos is 0.5%. The limit of quantification (LOQ) is 0.5%.

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured. Canadian owned.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: -

REPORT No: 24-036663 - Rev. 0

Report To:
EMC Scientific Inc.
5800 Ambler Dr. #100
Mississauga, ON L4W 4J4

CADUCEON Environmental Laboratories
2378 Holly Lane
Ottawa, ON K1V 7P1

Attention: Alister Haddad

DATE RECEIVED: 2024-Nov-26
DATE REPORTED: 2024-Nov-27
SAMPLE MATRIX: Paint Chips

CUSTOMER PROJECT: Forest Heights Collegiate Institute
P.O. NUMBER: 2-3240093

Analyses	Qty	Site Analyzed	Authorized	Date Analyzed	Lab Method	Reference Method
ICP/OES (Solid)	3	OTTAWA	APRUDYVUS	2024-Nov-27	D-ICP-02	EPA 6010

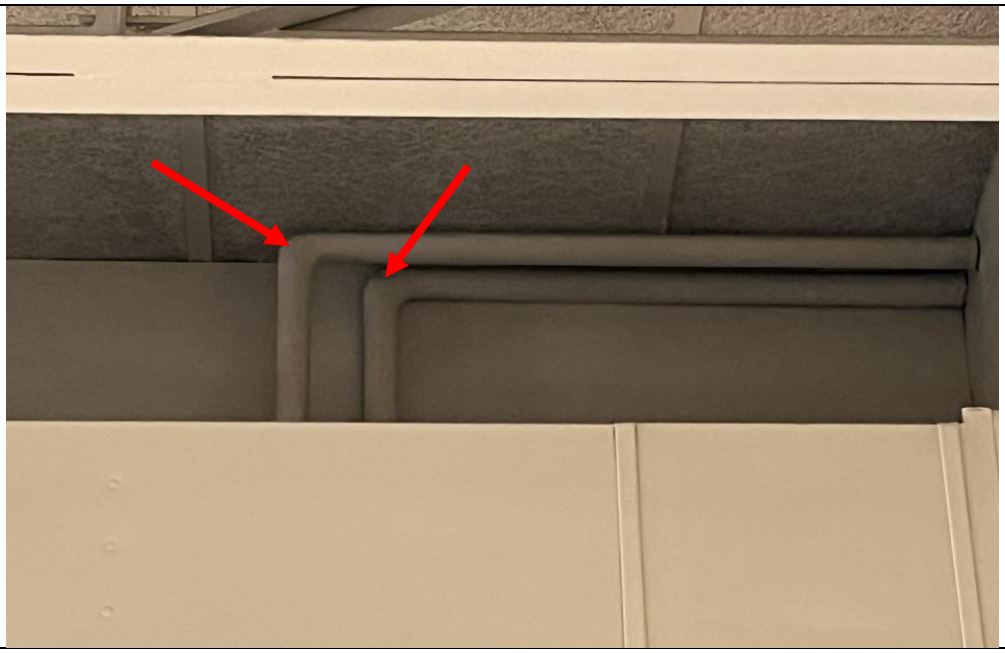
R.L. = Reporting Limit
NC = Not Calculated
Test methods may be modified from specified reference method unless indicated by an *

		Parameter	Lead
		Units	µg/g
		R.L.	5
Client I.D.	Sample I.D.	Date Collected	-
LP01 Blue on concrete block wall	24-036663-1	2024-Nov-21	109
LP02 Beige on concrete block wall	24-036663-2	2024-Nov-21	114
LP03 White on concrete block wall	24-036663-3	2024-Nov-21	<5

Michelle Dubien
Data Specialist

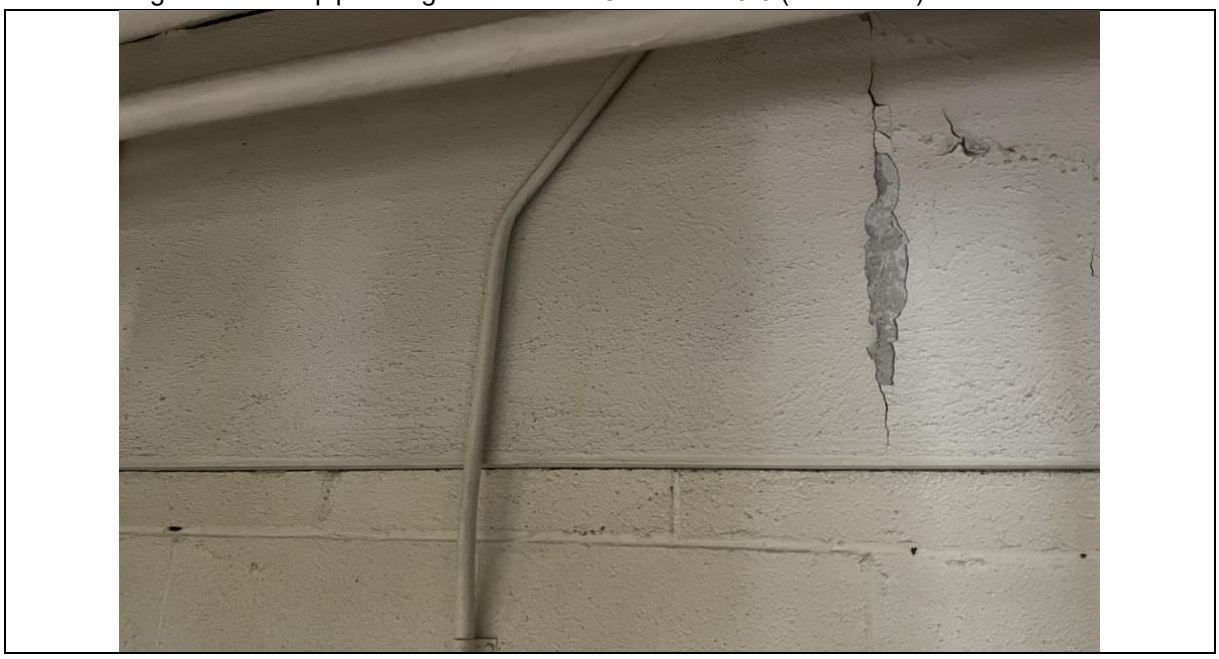
Appendix D

Site Photographs – November 21, 2024



P1 – Asbestos-Containing Mechanical Pipe Fittings

Asbestos-containing mechanical pipe fittings identified in Classroom 8-3 (red arrows).

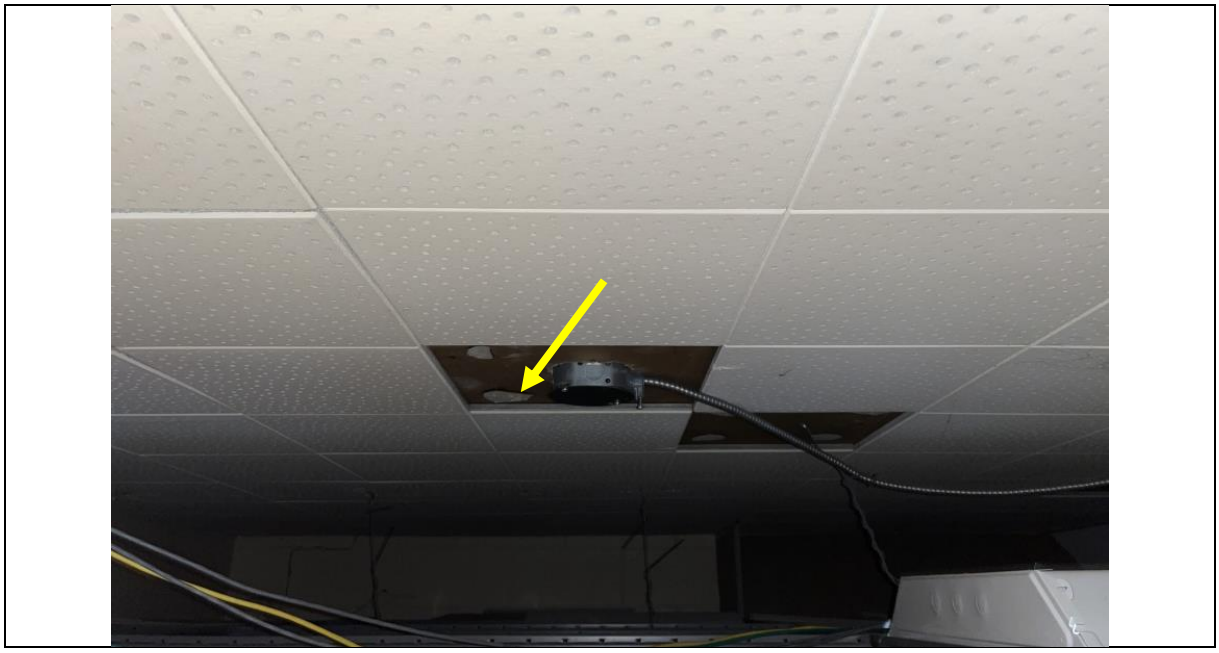


P2 – Asbestos-Containing Textured Plaster Panels

Asbestos-containing textured plaster panels were identified along the wall in classroom 8-5.

P3 – Asbestos-Containing Drywall Ceiling Finish

Asbestos-containing drywall ceiling finishes were identified in classroom 8-7A.



P4 – Asbestos-Containing 1'x1' Fixed-in-Place Ceiling Tiles and Associated Mastic

Asbestos-containing 1'x1' fixed-in-place ceiling tiles with a pinhole pattern and the associated asbestos containing mastic (yellow arrow) were identified above the lay-in ceiling in staff room 2-2B.

P5 – Asbestos-Containing 12”x12” Green Vinyl Floor Tiles

Asbestos-containing 12”x12” green vinyl floor tiles were identified within staff room 2-2B.

P6 – Asbestos-Containing 9”x9” Grey with White Streak Vinyl Floor Tiles

Asbestos-Containing 9”x9” grey with white and black streak vinyl floor tiles were identified within classroom 8-7.

Appendix E

Background Information on Designated Substances and Other Hazardous Materials

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.

Section 14 of O. Reg. 490/09 exempts an employer and the workers of an employer who engage in construction from the requirements of the regulation. However, designated substances are still required to be identified prior to the beginning of a demolition or renovation project to ensure that construction workers (and potentially building occupants) are adequately protected from the hazards posed by the presence of these materials if the planned work may cause them to be disturbed. Accordingly, under Section 30 of the OHSA building owners are required to perform an assessment to determine whether any designated substances are present at the project site before the beginning of the project. The owner is also required to prepare a list of designated substances that are present at the site and provide this list to prospective constructors before entering into a binding contract with the constructor. This way, contractors and construction workers are made aware of designated substances present within the work area so that appropriate measures can be taken during the work to limit exposure to these substances.

Designated Substances and Hazardous Materials Assessments are conducted to conform to the requirements of Section 30 of the OHSA. The assessments are performed to identify designated substances (and other hazardous materials) within the work area that may present a hazard to workers if disturbed. These substances are commonly a component of building materials or equipment found in buildings. Additional information regarding the eleven designated substances including their properties, uses and health effects are provided below.

Acrylonitrile

Acrylonitrile (ACN) is a clear, colourless or pale yellow liquid with a pungent onion- or garlic-like, irritating odour. It is highly flammable and as such is a severe fire and explosion hazard.

Acrylonitrile is used mainly as a monomer or comonomer in the production of acrylic fibres, plastics, resins and nitrile rubbers. Historically, a mixture of acrylonitrile and carbon tetrachloride was used as a pesticide; however, all pesticide uses have stopped. Based on its use as a chemical intermediate, exposure to acrylonitrile is primarily occupational, via inhalation during its manufacture and use. Therefore, this designated substance is not expected to be encountered in buildings where it is not either produced or used in a manufacturing process.

Acute (short-term) exposure of workers to acrylonitrile has been observed to cause mucous membrane irritation, headaches, dizziness, and nausea. More significant exposures may lead to symptoms such as limb weakness, labored and irregular breathing, impaired judgment, cyanosis, collapse, and convulsions. Exposure of the skin to high concentrations of acrylonitrile in the air may irritate the skin and cause it to turn red while direct skin contact with acrylonitrile may cause the skin to blister and peel. The International Agency for Research on Cancer (IARC) concluded that there is inadequate evidence in humans for the carcinogenicity of acrylonitrile, but has classified it as possibly carcinogenic to humans (Group 2B).

Arsenic

Arsenic is a naturally occurring mineral, widely distributed in the earth's crust. Elemental arsenic (sometimes referred to as metallic arsenic) is a silver-gray or white brittle metal. However, arsenic is usually found in the environment combined with other elements such as oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic has no odour and is almost tasteless.

Arsenic and its compounds have a variety of commercial uses. Inorganic arsenic compounds are mainly used as a wood preservative. Copper chromated arsenic (CCA) is used to make "pressure-treated" lumber. CCA-treated wood is no longer used for residential applications but may still be used in industrial applications. Arsenic is also used in metallurgy for hardening copper, lead and certain metal alloys, in pigment production, in the manufacture of certain types of glass, and in semiconductors and light-emitting diodes. Inorganic arsenic compounds are no longer used as pesticides in agriculture; however, organic arsenic compounds, namely cacodylic acid, disodium methylarsenate (DSMA), and monosodium methylarsenate (MSMA), are used, as yet, as pesticides – principally on cotton.

Today, workplace exposure to arsenic may still occur in some occupations that use arsenic, such as copper or lead smelting, wood treating, or pesticide application. Exposure to arsenic within buildings other than where it is used as part of the manufacturing process is unlikely and therefore arsenic is not expected to be encountered as part of a routine hazardous building materials assessment.

Human exposure to arsenic can cause both short and long term health effects. Short-term or acute effects can occur within hours or days of exposure. If you breathe high levels of inorganic arsenic, then you are likely to experience a sore throat and irritated lungs. Longer exposure at lower concentrations can lead to skin effects (such as darkened patches of skin and areas of thickened skin), and also to circulatory and peripheral nervous disorders. An important concern is the ability of inhaled inorganic arsenic to increase the risk of cancer. Long term exposure to arsenic has been linked to cancer of the bladder, lungs, skin, kidneys, nasal passages, liver and prostate. The IARC classifies arsenic and arsenic compounds as "carcinogenic to humans" (Group 1).

Asbestos

Asbestos is the name given to a number of naturally occurring fibrous minerals found in the environment. Ontario Regulation 490/09 (Designated Substances) defines asbestos as any one of the following fibrous silicates: actinolite; amosite; anthophyllite; chrysotile; crocidolite; and tremolite. Asbestos fibres have several desirable characteristics such as high textile strength, the ability to be spun and woven, and resistance to heat and most chemicals. These characteristics have resulted in the historical use of asbestos in a wide variety of building materials and other manufactured goods. Examples of products where asbestos has been used include roofing shingles, ceiling and floor tiles, insulation, sprayed fireproofing, gaskets, and friction products such as automotive brakes and clutches.

The peak years for asbestos use were in the 1960s and early 1970s. Therefore, asbestos is commonly found in building materials of this era. The use of asbestos in building materials and other products has decreased significantly since this time. Friable asbestos-containing materials (material that when dry can be crumbled, pulverized or powdered by hand pressure), such as sprayed fireproofing and sprayed insulation, ceased use circa 1973. Mechanical thermal system insulation ceased use circa 1981 while sprayed acoustic texture coat finishes ceased use circa 1982. Non-friable asbestos-containing materials were generally manufactured for a longer period of time (with the exception of plaster finishes which ceased use circa 1960’s). Asbestos-containing drywall joint compound ceased use circa 1980. Vinyl floor tiles, vinyl sheet flooring and acoustic ceiling tile ceased use 1982. Other non-friable materials continued to be produced into the 1990’s, including roofing materials (ceased use circa 1991) and floor adhesives (ceased use circa 1992). Today, asbestos is a controlled substance, and is banned for use in most products sold in Canada under the Hazardous Products Act (with the exception of certain roof shingles, clutch facings and brake linings).

Potentially harmful exposure to asbestos occurs through inhalation of air containing asbestos fibres. The greatest risk for workplace exposure to airborne asbestos is in occupations that produce and use asbestos, such as in mining and milling operations or in the manufacture of products containing asbestos. Exposure to airborne asbestos fibres may also occur to construction workers, trades people, maintenance workers and other building occupants in buildings constructed with asbestos-containing materials; especially during building renovations or repairs or if the materials are in poor condition or are otherwise disturbed.

Health risks associated with asbestos exposure are dependent on several factors such as the type and airborne concentration of asbestos, and period of exposure. In general, the greater the exposure to asbestos, the greater the chance of developing harmful health effects. Typically, chronic, daily exposure to elevated airborne concentrations of asbestos over a period of years is required for health effects to eventually manifest themselves. Health effects associated with exposure to asbestos can result in asbestosis (a scarring of the lungs which makes breathing difficult), mesothelioma (a rare cancer of the lining of the chest or abdominal cavity) and lung cancer. The link between exposure to asbestos and other types of cancers and health effects is less clear.

Benzene

Benzene is a clear, colourless liquid with a characteristic, sweet or aromatic hydrocarbon odour. It is a liquid at room temperature but evaporates into the air very quickly, making it a highly flammable vapour as well as an extremely flammable liquid.

Benzene is formed from both natural processes and human activities. Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke. It is produced from petroleum and coal sources and is used mainly in the manufacture of other chemicals which are used to make plastics, resins, and nylon and synthetic fibres. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides.

Exposure to pure benzene within buildings other than where it is produced or used as part of a manufacturing process is unlikely. Therefore benzene is not expected to be encountered as part of a routine hazardous building materials assessment.

Exposure to benzene primarily occurs through inhalation of airborne vapours. Short-term (acute) health effects associated with overexposure to benzene vapours can result in symptoms such as headache, nausea, dizziness, drowsiness and confusion, with unconsciousness or even death at very high levels. Long-term (chronic) exposure to Benzene may cause blood and bone marrow effects which can lead to anemia and leukemia (cancer of the blood-forming organs) as well as cause damage to the immune system, increasing the chance for infection. The IARC classifies benzene as "carcinogenic to humans" (Group 1).

Coke Oven Emissions

Coke Oven Emissions refers to the benzene soluble fraction of total particulate matter emitted during the destructive distillation or carbonization of coal for the production of coke (pure carbon). These emissions are a mixture of coal tar, coal tar pitch, volatiles (including benzene, toluene and xylene), creosote, polycyclic aromatic hydrocarbons (PAHs – including benzo(a)pyrene, benzanthracene, chrysene and phenanthrene), and metals (including cadmium, arsenic, beryllium and chromium). Condensed coke oven emissions are a brownish, thick liquid or semisolid with a naphthalene-like odour, while uncondensed coke oven emissions are vapours that escape when the ovens are changed and emptied and are a component of fugitive emissions.

The coke produced is used as a component in the manufacturing of iron and steel. Coke is also used to synthesize calcium carbide and to manufacture graphite and electrodes. Additional chemicals recovered from the coke oven emissions (such as benzene, toluene, naphthalene, sulfur, and ammonium sulfate) are used as raw materials for plastics, solvents, dyes, drugs, waterproofing, paints, pipe coating, roads, roofing, insulation, and as pesticides and sealants.

Coke oven emissions would only be present within facilities producing or using coke as part of the manufacturing process and thus occupational exposure is limited to those workers in the aluminum, steel, graphite, electrical, and construction industries. Therefore, coke oven emissions are not a contaminant of concern during a routine hazardous building materials assessment.

Chronic (long-term) exposure to coke oven emissions can result in chronic bronchitis (particularly those who smoke) and additional health effects such as conjunctivitis, severe dermatitis, and lesions of the respiratory system and digestive system. However, the greatest concern regarding chronic exposure to coke oven emissions is the increased risk of cancer. The IARC classifies coke production as "carcinogenic to humans" (Group 1). The site at which excess cancer rates have been identified most commonly among workers in coke production is the lung. Excess risk for kidney cancer has also been associated with work in coke plants. Additional studies have also reported excess risks for other types of cancers such as cancer of the large intestine and pancreas.

Ethylene Oxide

Ethylene oxide is colourless gas with a somewhat sweet odour. It is extremely flammable and also dangerously reactive. Ethylene oxide exists as a compressed gas that has been produced since the early 1900s. It is used primarily as a chemical intermediate in the production of ethylene glycol, glycol ethers, non-ionic surfactants and other industrial chemicals. Much smaller amounts are used as a non-explosive mixture with nitrogen or carbon dioxide for sterilizing medical instruments and supplies in hospitals and industrially for the fumigation of spices.

Most people are not likely to be exposed to ethylene oxide because it is not commonly found in the environment. Exposure to ethylene oxide is generally limited to those facilities where it is made or used. Therefore, ethylene oxide is not a contaminant of concern during a routine hazardous building materials assessment, although the presence of it should be determined in buildings such as hospitals if construction activities are to occur in or adjacent to areas where it is used or stored.

Exposure to ethylene oxide can result in irritation to the skin or eyes; however, the greatest risk for health effects is through inhalation. This can result in irritation to the nose, throat and respiratory tract, with damage to the central nervous system at higher concentrations. Exposure to high concentrations may cause headache, nausea, dizziness, drowsiness, and incoordination. Exposure to ethylene oxide is also a cancer hazard and possible reproductive hazard. In epidemiological studies of exposure to ethylene oxide, the most frequently reported association has been with lymphatic and haematopoietic cancer. The IARC has concluded that there is limited evidence for the carcinogenicity of ethylene oxide in humans and sufficient evidence for carcinogenicity in experimental animals, classifying ethylene oxide as “carcinogenic to humans” (Group 1).

Isocyanates

Isocyanates are a family of highly reactive, low molecular weight, manufactured chemicals containing one or more isocyanate groups (-NCO). An isocyanate that has two isocyanate groups is known as a diisocyanate, which are the most common type of isocyanates used for manufacturing other products. The most commonly used diisocyanates include methylene diphenyl diisocyanate (MDI), toluene diisocyanate (TDI), and hexamethylene diisocyanate (HDI).

When isocyanates are combined with other compounds that contain free hydroxyl functional groups (i.e. –OH) they react and begin to form polyurethane polymers. These polyurethanes find significant application in the manufacture of rigid and flexible foams. Flexible foam is primarily used for cushioning, while rigid foam is used mainly for insulation. Polyurethanes are also used in the production of adhesives, elastomers, and coatings and are increasingly used in the automobile industry, autobody repair, and building insulation materials.

This diversity of applications means that exposures to isocyanates can occur in a broad range of production facilities from small workshops to automated production lines. Jobs that may involve exposure to isocyanates include painting, foam-blowing, and the manufacture of many polyurethane products. Exposure to isocyanates within buildings where it is not produced or used as part of manufacturing is unlikely, as products such as rigid foam insulation that may be used in buildings has already undergone the curing process. Completely cured products are fully reacted and therefore are considered to be inert and non-toxic. However, some products such as spray foams, coatings, sealants and adhesives may be sold and used in an uncured form. An example would be an adhesive, which is sold to be initially applied in an uncured form and as it cures (hardens), bonds two pieces of wood together. Such products can provide potential exposure to building occupants and construction workers during the application and use of these products. However, for the purposes of a routine hazardous building materials assessment, products that may have contained isocyanate as part of the manufacturing process (e.g. rigid foam) or during the application/installation process (e.g. spray foam, adhesives and sealants) are assumed to be fully cured and would no longer contain free isocyanate.

Direct skin contact with isocyanates can cause marked skin irritation, resulting in reddening, swelling and blistering. However the greatest route of exposure to isocyanates is through inhalation of fine vapours or droplets. Airborne exposure to isocyanates can result in irritation to the mucous membranes of the eyes and respiratory tracts. This results in symptoms such as excessive tear secretion, dry throat, dry cough, chest pains and difficulty in breathing. Isocyanates are also a major cause of work-related asthma worldwide. Increased exposure to isocyanates can lead to sensitization. Once sensitized, individuals are subject to severe asthma attacks (which in some cases has been reported to result in death) if they are re-exposed.

Lead

Lead is a naturally occurring metal found in small amounts in the earth's crust. It is usually found in ore with zinc, silver and (most abundantly) copper, and is extracted together with these metals. Metallic lead is bluish-white in colour but soon tarnishes to a dull grey when exposed to air. When melted into liquid form it has a shiny chrome-silver appearance.

Lead is soft, dense, highly malleable and resistant to corrosion, with poor electrical conductivity as compared to most other metals. Such properties have resulted in lead being used in many applications, including products and materials commonly found in buildings. It is present as a component of lead-acid batteries, ammunition, PVC plastics, and older brass and chrome-plated brass faucets. As a building component, lead has been used in water distribution piping, as an alloy in solder, in electrical conduits, roofs and roofing details, and as an additive to paints, ceramic glazes and mortars as pigments

or for anti-corrosion properties. Lead has also used as sheeting inside buildings for shielding X-rays and for sound attenuation.

Exposure to lead can occur for workers in workplaces that produce the above materials but also to construction workers, building maintenance personnel and the general population due to the widespread historical use of lead in building materials and consumer products. Most exposure to lead occurs through ingestion or inhalation, with the health effects being the same. Overexposure to lead can result in damage to nervous connections and can cause blood and brain disorders, severe damage to the kidneys and ultimately death. Infants and young children are especially vulnerable to the health effects of lead, as overexposure has been proven to result in the permanent reduction in cognitive capacity. In pregnant women, high levels of exposure to lead may cause miscarriage. The IARC has concluded that lead and inorganic lead compounds are “possibly carcinogenic to humans” (Group 2B).

The known serious health effects associated with lead exposure has brought about widespread reduction in its use. The use of lead in building materials and consumer products has decreased substantially since the 1970s to where lead is no longer being used in building materials and consumer products or is present at significantly lower concentrations. For example, unleaded gasoline was introduced in Canada in 1975, after which leaded gasoline was phased out and banned in 1990. Lead-based solder has been banned since the1980s and most solder used today is either lead-free or has very low lead concentrations. Up until the 1960s, lead was added to paints in significant quantities. Since that time, the concentration of lead in paint has decreased. The federal government began reducing the amount of lead allowed in interior paint in 1976 (to 0.5% by weight). By 1991, paint manufacturers in Canada and the U.S. voluntarily stopped adding lead to paint, reducing lead concentrations to background levels. In 2005 the *Surface Coating Materials Regulations* came into effect to limit the concentration of lead in paint (to 0.06% by weight) for both interior and exterior paints sold to consumers. This was since amended in 2011 to further reduce the allowable lead limit (to 0.009% by weight) and extended to include all consumer paints and coatings.

Mercury

Mercury is a naturally occurring element found in the earth's crust, with natural deposits generally found as a vermilion red ore called cinnabar. Mercury can exist as metallic mercury, organic mercury or inorganic mercury. Metallic or elemental mercury has unique properties as compared to other metals. It is the only pure metal that is a liquid at room temperature, having a silvery-white, shiny appearance. Mercury is the densest liquid known, which produces a colourless, odourless vapour at room temperature.

The unique properties of mercury have resulted in it being used in a wide variety of applications. Properties such as its coefficient of expansion and ability to conduct electricity has resulted in mercury being used in thermometers, barometers and other

measuring devices (blood pressure gauges, vacuum gauges, manometers, etc.), thermostats and a variety of other electrical switches (temperature sensitive, tilt switches, float switches, etc.). Mercury is also used in antifouling paints, dry cell or button batteries, and numerous lighting products, including fluorescent lamps and a variety of High Intensity Discharge (HID) lamps such as mercury vapour, metal halide and high pressure sodium lamps. HID lamps are used for street lights, floodlights and industrial lighting applications. Because of the wide variety of uses mercury can be found as a component of machinery, equipment and lighting within buildings; although many of its uses have been phased out over the years.

The health effects of mercury exposure depend on its chemical form (elemental, inorganic or organic), the route of exposure (inhalation, ingestion or skin contact), and the level of exposure. Vapours from liquid elemental mercury and methyl mercury are more easily absorbed than inorganic mercury salts and can, therefore, cause more harm. Exposure to mercury occurs mainly from breathing contaminated air or ingesting contaminated water and food. Mercury is a neurotoxin, which means it can adversely affect the central nervous system. Upon exposure, mercury tends to accumulate quickly in the brain where it tightly binds with the tissue and is released at a very slow rate. The nervous system effects of mercury toxicity are sometimes referred to as "Mad Hatter's Disease" since mercurous nitrate was used in making felt hats. High levels of exposure to mercury can also lead to harmful effects on the digestive and respiratory systems, and the kidneys. Many mercury compounds may also be teratogenic or capable of causing birth defects.

Mercury compounds can also be toxic at low levels in the environment. The characteristics of mercury that make it an environmental problem are its toxicity and persistence in the environment, and its ability to accumulate and bioconcentrate as methyl mercury in fish and fish-eating predators such as large fish or loons. Therefore, proper disposal of mercury-containing materials is essential. The improper disposal of mercury-containing products such as fluorescent light bulb tubes, high intensity discharge lamps, mercury vapour lamps, mercury thermometers and thermostats can lead to the release of mercury from municipal landfills. Used fluorescent and HID lamps may be classified as hazardous waste due to their mercury content and should be recycled if possible rather than being disposed of in landfill.

Silica

Silica (silicon dioxide) is the name of a group of minerals that contain silicon and oxygen in a chemical combination and have the general formula SiO_2. It is one of the most common minerals in the earth's crust. Silica can be present as crystalline silica (free silica) or amorphous silica (combined silica), and exists in many forms. The three most common crystalline forms of silica encountered in the workplace environment are quartz, tridymite, and cristobalite. Quartz is by far the most common crystalline silica found in nature, being abundant in most rock types, notably granites, sandstones, quartzites and in sands and soils. Cristobalite and tridymite are found in volcanic rocks. Amorphous silica is found in

nature as biogenic silica and as silica glass of volcanic origin. One form of biogenic silica, diatomaceous earth, originates from the skeletons of diatoms deposited on sea floors. From a health perspective it is the crystalline silica forms that raise the biggest concerns.

Silica is present in numerous building materials and products, including concrete, brick, stone, terrazzo, refractory brick, etc. Low concentrations of silica are also possible in plaster, drywall, acoustical ceiling tiles, drywall joint compound, mortars and adhesives. Because of the wide usage of quartz-containing materials, workers may be exposed to crystalline silica in a large variety of industries and occupations. Occupational exposure to silica dust occurs in cement and brick manufacturing, asphalt pavement manufacturing, china and ceramic manufacturing, and the tool and die, steel and foundry industries. Exposure to silica also occurs during many different construction and maintenance activities. The most severe exposures to crystalline silica result from abrasive blasting activities using silica sand. Other activities that may produce crystalline silica dust include jack hammering, rock/well drilling, concrete mixing, concrete drilling, tuck pointing, and brick and concrete block cutting and sawing. Additionally, crystalline silica exposures occur in the maintenance, repair and replacement of refractory brick furnace linings.

Adverse health effects associated with silica exposure result from inhalation of the respirable fraction of crystalline silica, which can arise from many of the activities outlined above. The main health effects associated with silica exposure are lung cancer and silicosis. The IARC has concluded that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is “carcinogenic to Humans” (Group 1). Silicosis is caused by scarring of the lung tissue from breathing in silica dust. This scarring is permanent and causes a reduction in the lungs’ ability to take in oxygen, making it difficult to breathe and in severe cases can be disabling, or even fatal. Since silicosis affects lung function, it also makes one more susceptible to lung infections like tuberculosis.

Vinyl Chloride

Vinyl chloride is a manufactured substance that does not occur naturally. It is used as a chemical intermediate and not an end product. Vinyl chloride exists in liquid form if kept under high pressure or at low temperatures. At room temperature, it is a colourless gas. It burns easily and is not stable at high temperatures.

Most of the vinyl chloride produced is used to make a polymer called polyvinyl chloride (PVC). PVC is used to make a variety of plastic products including pipes, wire and cable coatings, vinyl flooring, vinyl wallpaper and window frames. It is also used to make furniture, upholstery and packaging materials. One of the concerns regarding PVC is that upon burning it will emit toxic fumes. Contaminants emitted when PVC is burned include hydrochloric acid, carbon monoxide, and carbon dioxide, along with lesser amounts of dioxin and furan.

Vinyl chloride is reported to be slightly irritating to the eyes and respiratory tract in humans. Central nervous system effects (including dizziness, drowsiness, fatigue, headache, visual and/or hearing disturbances, memory loss, and sleep disturbances) as well as peripheral nervous system symptoms (peripheral neuropathy, tingling, numbness, weakness, and pain in fingers) have been reported in workers exposed to vinyl chloride. Short-term (acute) exposure to extremely high levels of vinyl chloride has also reportedly caused loss of consciousness, lung and kidney irritation, and inhibition of blood clotting in humans. The most significant health effect associated with exposure to vinyl chloride is that it is a known human carcinogen that causes a rare cancer of the liver. It has been classified by the IARC as “carcinogenic to humans” (Group 1). Brain cancer, lung cancer, and some cancers of the blood also may be connected with breathing vinyl chloride over long periods.

OTHER HAZARDOUS MATERIALS

CHEMICAL HAZARDS

Urea Formaldehyde Foam Insulation

Urea-formaldehyde foam insulation (UFFI) was developed in as an improved means of insulating difficult-to-reach cavities. It was typically made at the construction site from a mixture of urea-formaldehyde resin, a foaming agent and compressed air. When the mixture is injected into the wall, urea and formaldehyde unite and "cure" into an insulating foam plastic. Its appearance is like ordinary shaving cream. Dry, it can be a white or tan colour, and fluffy like styrofoam. Over time UFFI shrinks significantly and may begin to degrade due to its crumbly texture.

UFFI was installed primarily in wall cavities during the 1970's as an energy conservation measure. The insulation was used most extensively from 1975 to 1978, during the period of the Canadian Home Insulation Program (CHIP), when financial incentives were offered by the government to upgrade home insulation levels. In addition to detached homes it can be found in common areas and walls of semi-detached homes, apartment buildings and condominiums. UFFI was also used to a lesser degree in some commercial and industrial buildings.

UFFI installation has been banned in Canada under the Hazardous Products Act (HPA) since December, 1980 due to concerns regarding the health effects of exposure to formaldehyde. Formaldehyde is a colourless, pungent-smelling gas. Health effects include eye, nose, and throat irritation; wheezing and coughing; fatigue; skin rash; nausea; headache; dizziness; and severe allergic reactions.

Sometimes, a slight excess of formaldehyde was often added to ensure complete "curing" with the urea to produce the urea-formaldehyde foam. The excess formaldehyde was given off after installation during the initial curing process, which typically took a few days to a week to complete. UFFI was sometimes improperly installed or used in locations where it should not have been, resulting in continued off-gassing of formaldehyde past the initial curing stage. Since UFFI was last installed in 1980, it should have little effect on indoor formaldehyde levels today. However, if UFFI comes in contact with water or moisture, it could begin to break down. Due to the age of the insulation UFFI may also begin to degrade and crumble into a fine powder. Under these conditions UFFI may release more formaldehyde and consideration should be given to removing the material using properly trained remediation personnel.

BIOLOGICAL HAZARDS

Mould

Mould is part of the fungi kingdom, which also includes mushrooms and yeasts. They are a naturally occurring and essential part of our environment since they break down dead organic material in the outdoor environment (such as leaves, wood and other plant debris), which they use as a food source.

Mould reproduces by means of tiny spores that are so small they can’t be seen by the naked eye. Because of their small size mould spores easily become airborne and can travel long distances, entering indoor environments through ventilation systems, open windows or doors, or tracked in on footwear. Therefore, mould spores are a commonly detected in indoor air and as a component of settled dust.

Under normal conditions, the presence of indoor mould is not an issue. However, if conditions exist that allow it to grow and multiply indoors it can become a potential hazard. Several factors will affect what moulds will grow within a building and how fast they will grow. This includes parameters such as temperature, airflow, and the pH (i.e. acidity/alkalinity) of the food substrate. However, the most important parameter affecting mould growth is water availability, as all moulds need some amount of moisture for them to be able to grow. Buildings that have had a history of water damage are at greater risk of indoor mould growth.

Indoor mould growth may present a risk to the building structure itself through decomposition of building materials. Health risks to building occupants may also occur as

a result of indoor mould growth. Construction or renovation work which disturbs mould-contaminated materials increases this risk of exposure to building occupants and the construction workers themselves. Health effects associated with exposure to mould most commonly results in allergic type reactions such as runny nose, cough, congestion, eye irritation and aggravation of asthma, headache and fatigue. Exposure to very high concentrations of airborne mould spores (such as those that may be observed during disturbance of mould-contaminated building materials) can result in more serious health effects such as Organic Dust Toxic Syndrome (ODTS) or Hypersensitivity Pneumonitis (HP), where flu-like symptoms (fever, chills, cough, fatigue, shortness of breath, body aches, etc.) are exhibited. The chronic form of HP may occur from long-term exposure to lower levels of mould and results in a continued worsening in shortness of breath or cough. A variety of species of mould have also been documented to cause serious invasive infections, which are generally limited to individuals whose immune systems are already somehow compromised.

ENVIRONMENTAL HAZARDS

Polychlorinated Biphenyls

Polychlorinated biphenyls (PCBs) are a class of man-made organic chemicals known as chlorinated hydrocarbons. They vary in consistency from thin, light-coloured liquids to yellow or black waxy solids. They were manufactured in the United States from 1929 until their manufacture was banned in 1979. Although PCBs were not manufactured in Canada, they were imported from the U.S. over the years. Canada banned the import, manufacture and sale of PCBs in 1977.

PCBs are non-flammable, chemically stable over a wide range of temperature and physical conditions, not soluble in water, unaffected by acids, base or corrosive chemicals, and have a high dielectric or electrical insulating capacity. Due to these unique properties PCBs were used in hundreds of industrial and commercial applications, most commonly in electrical transformers and capacitors, including those capacitors found in light ballasts. They were also used as coolants, fire retardants and as insulation and in a number of other commercial applications including carbonless copy paper, dust suppressors for roads, hydraulic fluids, caulking compounds, plasticizers and lubricating oils and heat-transfer applications.

Although PCBs were found to be extremely useful in many industrial and commercial applications some of their chemical properties also made them an environmental and health hazard. PCBs are nearly indestructible and therefore persist if released into the natural environment. Their high fat and low water solubility result in a build-up (bioaccumulation) of PCBs in the fatty tissue of animals and humans if ingested/inhaled. Because PCBs persist in the fatty tissue of animals their concentration will tend to increase the higher up the food chain.

Most of what is known about the human health effects of PCBs is based on exposures due to accidental releases or job-related activities. These exposures are much higher than the levels normally found in the environment. The adverse health effects include a severe form of acne (chloracne), swelling of the upper eyelids, discolouring of the nails and skin, numbness in the arms and/or legs, weakness, muscle spasms, chronic bronchitis, and problems related to the nervous system. The International Agency for Research on Cancer (IARC) classifies PCBs as “probably carcinogenic to humans” (Group 2A) based on limited evidence that long-term, high-level occupational exposure can lead to increased incidence of liver and kidney cancers. The long-term impact of low-level exposures to PCBs that is common in the general population is unclear. The current state of knowledge suggests that low-level exposures to PCBs are unlikely to cause adverse health effects. However, people eating large amounts of certain sports fish, wild game and marine mammals are at increased risk for higher exposures and possible adverse health effects.

Ozone Depleting and Global Warming Substances

There are several different types of chemicals that are being or have been used as refrigerants in commercial, home and vehicle air conditioners and refrigerators or as fire extinguishing agents in portable and fixed fire extinguishing equipment. This includes groups of chemical compounds known as chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and halons. Some of these chemicals have also been used as foam blowing agents, as cleaning solvents for electrical components, as aerosol spray propellants, and in hospital sterilization procedures. Fixed halon fire extinguishing systems have historically been used in areas such as data centers, IT rooms, museums, libraries, surgical suites, and other locations where use of water-based suppressants could irreparably damage electronics or vital archival collections. There is a large number of halon fire extinguishing systems still in service in Canada.

The concern regarding past and present use of many of the chemicals used as refrigerants or fire extinguishing agents is that they are ozone-depleting substances (ODS). When released into the environment these chemicals break down in the stratosphere and release chlorine or bromine, which destroy the stratospheric ozone layer. The ozone layer screens the earth from some of the sun's harmful ultraviolet rays (UVB). As the ozone layer is depleted, higher UVB levels reach the earth, resulting in increased exposure to UVB. Increased exposure to UVB can cause skin cancer and plays a major role in malignant melanoma development. It can also increase the likelihood of cataracts and may also suppress proper functioning of the body's immune system and the skin's natural defenses.

CFCs, HCFCs and halons are also known to be greenhouse gases and contribute to global warming due to the build-up of these heat-trapping gases in the atmosphere. Hydrofluorocarbons (HFCs) are a common replacement chemical for CFC and HCFC

refrigerants; and although they do not have any ozone depleting potential they are a potent greenhouse gas.

Due to the ozone-depleting potential and/or global warming potential of CFCs, HCFCs, HFCs and halons it is important to control their use and emission into the environment. The manufacture and use of CFCs has stopped while transitional refrigerants (HCFCs) are scheduled to be phased out of production. No phase-out dates are currently planned for any HFCs. In Ontario, Regulation 463/10, “Ozone Depleting Substances and Other Halocarbons” (made under the Environmental Protection Act) enhances the control and management of substances that deplete the ozone layer and contribute to global warming. This regulation has requirements to prevent or minimize ozone-depleting substances and other halocarbons emissions, which serves a dual environmental benefit of lowering emissions that destroy the ozone layer and contribute to climate change.

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

ART 1 - GENERAL

1.1 **General Requirements**

.1 Comply with requirements of Division 1.

1.2 **Related Sections**

.1 Scheduling of work: Division 1.

.2 Submittals: Division 1.

.3 Temporary facilities: Division 1.

1.3 **Qualifications**

.1 CSA S350-M1980 (R1998), Code of Practice for Safety in Demolition of Structures.

1.4 **Submittals**

.1 Where required by authorities having jurisdiction and by other sections of this specification, submit for approval, drawings, diagrams, details and supporting data clearly showing sequence of demolition & removal work of building designed by a registered professional structural engineer licensed to practice in Ontario.

1.5 **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 Project Manager 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 Project manager.

.3 Cease operations and notify the Project Manager immediately for special protective and disposal instructions when asbestos materials or other hazardous materials [, other than those identified,] are uncovered during the work of this project.

.4 NA

.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.

1.6 **Examination**

.1 Visit the site and the existing building so as to fully understand all existing conditions and extent of work required. No increase in cost or extension of performance time will be considered for failure to know conditions.

1.7 **Components Removed by Owner**

.1 All components not removed by the Owner shall become the property of the Contractor and shall be removed from the site by the Contractor.

.2 Existing millwork and countertops noted to be removed are to be turned over to school.

PART 2 - PRODUCTS

2.1 **Materials & Equipment**

.1 Provide materials and equipment as required to perform work of this section.

PART 3 - EXECUTION

3.1 **Preparation**

.1 Ensure that affected building areas are unoccupied and discontinued in use prior to start of demolition work.

.2 Verify that existing services in areas affected by demolition work are disconnected, capped or removed, prior to start of work.

3.2 **Existing Services**

.1 Disconnect all electrical and telephone service lines in the areas to be demolished in accordance with rules and regulations of authorities having jurisdiction. Post warning signs on all electrical lines and equipment that must remain energized to serve other areas during period of demolition.

.2 Disconnect and cap mechanical services in accordance with requirements of local authority having jurisdiction.

.1 Natural gas supply lines to be removed by qualified tradesman in accordance with gas company instructions.

.2 Remove sewer and water lines and cap to prevent leakage.

.3 Remove and cap other underground services.

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

.3 Do not disrupt active or energized utilities designated to remain undisturbed.

3.3 **Demolition**

.1 Carry out demolition work in accordance with CSA S350, unless otherwise specified.

.2 Remove from the site all materials indicated to be removed.

.3 Carry out demolition in a manner to minimize inconvenience to adjacent occupied space.

.4 Demolish work in a safe and systematic manner, from top to bottom.

.5 Sprinkle exterior debris with water to prevent dust. Do not cause flooding, contaminated runoff or icing. Do not allow waste material, rubbish, and windblown debris to reach and contaminate adjacent properties.

.6 Lower waste materials in a controlled manner; do not drop or throw materials from heights. Use chutes, conveyors, or hoisting equipment to lower materials.

3.3	**Demolition (Cont'd)**	.7	Burning of materials on site is not permitted.
		.8	Demolish masonry and concrete elements in small sections. Carefully remove and lower structural framing and other heavy and large objects.
		.9	At end of each work period, leave work in a safe condition, so that no part is in danger of toppling or falling.
3.4	**Clean-Up**	.1	For clean-up during demolition and for final cleaning, comply with requirements of Division 1.
3.5	**Disposal**	.1	Dispose of all demolished and surplus materials off site at a dump site authorized and licensed to receive specific materials.

End of Section

PART 1 - GENERAL

1.1 **Related Work**

.1 Concrete Floor Finishing: Section 03345

1.2 **References**

.1 ANSI/ACI 117-81, Tolerances for Concrete Construction and Materials.

.2 ASTM C 309-94, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C 494-92, Specification for Chemical Admixtures for Concrete.

.4 ASTM E1155M-87, Test Method for Determining Floor Flatness and Levelness Using the F-Number System.

.5 CAN/CSA-A5-03, Portland Cement.

.6 CSA-A23.1-00, Concrete Materials and Methods of Concrete Construction.

.7 CAN/CSA-A23.5-03, Supplementary Cementing Materials.

1.3 **Certificates**

.1 Submit certificates in accordance with Section 01300 - Submittals.

.2 Submit to Consultant manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:

.1 Portland cement.
.2 Supplementary cementing materials.
.3 Grout.
.4 Admixtures.
.5 Aggregates.

.3 Provide certification that mix proportions selected will produce concrete of quality,yield and strength as specified in concrete mixes, and will comply withCAN/CSA-A23.1.

PART 2 - PRODUCTS

2.1 **Materials**

.1 Portland cement: to CAN/CSA-A5.

.2 Supplementary cementing materials: to CAN/CSA-A23.5.

.3 Water: to CSA-A23.1.

.4 Aggregates: to CSA-A23.1. Coarse aggregates to be normal density.

.5 Water reducing admixture: to CAN3-A266.2-M78 and ASTM C494, Type A, Prokrete N by Conchem Lafarge, WR75 by Euclid Chemical Canada Ltd. or Pozzolith 322N by Master Builders Technologies Limited.

.6 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for the mixture to retain its shape when made into a ball by hand and capable of developing compression

2.1 **Materials (Cont'd)**

strength of 40 MPa at 7 days. M-Bed Standard by Sternson, V-3 Non-metallic Grout by W.R. Meadows of Canada Ltd., In-Pakt by C.C. Chemicals Canada Ltd. or Progrout by Conchem Lafarge.

.7 Liquid Curing/Sealing Compound: to CAN/CSA-A23.1 and to ASTM C 309 Type 1-chlorinated rubber, Class B water based acrylic curing/sealing compound, Acryseal WB by Conchem Lafarge, Masterseal W by Master Builders Technologies Limited, Florseal W.B. by Sternson or Sealtight Intex by W.R. Meadows of Canada Ltd.

.8 Premoulded joint fillers:

.1 Bituminous impregnated fiber board: to ASTM D1751, 12.7mm thick x depth of slab.

9 Shrinkage control fibres: Fibre Mesh fibrillated polypropylene fibres by Fibrermesh Canada Ltd. or equal, 19 mm in length.

2.2 **Mixes**

.1 Ready-mixed concrete and concrete proportions shall be in accordance with CSA-A23.1, Clause 14, and as follows.

.2 Concrete shall be proportioned by the water-cement ratio and to provide a plastic and workable mix without the formation of free water on the surface.

.3 Mix shall be designed for both strength and durability. Submit to Consultant the mix design for the different classes of concrete indicated in the General Construction Notes provided on the structural drawings and listed below.

.4 The amount of free moisture in the aggregate shall be deducted from the amount of mixing water being added.

.5 Specified slumps shall be maintained and checked periodically with slump tests.

.6 Mix shrinkage control fibres into slab mix at rate of 0.9 kg/cu.m of concrete, unless otherwise indicated on drawings. Add admixture as required.

.7 Class of exposure: refer to Clause 15 and Tables 7, 8 and 9 of CSA-A23.1, and Class of Concrete Table herein.

.8 Air content: to Table 10 of CSA-A23.1, according to category of exposure and Class of Concrete table provided on structural drawings.

.9 Concrete mix shall be designed and proportioned to yield the specified ultimate and compressive strength at 28 days as determined by laboratory testing standard 150 mm x 300 mm or 100 mm x 200 mm cylinders moist cured in the laboratory.

.10 Classes of concrete:

CLASS OF CONCRETE	LOCATION	EXPOSURE CLASS	STRENGTH (MPa)	SLUMP (mm)	AIR (percent)
A	Slab on Grade	-	25	80	up to 3

			Inside Building,			
2.2	**Mixes (Cont'd)**	B	Concrete Fill	-	5	20-80

*concrete must utilize plasticizer to facilitate placement.

PART 3 - EXECUTION

3.1 **Preparation**

.1 Obtain Consultant's approval before placing concrete. Provide 24 hour notice prior to placing of concrete.

.2 Pumping of concrete is permitted only after approval of equipment and mix.

.3 Ensure reinforcement and inserts are not disturbed during concrete placement.

.4 Prior to placing of concrete obtain Consultant's approval of proposed method for protection of concrete during placing and curing.

.6 In locations where new concrete is dowelled into existing work, drill holes in existing concrete. Place steel dowels and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.

3.2 **Construction**

.1 Do cast-in-place concrete work in accordance with CSA-A23.1.

.2 Place concrete to prevent layering and segregation, and vibrate sufficiently to ensure thorough compaction, maximum density, and according to CSA-A23.1 Clause 19.

.3 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.

.4 Surface Finishing

.1 Finish concrete in accordance with CSA-A23.1.

.2 Use procedures acceptable to CAN/CSA-A23.1 to remove excess bleed water. Ensure surface is not damaged.

.3 Honeycomb: In locations where the repair of honeycomb is acceptable to Consultant, cut out defective areas and fill the space with a cement mortar of the same materials as the surrounding concrete. Incorporate a liquid latex bonding agent into the mix. Apply in layers not exceeding 25 mm in thickness.

.5 Joint Fillers

.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Consultant. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

.2 Locate and form isolation and construction joints as indicated. Install

joint filler.

3.2 **Construction (Cont'd)**

.3 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces, except where perimeter insulation is installed in its place. Extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

.6 Patching

.1 Make good temporary openings left in concrete work for pipes, conduits, ducts, shoring and other such work during construction using mix of same proportions as surrounding work. Reinforce as required and finish to match surrounding work. Carry out patching as specified in standards contained herein.

3.3 **Site Tolerance**

.1 Concrete tolerance in accordance with CSA-A23.1.

End of Section

PART 1 - GENERAL

1.1 **General Requirements**
.1 Comply with requirements of Division 1.

1.2 **Related Sections**
.1 Cast-in-Place Concrete: Section 03300.

1.3 **Reference Standards**
.1 Do concrete floor finish in accordance with CAN3-A23.1-M77 except where specified otherwise.

.2 Conform to Concrete Floor Finish Specifications of Concrete Floor Contractor's Association of Toronto.

.3 Surface tolerances 1:350 from plane, maximum 13 mm from floor level at any point, free from trowel marks and "Washboard" chatters.

1.4 **Qualifications**
.1 The work of this section is to be done by a concrete floor finish contractor of recognized standing having personnel with experience in this type of work and who has the necessary equipment to carry out the work.

1.5 **Guarantee**
.1 Provide the following guarantee in accordance with the General Conditions, notwithstanding the time provisions therein.

Three year guarantee against defects in workmanship and materials.

PART 2 - PRODUCTS

2.1 **Materials**
.1 Concrete materials and reinforcement: in accordance with Section 03300.

.2 Additive: "Albitol" distributed by Albert Chemical Sales of Canada Limited.

.3 Curing compound: Mats 3.5.1.

.4 Sheet: polyethylene film, 0.1 mm thick, CGSB 51-GP-51M; or waterproof paper, Type 2, ASTM C171.

.5 Cement: Mats 3.2.1, normal, false set final penetration minimum 50% when tested in accordance with ASTM C 359.

.6 Additives, admixtures and hardeners: to be compatible.

.7 Chemical Hardener: Sealhard 400 by Sternson Ltd. or Saniseal 100 by Master Builders.

PART 3 - EXECUTION

3.1 **Inspection**
.1 Check that drains and other insets and inserts are set at correct heights.

3.2 **Preliminary Finishing**
.1 After concrete has been placed to screeds under Section 03300, strike off concrete level and flush with screeds with true, wooden, strike-off bar.

3.2 **Preliminary Finishing (Cont'd)**

.2 Immediately after striking off concrete, level it and consolidate it with wooden bull float, or in limited access areas, with wooden darby. Complete levelling and consolidation before free moisture rises to surface (bleeding).

.3 Use suitable techniques to finish abutting pours at joints to eliminate "humping". If humping occurs, grind joint down level to surrounding surface.

3.3 **Float Finish**

.1 After preliminary finishing wait until concrete stiffens sufficiently to sustain foot pressure with only about 6 mm indentation.

.2 Float concrete with hand float or with disc type power float or power trowel with float shoes attached.

.3 Do not bring water and fines to surface by over floating. Where longer floating is required, floating operation shall be repeated after sheen has disappeared and concrete has further hardened.

3.4 **Light Steel Trowel Finish**

.1 After float finish, trowel surface with steel hand trowel or power trowel keeping blade relatively flat at first and raising blade angle a little more on subsequent passes. Do not bring water and fines to surface by over trowelling.

.2 Slope surface to drains not less than 1:50, unless different slope is indicated or no slope to drain is required. Surface shall be level where no drainage requirements exist.

.3 Trowel surface as required to leave surface even and straight, free of high or low spots, pits, ridges or other surface irregularities and blemishes.

.4 Surface shall have firm and even textured finish.

3.5 **Steel Trowel Finish**

.1 After float or shake finish, trowel surface with steel hand trowel or power trowel keeping blade relatively flat at first and raising blade angle a little more on subsequent passes.

.2 Trowel surface at least twice and as many times as necessary to produce smooth, dense surface with close surface tolerances. Do not bring fines to the surface by over trowelling.

.3 Surface shall have a smooth, level, extremely fine textured but not burnished finish.

3.6 **Chemical Hardened Finish**

.1 Not sooner than 14 days after steel trowel apply chemical hardener.

.2 Make sure surface is thoroughly cured, dry and free from dust. Remove dust with heavy duty, commercial vacuum cleaner.

.3 Floors which are to receive chemical surface treatment must not be cured using membrane forming liquid curing compound. Use other means of curing.

.4 Remove oil, grease or other foreign substances on surface using suitable floor cleaner. Allow floor to dry thoroughly after cleaning.

.5 Apply chemical treatment as direct by manufacturer.

3.7 **Curing**

.1 Cure surfaces which are to receive chemical surface treatment. Begin curing immediately after trowelling.

.2 Other finishes may be cured by any method specified in CAN3-A23. Do not use curing compound without first determining whether subsequent finishes are to be applied. If subsequent finishes are to be applied do not use curing compounds, unless it can be warranted not to affect bond of applied finishes.

3.8 **Finishes Schedule**

.1 Finish top horizontal concrete surfaces in accordance with intended use and any intended applied finish. Conform to room finish schedule and following table of finishes.

.2

Intended Use of Surface or Intended Applied Finish	Integral Finish
- surface to receive cementitious beds for subsequent applied hard finishes, e.g. ceramic tile, quarry tile, portland cement bonded terrazzo.	float finish
- seamless, liquid applied flooring; liquid applied waterproof membranes.	light steel trowel
- resilient flooring, exposed surfaces not indicated to receive other or applied finishes, glued down carpet.	steel trowel finish
- exposed surfaces indicated to be chemically hardened, other surfaces.	steel trowel finish, followed by chemical surface treatment

End of Section

PART 1 - GENERAL

1.1 **General Requirements**
.1 Comply with requirements of Division 1.

1.2 **Related Sections**
.1 Concrete fill for block lintels: Section 03300
.2 Block Masonry: Section 04200
.3 Brick Replacement Section 04210

1.3 **Reference Standards**
.1 Quality Standards: meet requirements of CSA A179-94, Mortar and Grout for Unit Masonry.

1.4 **Source Quality Control**
.1 Source of Materials: for mortar to remain exposed in finished project, brands of cementitious materials and source of supply of sand, shall remain the same for duration of work.

1.5 **Delivery & Storage**
.1 Store cementiitous materials so as to prevent moisture absorption from any source. Do not use material affected by moisture.

.2 Store mortar and aggregate materials to prevent contamination. Do not use contaminated materials.

PART 2 - PRODUCTS

2.1 **Materials**
.1 Water: potable and non-staining.

.2 Aggregate - Sand: CSA A82.56M

.3 Portland cement: CAN/CSA-A5-93, Type 10.

.4 Masonry cement: CAN/CSA-A8-93, Type H.

.5 Waterproofer: Master Builders "Omnicron"

.6 Lime: Hydrated lime 'S' Type to ASTM C207.

PART 3 - EXECUTION

3.1 **Proportioning & Mixing**
.1 Mix mortar in accordance with table 2 of CSA A179-94 and the recommended procedures of the Brick Institute of America Manual MI except as specified herein.

.2 Mix mortar to proportions indicated in Mortar Schedule.

.3 An experienced competent tradesman must supervise mortar mixing.

.4 Mix mortar in watertight mechanical mixers. Measure ingredients accurately by volume. Bring mortar to required elasticity. Continue mixing mortar until materials are blended to uniform colour, but not less than 3 minutes, or more than 5 minutes. Do not mix longer than 10 minutes.

3.1 **Proportioning & Mixing (Cont'd)**

.5 Do not use admixtures of any kind in mixes except where specified otherwise.

.6 Prehydrate pointing mortar by mixing ingredients dry then mix again adding just enough water to provide a damp workable mix that will retain its form when pressed into a ball. Allow to stand for not less than two hours then remix with sufficient water to produce mortar of the proper consistency for pointing.

3.2 **Time Limits & Retempering**

.1 Use and place mortar in final position within the following time limits after mixing:

.1 Air Temp. above 25 degrees C - 12 hours.
.2 Air Temp. below 25 degrees C - 2.5 hours.

.2 Standard mortar that has stiffened within above time limits because of evaporation of water may be retempered by adding water as frequently as needed to restore required consistency. Discard mortar not used within above time limits.

3.3 **Mortar Schedule**

.1 Bearing walls: Type S mortar.

.2 Non bearing walls: Type N mortar consisting of 1 part Masonry Cement, 3 parts aggregate.

End of Section

PART 1 - GENERAL

1.1 **General Requirements**

.1 Comply with requirements of Division 1.

1.2 **Related Sections**

.1	Supply of reinforcing steel and concrete for block lintels:	Section 03300
.2	Mortar	Section 04100
.3	Supply of loose steel lintels	Section 05500
.4	Caulking:	Section 07900
.5	Supply of steel door frames	Section 08100
.6	Supply of access doors for mechanical and electrical Work.	Division 15 & 16

1.3 **Work Installed But Supplied By Others**

.1 Build into masonry elements inserts, anchors, bolts, sleeves and other items supplied by other Sections and which are required for installation and performance of work of other Sections.

.2 Install loose steel lintels.

.3 Coordinate installation of lateral supports required for final support of masonry partitions with Section 05500.

.4 Install steel door frames and access doors occurring in masonry elements.

.5 Install reinforcing steel and concrete fill into block lintels.

1.4 **Reference Standards**

.1 Confirm to requirements of CSA A370.94, CSA A371.94 and CSA S304.1.94.

1.5 **Qualifications**

.1 The work of this section is to be done by a masonry contractor of recognized standing having personnel with experience in this type of work and who has the necessary equipment to carry out the work.

1.6 **Inspection & Testing**

.1 The Consultant may at his discretion call for tests of mortar or other masonry materials to be made by an independent inspection company.

.2 A Cash Allowance for these tests will be carried by the General Contractor in accordance with the General Conditions.

1.7 **Source Quality Control**

.1 Submit laboratory test reports certifying compliance of masonry units and mortar ingredients with Specification requirements.

1.8 **Product Handing & Storage**

.1 Handle masonry units so as to prevent soiling and chipping and deliver to the job site in dry condition.

.2 Store masonry units above and off ground on level platforms which permit air circulation under stacks.

.3 During storage, protect masonry units against moisture absorption, damage, staining and freezing.

.4 Keep materials dry until use.

1.12 **Protection**

.1 Protect face work from splashing or marking. Protect interior block walls which are to be painted or left unfinished from staining and other damage.

.2 Protect all work installed by other trades from splashing and marking and other damage.

.3 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

PART 2 - PRODUCTS

2.1 **Materials**

.1 **Concrete Block**: Metric size and autoclaved.

.1 Lightweight block: Ultra Lite to CSA Standard A-165.1M

.2 Standard weight block: to CAN3-A165.1M85.

.3 Units must be cured for at least 28 days before delivery and shall have a moisture content of not more than 30% of total absorption.

.4 Size: unless indicated otherwise 190 x 390 mm x thickness as shown on drawings.

.5 Exposed block units shall be uniform in size, free of perceptible warp or twist, without chipped, ragged or broken edges; have a uniform surface texture, free of cracks, blemishes or defects detrimental to appearance or performance.

.6 Where indicated on Drawings and/or Specifications, provide solid or semi-solid units.

.7 Provide manufacturer's catalogued special units such as bullnose corner, lintel block and 45° corner blocks.

..2 **Metal Reinforcement and Anchors**

.1 Material: high tensile strength steel wire meeting ASTM A82, by Bloklok or Durowall.

.2 Finish: hot dip galvanized after fabrication to ASTM A153, Class B.

.3 Provide prefabricated assemblies for corners and intersections.

.4 Horizontal Reinforcement:

.1 Single wythe and solid walls: truss type with minimum 3.66 mm thick side and cross rods unless otherwise indicated; width 50 mm less than wall thickness: BLOK-TRUS BL30.

.5 Anchors and Ties:

.1 Non-bearing walls and partitions to bearing walls: corrugated wall ties minimum 0.7 mm thick, 21 x 175 mm

BLOK-LOK BLT7A.

.2 Masonry walls, partitions and veneer to concrete elements: Flexible wire tie, 4.76 mm thick, length to suit wall condition, and dovetail anchor slot: BLOK-LOK BLT8, or POS-1-TIE NWTC-TAPCON screw anchors by National Wire Products Industries Inc.

.3 Masonry wall to structural wood wall: BLOK-LOC 362-C Gripstay Channel bolted directly to wood stud

2.1 **Materials (Cont'd)**

.3 **Premoulded Joint Filler** - Closed cell vinyl foam, compressed 25% when in joint, one of the following:

.1 Unifoam R 1009 - Flexible by Goodco Ltd
.2 Rodofoam PR by Sternson Ltd.

.4 **Fire stop:** ULC labelled, firebarrier mineral wool by Double A/D Distributors Ltd., Fire-Bloc by M.W. McGill and Associates. Use Bakelite 910-10 Adhesive.

.5 **Dovetail anchor slots**: 26 ga. galvanized steel, glass fibre filled. Supply to Section 03300 for installation.

.6 **Preformed Control Joint Key:** Titewall BL.A Rubber Preformed Joint Key by BLOK-LOK.

.7 **Bond Break**: 0.1 mm thick polyethylene.

.8 **Compressible Filler:** Rockwool Insulation

.9 **Asphalt Impregnated Board**: 12 mm thick asphalt impregnated fibre boards.

PART 3 - EXECUTION

3.1 **Erection General**

.1 Build masonry work true to line, plumb, square and level, with vertical joints in proper alignment.

.2 Assume complete responsibility for dimensions, plumbness and levels of this work and constantly check same with graduated rod.

.3 Masonry courses to be of uniform height, and both vertical and horizontal joints to be of equal and uniform thickness.

.4 Extend all non-bearing partitions to within 25 mm of underside of floor or roof construction above and pack joint with a compressible filler of fire stop mineral wool, leave no voids.

.5 Carry wall up in uniform manner, no one portion being raised more than 750 mm above another at any time. Build no more than 1500 mm of wall measured vertically in any one day.

.6 Buttering corners of units, throwing mortar into joints, deep or excessive furrowing of bed joints not 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.

.7 Isolate masonry from vertical structural framing in exterior walls using 12 mm thick asphalt impregnated rigid board cemented to columns.

.8 Cut exposed masonry units with power driven masonry saw only. Ragged or chipped edges will not be permitted.

.9 Consult with other sections to avoid cutting and patching. Co-operate in setting and aligning built-in items. Build in conduit and piping so that they are not exposed. Do not break masonry bond to accommodate concealed built-in items.

.10 Install access doors occurring in masonry elements, required by Division 15 and 16. Install access doors, level, plumb properly aligned and securely anchored, in locations directed by Division 15 and 16.

.11 Grout solid with mortar all spaces around built-in items.

.12 Build in metal nailing plugs, grounds, inserts, anchor bolts, bearing plates, loose and miscellaneous items of steel and iron, isolated beams, lintels and shelf angles, sleeves, blocking and items furnished by other Sections.

3.2 **Blockwork**

.1 Lay all block in running bond with thicker end of face shell upward. Coursing to be modular 200 mm for one block and one joint.

.2 Do not wet blocks before laying.

.3 Lay units with webs aligning one over the other in full bed of mortar over entire laying surface including webs. Vertical joints shall be fully filled with mortar on both faces and squeezed tight.

.4 Exposed faces shall be full units laid out to minimize cutting with not less than 100 mm at any vertical edge or corner.

.5 Use solid block for at least two courses under all point bearing loads.

.6 Use special shaped units where indicated, specified or required. Use bull nosed units for exposed external corners, window jambs, door jambs and as detailed. Exposed open cells not permitted.

.7 Use square cornered block for first course at floor at locations with exposed external bullnose corners. Grind square corner above top of base to match bullnose of blocks above as detailed.

.8 Where resilient base is indicated, tool the joints to within 100 mm of the floor. Cut joints flush behind the base.

.9 Provide minimum 400 mm solid or grouted block for jambs of openings and at ends of walls.

.10 Cope or cut with power saw exposed units to accommodate flush mounted electrical outlets, grilles and other components. Leave maximum 5 mm

clearance. Cover plates and flanges must cover cut edges.

3.2	**Blockwork (Cont'd)**	.11	Take special care to prevent mortar or other substances from staining exposed block faces. Replace stained blocks as directed by the Consultant at no extra cost to Contract.
		.12	Tie intersecting non-bearing walls together with masonry reinforcing every second course.
		.13	Provide continuous 0.1 mm thick polyethylene bond breaker at base of partitions and walls which bear on concrete slabs.
		.14	Use lightweight blocks for all interior block walls and partitions.
3.3	**Mortar & Pointing**	.1	Make all joints uniform in thickness, straight, in line, with mortar compressed to form concave joints.
		.2	After joints have been tooled rub walls with burlap.
		.3	Strike joints flush where walls are to receive insulation, ceramic tile or similar finishes.
3.4	**Building-In**	.1	Build in door and window frames, steel lintels, sleeves, anchor bolts, anchors, nailing strips and other items to be built into masonry.
		.2	Do not distort metal frames. Bed anchors of frames in mortar and fill frame voids with mortar or grout as wall is erected.
3.5	**Bearings**	.1	Fill concrete block solid with 20 mPa concrete for two courses below bearing points of structural members, and where indicated.
		.2	Install building paper and wire mesh reinforcing in the bed below second block course from top.
		.3	Use 100% solid concrete blocks where indicated.
		.4	Build masonry neatly around beam and lintel bearings.
		.5	Complete fill voids beneath steel bases bearing on masonry with an approved non-shrink grout having a compressive strength at 28 days of at least 35MPa. Where grout is exposed to view or weather, use no-ferrous expansion agents.
3.6	**Anchoring, Bonding & Reinforcement**	.1	Anchor or bond walls and partitions at points where they intersect.
		.2	Anchor masonry walls and partitions to concrete elements with anchors spaces at 400 mm vertically.
		.3	Unless otherwise indicated reinforce all walls and partitions with continuous horizontal metal reinforcement, installed at 400 mm o.c. vertically.
		.4	At all wall openings place continuous reinforcement in first and second mortar joints above and below openings. Additional reinforcement at openings shall extend 610 mm beyond both sides of openings.

.5 Install prefabricated corner assemblies at outside corners.

.6 Lap continuous reinforcement 150 mm at splices. Cut reinforcement at control joints.

3.7 **Cutting Masonry**

.1 Cutting of masonry units exposed in finished work shall be done with approved type power saw. Where electrical conduit outlet or switch boxes occur, grind and cut units before services installed.

.2 Patching of masonry not permitted.

3.8 **Reinforced Lintels**

.1 Install reinforced concrete block lintels at openings where steel lintels are not indicated.

.2 Support masonry units of reinforced block lintels built in place. Provide a level platform, true to the proper elevation and of sufficient strength to support the load without visible deflection. Maintain supports in place for a minimum of 7 days and for a period sufficient to permit the concrete to cure and gain sufficient strength to safely support all loads.

.3 Cast and cure lintels on a plank. Set special channel lintel blocks using specified mortar. Place wood stops at each end of lintel to prevent movement.

.4 Place 25 mm of 20 mPa concrete in voids, lay in reinforcing bars as indicated on drawings and place concrete to level of block sides. Rod and tamp concrete well without disturbing reinforcing. Allow lintels to cure 7 days before moving.

.5 Minimum bearing shall be 200 mm each side.

.6 Provide building paper in joint at bearings and at vertical joint at ends of block lintels to break bond.

3.9 **Steel Door Frames**

.1 Install steel frames in masonry walls. Build in frames rigid, true and plumb. Fill voids between frames and masonry with mortar grout.

.2 Brace frames solidly in position while being built in. Provide temporary horizontal wood spreader at mid-height of frames to ensure maintenance of required frame width until masonry work is completed.

.3 Comply with installation requirements specified under Section 08100.

3.10 **Patching & Cleaning**

.1 At completion of work, holes and other defects in masonry joints shall be repaired, and masonry surfaces shall be thoroughly cleaned.

.2 Holes in masonry joints shall be filled with mortar and suitably tooled. Cut out and repoint defective joints.

.3 Dry brush masonry surfaces at end of each day's work and after all final pointing. When mortar joints are dry and hard, clean masonry surfaces by rubbing down with abrasive blocks and stiff fibre brushes.

End of Section

PART 1 - GENERAL

1.1	**General Requirements**	.1	Comply with requirements of Division 1.	
1.2	**Related Section**	.1	Cabinet Work:	Section 06400
		.2	Block Masonry	Section 04200
		.3	Metal Doors and Frames	Section 08100
		.4	Painting:	Section 09900
1.3	**Reference Standards**	.1	Do welding work to C.S.A. W59-1984 unless specified otherwise.	
		.2	Comply with the Ontario Building Code latest edition.	
1.4	**Submittals**	.1	Submit shop drawings in accordance with the General Conditions. Clearly indicate such items as design calculations, materials, thickness, construction, connections, joints, anchorage, supports, reinforcements, and other relevant details.	
		.2	Shop drawings for ladders and pit covers shall bear stamp of a professional engineer registered in Ontario.	
1.5	**Work Supplied To Other Trades**	.1	Supply the following items for installation under other Sections of work: Anchor bolts, bearing plates, sleeves and other inserts to be built into concrete and masonry elements and required for anchorage and support of work of this section.	
		.2	Supply other Sections with instructions, and if required, templates, necessary for accurate setting of inserts and components.	
1.6	**Product Delivery & Storage**	.1	Deliver, handle and store fabricated components to prevent permanent distortion, corrosion and damage.	

PART 2 - PRODUCTS

2.1	**Materials**	.1	Material to be free from defects impairing strength durability or appearance and be of best commercial quality for purposes specified.
		.2	Steel sections and plates: To C.S.A. GRO.21-M1978. Type (300W).
		.3	Steel Pipe: To CSA B63-1966 (R1971) standard weight, extra strong, double extra strong, black, galvanized finish.
		.4	Square steel tube: CAN3-G40.21-M81, Grade 350W, Class H.
		.5	Sheet steel: Hot dip galvanized, cold rolled, with stretcher level degree of flatness to ASTM A526; zinc coating designation Z275.
		.6	Stainless steel: To C.S.A. G110.6-1968 Type 302, exposed surfaces to have No. 4 polished finish.

2.1 **Materials (Cont'd)**

.7 Welding materials: To C.S.A. W59-1984.

.8 Bolts and anchor bolts: To ASTM A307-76B.

.9 Galvanizing: Hot dipped galvanizing with minimum zinc coating of 600 g/m^2 to CSA G164-1965 (1972).

.10 Chromium plating: Chrome on steel with plating sequence of 9 micrometres thickness of copper, 10 micrometres thickness of nickel and 2.5 micrometres thickness of chromium.

.11 Galvanized primer: Zinc rich, ready mix to CGSB 1-GP-181M.

.12 Cast Iron: Soft grey iron.

.13 Wrought Iron: Best quality, strong homogeneous, ductile forged iron to CSA standards latest edition for wrought iron.

.14 Shop primer: CGSB 1-GP-40M.

.15 Zinc rich paint: CGSB 1-GP-181M.

.16 Bituminous enamel: Alkali resistant asphaltic coating.

.17 Non-shrink grout: Por-Rok by Hallemite Products Ltd., or SET 15 Minute Anchoring Cement by SET Products Ltd.

2.2 **Fabrication**

.1 Fabricate components in the shop in largest size practicable to minimize field jointing.

.2 Fabricate components square, straight, true, free from warpage and other defects. Accurately cut, machine file and fit joints, corners, copes and mitres.

.3 Fabricate items from steel unless otherwise noted.

.4 Reinforce fabricated components to safely withstand expected loads.

.5 Make joints in built-up sections with hairline joints in least conspicuous locations and manner.

.6 Make allowance for thermal expansion and contraction when fabricating exterior work.

.7 Joints shall be welded unless otherwise indicated and unless details of construction do not permit welding. Exposed welds shall be continuous and shall be ground smooth.

.8 Close exposed open ends of tubular members with welded on steel plugs.

.9 Curved work to be made true radii.

.10 Use self-tapping shake-proof countersunk flat headed screws on items required to be assembled by screws or as indicated.

2.2 **Fabrication (Cont'd)**

.11 Where work of other Sections is to be attached to work of this Section, prepare work by drilling and tapping holes, as required to facilitate installation of such other work.

.12 Work of this Section, supplied for installation under other Sections, shall be prepared as required ready for installation by drilling, countersinking and tapping holes, forming shapes and cutting to required sizes.

.13 Grind off mill stampings and fill recessed markings on steel components left exposed to view.

2.3 **Connections**

.1 All exposed fastenings to be of same material, colour and finish as the metal to which it is applied.

.2 Connections and accessories must be adequate to sustain safely and withstand stresses and strains to which normally subjected.

.3 Shop and field connections to be riveted or welded and where indicated or required, blind riveted. Rivets, screws and fastenings to be countersunk into exposed work and finished flush.

.4 Connect all members to form a homogeneous structure. Connections to develop the full strength in the member connected before failure.

2.4 **Finishes**

.1 Thoroughly clean steel of loose scale, rust, oil, dirt and other foreign matter. Suitably prepare steel surfaces by power tool cleaning to receive specified finishes.

.2 Grind smooth sharp projections.

.3 Remove oil and grease by solvent cleaning.

.4 Apply coatings in the shop and before assembly. Where size permits, galvanize components after assembly.

.5 Shop apply coat of primer to interior components after fabrication except where galvanized or zinc rich paint finish is required.

.6 Do not paint surface to be field welded.

.7 Dip bolts that are to remain permanently in the structure, in oxide paint before placing in position.

.8 Hot dip galvanize all exterior components and, where so indicated, interior components, after fabrication.

.9 Apply coat of bituminous enamel to surfaces of metal components in contact with cementitious materials and dissimilar metals.

PART 3 - EXECUTION

3.1 **Installation**

.1 Erect metal work square, plumb, straight and true, accurately fitted, with tight joints and intersections. Drill, cut and fit as necessary to attach this work to adjoining work.

3.1 **Installation (Cont'd)**

.2 Provide suitable and acceptable means of anchorage such as dowels anchor clips, bar anchors, expansion bolts and shields, toggles.

.3 Make field connections with high tensile bolts, or weld to CSA S16-1969 and CSA S16S1-1975.

.4 Provide temporary supports and bracing required to position components until they are permanently anchored in place.

.5 Securely anchor components in place; unless otherwise indicated, anchor components as follows:

.1 To concrete and solid masonry with expansion type anchor bolts.
.2 To hollow construction with toggle bolts.
.3 To thin metal with screws or bolts.
.4 To thick metal with bolts or by welding.
.5 To wood with bolts or lag screws.
.6 Fill space between railing members and sleeves with non-shrink grout.

.6 Hand items to be cast into concrete or built into masonry over to appropriate trades together with setting templates.

.7 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection.

.8 Touch-up galvanized surfaces with zinc primer where burned by field welding.

.9 Dissimilar metals and metals in contact with cementitious elements shall have contact surfaces coated with bituminous paint or be isolated by other means as approved by Consultant.

3.2 **Schedule of Components**

.1 **Millwork Accessories**
Examine millwork detail drawings and Section 06400 and supply welded tubular frames, angle and channel supports and other miscellaneous metal items required for but not specified as part of Section 06400.

.2 **Miscellaneous Steel Items**

.1 Miscellaneous steel angles, plates and lintels indicated on Architectural Drawings.

.2 Other metal fabrications shown on Drawings and not specifically covered in other Sections.

End of Section

PART 1 - GENERAL

1.1 **General Requirements** .1 Comply with requirements of Division 1.

1.2 **Related Sections**
.1 Concrete Floor Finishing: Section 03345
.2 Cabinetwork: Section 06400

1.3 **Work Supplied to Other Trades**
.1 Supply following items for installation under other Sections of work: Anchor bolts, bearing plates, sleeves and other inserts to be built into concrete and masonry elements and required for anchorage and support the work of this section.

.2 Supply other Sections with instructions, and if required, templates, necessary for accurate setting of inserts and components.

1.4 **Source Quality Control**
.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

1.5 **Product Delivery & Storage**
.1 Store material on site on skids off the ground and covered for protection from rain.

.2 Take adequate measures to prevent moisture gain of kiln dried materials.

PART 2 - PRODUCTS

2.1 **Lumber Material**
.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:

.1 CAN 3-086-M84
.2 CSA 0141-1970
.3 NLGA Standard Grading Rules for Canadian Lumber, 1980 edition revised according to Supplement No. 1, 1981.

.2 Furring, blocking, railing strips, grounds, rough bucks, curbs.

USE	SPECIES	GRADE
Blocking	Spruce	2
Studs	Spruce	1
Plates	Spruce	1
Other	Spruce	1
Cants	Douglas Fir	2
Wood Fascia	Douglas Fir	1

2.2 **Plywood** .1 Douglas Fir to CSA 0121-08 Unsanded Sheathing Grade.

2.3 **Fasteners**

.1 Nails: to CSA B111-1974, hot dip galvanized steel for exterior work including components located in exterior walls and roofs; bright finish steel in all other locations. Unless otherwise indicated use common spiral flathead nails.

.2 Bolts, nuts, washers: ASTM A307, hot dip galvanized steel.

.3 Connectors, anchors, brackets, spikes: hot dip galvanized structural quality steel.

.4 Plugs for masonry walls: 4.5 mm galvanized sheet steel wall plugs by Drummond & Reeves, approx. 75 mm deep and 57 mm wide.

.5 Screws: to CSA B35.4-1972 zinc, cadmium or chrome plated.

.6 Nailing discs: flat caps, minimum 1" diameter, maximum 16 ga thick sheet metal, formed to prevent dishing. Bell or cup shapes not acceptable.

2.4 **Wood Treatment**

.1 Preservative pressure treated components: to CSA, using alkaline copper quatemary (ACQ).

.2 Surface, cut, bore and trim components to sizes required as much as possible prior to pressure treatment.

PART 3 - EXECUTION

3.1 **General**

.1 Erect work plumb, level, square and to required lines, Ensure that materials are rigidly and securely attached to each other and to adjacent building elements and will not be loosened by work of other trades.

.2 Where other materials and components are to be applied directly over wood members recess heads of fastening devices below wood surfaces.

.3 Where work remains exposed to view, fasteners shall be uniformly and evenly spaced and neatly installed.

3.2 **Nailers, Blocking Copings Grounds**

.1 Provide wood nailers, blocking, copings, strapping, bucks, grounds and other rough carpentry components to sizes and in locations required for satisfactory supply of fabricated items and other work.

.2 Unless otherwise indicated, provide minimum 38 mm thick material. Grounds may be 21 mm thick material unless otherwise indicated.

.3 Install wood members plumb, level, straight, true to line and solidly anchored to adjacent building elements.

.4 Provide rough bucks where indicated or required for windows, doors lockers and other elements.

3.3 **Anchors & Fasteners**

.1 Provide rough hardware including nails, screws, bolts, washers, brackets, hangers, and fastening devices of all types.

.2 Unless otherwise indicated, attach wood members at maximum 600 mm. o.c. as follows:

.1 To concrete and solid masonry with expansion type anchor bolts.

.2 To hollow masonry with toggle bolts.

.3 To heavy gauge metal with bolts.

.4 To light gauge metal with screws or bolts.

.5 To wood with nails, screws or bolts as required to ensure stability.

.3 Bucks and plates shall be anchored to masonry walls with 13 mm galvanized steel bolts 450 mm long.

.4 Fasten wood copings to supporting masonry elements with 13 mm galvanized steel bolts min. 450 mm long spaced max. 600 mm o.c. Where width of coping plate exceeds 100 mm, stagger bolts off centre.

3.4 **Pressure Treated Components**

.1 Use preservative pressure treated lumber and Treated plywood within exterior wall and roof systems and other locations indicated on drawings.

.2 Where it is necessary to cut, bore or otherwise alter pressure treated components in the field, treat cut surfaces with heavy coat of wood preservative.

End of Section

PART 1 - GENERAL

1.1 **General Requirements**

.1 Comply with requirements of Division 1.

1.2 **Related Sections**

.1 Carpentry — Section 06100
.2 Finished Hardware: — Section 08710

1.3 **Reference Standards**

.1 Standards referred to herein are based on the published standards of the Architectural Woodwork Manufacturer's Association of Canada (AWMAC).

.2 Subcontractors shall make themselves thoroughly familiar with these standards prior to submitting their tender.

1.4 **Qualifications**

. 1 The work of this section is to be done by a Millwork Contractor of recognized standing having personnel with five years experience in this type of work and who has the necessary equipment to carry out the work.

1.5 **Guarantee**

.1 Provide the following guarantee in accordance with the General Conditions, not withstanding the time provisions therein.
Five (5) year guarantee against defects in workmanship and materials including warpage and delamination.

.2 Make good or replace work showing defect in this period at no expense to the Owner

1.6 **Submittals**

.1 Submit shop drawings in accordance with the General Conditions of the contract. Clearly indicate methods of construction, profiles, jointing, fastening and other related details. Make shop drawings complete with details and sections drawn to scale no smaller than 1:10. Draw plans and elevations no smaller than 1:20.

.3 Submit samples of each type of countertop and splashback showing construction and finishes.

.4 Submit samples of melamine, plastic laminate, edging and all types of hardware including drawer glides, hinges, locks, pilasters, etc. for review by the Consultant.

1.7 **Product Delivery & Storage**

.1 Do not deliver materials until suitable heated dry storage space is available and portion of building in which it is to be installed is completely ready. Deliver materials with protective coverings and maintain in undamaged condition.

.2 Store materials on site in such a way as to prevent deterioration or loss or impairment of essential properties. Do not store or install materials in areas where relative humidity is less than 25% or greater than 60% at 22oC.

.3 Cover finished plastic laminate surfaces with heavy kraft paper or put in cartons during shipment. Protect installed plastic laminate surfaces by approved means. Do not remove until immediately before final inspection.

PART 2 - PRODUCTS

2.1 **Materials** .1 **Cabinet Hardware:**

.1 Hinges:
19 mm cupboard door — Blum Model 170BL91-653 with Blum mounting plate BL175.810. or Hafela Aximat hinges, self-closing 270 degree where noted on drawings.

.2 Locks
19 mm cupboard door — National C8053-5
19 mm drawer — National C8053-5
All cupboard doors and drawers to be keyed the same.
Each room to be keyed differently.
Provide 6 master keys.

.3 Pulls:
Cupboard door or drawer — Canadian Building Hardware CBH 255 xC26D

.4 Catches:
19 mm cupboard door — Elbow Catch Richelieu #BP3675-2G

.5 Door Bumper — Richelieu AMP 5312-11

.6 Surface Bolts: — Gallery Hardware No. 73

.7 Shelf Supports: Richelieu #5834-180 for 32mm spaced holes.

.8 Drawer Slide: Blum Metabox 320M integrated runner system using epoxy steel carcasses, adjustable front fixing brackets and 12mm Melamine with 3mm PVC on all exposed edges for bottoms and back panels. Install screws to all pre-drilled holes. Use deepest Metabox possible for space available or approved equal. See drawings for other slides called for specific locations.

.9 Wall Mounted Shelf Brackets and Standards:
Standards: Knape & Vogt 185 Series length as shown on drawings to suit shelf width.
Brackets: Knape & Vogt Series 85c/w shelf rest.

.10 Computer Grommets: Standard recessed 3" (75mm) diameter. Colour as selected by Architect.

.11 Slide Bolts: Gallery 73 - 3" (75 mm) or approved equal.

.12 Coat Hooks: Henkel Hook from Henkel Diversified Inc (519-641-5872). Colour to be either HD001-Graphite or HD006-

Light Grey. Architect to make final colour decision.

.2 **Solid Wood**

2.1 **Materials (Cont'd)**

.1 Hardwood Lumber: to National Hardwood Lumber Association (NHLA) requirements, moisture content of maximum 7%, maple species to AWMAC premium grade.

.2 Softwood Lumber: to CSA 0141-1970, dressed all sides used in concealed locations.

.3 All wood materials shall be new, straight and clean, free of sap, knots, pitch, and other defects, except as permitted by applicable grading rules.

.3 **Casework Plywood:**

.1 Hardwood Plywood: Multicore plywood to CSA 0115 - M1982 of thickness indicated, rotary cut face, maple species veneer, good two sides grade where exposed or semi-exposed, good one side sound one side grade where one side is permanently concealed. Veneer to be select maple with book match face.

.2 Poplar Plywood: to CSA 0153-1976 sanded grade in thickness indicated.

.4 **Casework Particleboard**

.1 Particleboard: to CAN 3-0188, 1-M78 Grade 'R', minimum density of 720 kg/m3, of thickness indicted, rotary cut face veneer, good two sides. Veneer to be select maple, book match face.

.5 **Hardboard:**

.1 Hardboard: to CGSB 11-GP-3M, Type 2, tempered hardboard 6 mm thick.

.2 Perforated Hardboard: to CGSB 11-GP-3M Type 2, 6 mm thick with 6 mm holes at 25 mm o.c.

.6 **Melamine:**

.1 Melamine Faced Particleboard: to CAN3-0.188.1-M78, grade "H" particleboard sanded faces, 19 mm thickness, faced with laminated plastic melamine resin impregnated cover sheet with coloured and/or patterned paper inner layer. Melamine shall be thermally fused to rigid particle board substrate. Melamine faces shall be 120 Gram Weight Paper.
Colour: Refer to Section 00865 Colour schedule
Acceptable Material: Flakeboard, Uniboard or approved equal.

.2 Edge Banding: solid polyvinylchloride (PVC), 3 mm thickness x full

width of board, wood grain, colour through type to match melamine face by Canada Wood tape or approved equal.

2.1 **Materials (Cont'd)**

Edging: rigid PVC with a measured degree of hardness of " 95 shore D" and thickness of "3mm (+0.15mm, -0.2mm)" with the primer side having a concave measuring 0.10 to 0.25mm.
Edging adhesive: Ethylene vinyl acetate thermalset adhesive with a temperature resistance of not less than 100 degrees C; A Processing range of 190 degrees - 200 degrees C and natural in colour.

Edging is to be applied using only equipment designed for the application of thick PVC in strict accordance with the specifications of both the thick PVC and hot-melt adhesive manufactures.

.7 **Plastic Laminate Components:**

.1 Plastic Laminate: From full range of products at Nevamar, Formica, Arborite, Wilsonart, Pionite. Colour, gloss and texture to later selection by the Consultant.

.2 Plastic Laminate for Flat Work: to CAN3-A172-M79, Grade 10, General Purpose Grade.

.3 Plastic Laminate Backing Sheet: supplied by same manufacturer as facing sheet and same thickness and colour as face laminate.

.4 Laminated Plastic for Post Forming Work: to CSA A172 1974 Grade 52 General Purpose Forming Grade.

.5 Plywood Core: Douglas Fir to CSA 0121-M1978 solid two sides 19 mm thick.

.6 Particleboard Core: CAN 3-0188.1-M78, Sanded Grade good two sides Grade 'R'.

.7 Plastic Laminate Adhesive: to CSA Standards as recommended by cabinet work manufacturer.

.8 Sealer: Water resistant sealer or glue acceptable to laminate manufacturer.

.9 Sealant: Proglaze by Tremco Silicone Construction sealant.

.10 Draw Bolts and Splines: as recommended by fabricator.

.8 **Fasteners & Adhesives:**

.1 Nails and Staples: to CSA B111-1974 galvanized for exterior work, interior highly humid areas and for treated lumber, plain finish elsewhere.

.2 Screws: zinc cadmium or chrome plated steel. Stainless steel for high moisture areas.

.3 Wire: stainless steel 16 gauge.

.4 Adhesives: Resorcinol resin adhesive to CSA 0112.7-M1977.

2.1 **Materials (Cont'd)**

.9 **Solid Core Doors:**

.1 Solid Core Doors: to CSA 0132.2-M1977, flush doors, 35 mm thick, plastic laminate face matching adjacent cabinetwork.

.10 **Miscellaneous Materials:**

.1 Rigid Backer Board: 13 mm foilback sheet rock as distributed by Canadian Gypsum. Install on back of cabinets set in front of convectors or for facing convector enclosures.

.11 **Stainless Steel:** Stainless steel designated by the abbreviation S.S. must be analysis 18-8 type 304, No. 4 finish, 180 grit, free from pits and imperfections. All finish lines to run vertically.

2.2 **Fabrication**

.1 **General Requirements**

.1 Fabricate all casework to AWMAC premium grade standards.

.2 Unless noted otherwise casework construction shall be flush overlay.

.3 Shop install all cabinet hardware.

.4 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures to accommodate work of other sections.

.5 Use poplar plywood only in locations where wood is concealed.

.6 Inconspicuously locate mechanical fasteners. Wherever possible concealed fastenings.

.7 Countersink nail heads, apply stained wood filler, and smooth to receive finish.

.8 Where exposed to view, countersink screw and bolt heads and fill holes with matching wood plugs.

.2 **Fabrication of Casework:**

.1 All cabinet work is to be constructed with Melamine Faced Particleboard with solid polyvinylchloride (PVC) edging. Fabricate casework components as follows

.1 Gables: 19 mm melamine faced particleboard complete with douglas fir plywood kick.

.2 Case bottoms: 19 mm melamine faced particleboard

.3 Case backs: 13 mm melamine particleboard

.4 Backs on Freestanding cabinets: 19 mm melamine particleboard

.5 Base: 19 mm Fir plywood where covered with rubber base

.6 Shelving:
Under 915 mm long: 19 mm melamine faced particleboard
Over 915 mm long: 19 mm melamine faced particleboard with front edge return of 50 mm.

2.2 **Fabrication (Cont'd)**

.7 Valance strips: 19 mm melamine particleboard

.8 Cabinet doors up to 1200 mm high: 19 mm melamine particleboard.

.9 Door over 1200 mm high: 35 mm solid core doors complete with three butt hinges per door or as detailed.

.10 Glazed doors under 1200 mm high: 19 mm x 64 mm melamine faced particleboard

.11 Drawer fronts: 19 mm melamine faced particleboard

.12 Drawer backs and sides: 13 mm melamine faced particleboard

.13 Drawer bottoms: 6 mm hardwood plywood

.2 Shelving in cabinetwork to be adjustable, with recessed pilasters, supported by four shelf clips, unless noted otherwise. All sides of adjustable shelving to be edge banded with 5mm hardwood.

.3 Hanging strips shall be 9 mm x 56 mm hardwood plywood.

.4 All doors in full height storage units, regardless of size, shall be 35 mm solid core doors.

.5 Backs of cabinets to receive coat hooks or other hardware shall be 19 mm hardwood plywood.

.6 Make backs of cabinets easily removable where access to pipes and services is required.

.7 Provide removable hardwood stops for all glazed doors.

.8 Tongue drawer sides, front and back to receive bottom. Plywood top edge for sides and back may be exposed.

.9 Provide all finishing hardware unless noted otherwise.

.10 Install hardware in accordance with the hardware manufactures printed instructions.

.11 Edge band all exposed edges with 3mm PVC edge banding

.3 **Fabrication of Plastic Laminate Tops**

.1 Comply with CAN3-A172-M79, Appendix 'A'.

.2 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

.3 Ensure adjacent parts of continuous laminate work match in colour and pattern.

.4 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 3000 mm. Keep joints 600 mm from sink cutouts.

2.2 **Fabrication (Cont'd)**

.5 Use straight self edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly. Do not mitre laminate edges.

.6 Apply laminate backing sheet to reverse side of core of plastic laminate work.

.7 Form shaped profiles and bends as indicated using post forming grade laminate to laminate manufacturer's instructions. Layout sheets of plastic laminate to minimize joints.

.8 Fabricate tops using particleboard core.

.9 Unless noted otherwise form all countertops using post forming grade laminate to laminate manufacturer's instructions. Provide radiused corners on edge and at integral splashback.

.10 Provide full height plastic laminate splashback where noted on drawings using post forming grade laminate.

.4 Fabrication of Stainless Steel Tops

.1 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

.2 Fabricate according to final drawings reflecting dimensions and details of field conditions.

.3 Fabricate up to 3600 mm long in one piece, including nosing, backs and ends. When counter tops exceed 3600 mm in length accurately fitted, hair line, field joints are acceptable. Grind welds smooth and finished on exposed surfaces to match finish specified.

.4 Tops to consist of 16 gauge worksurface, in type 304 with #4 finish stainless steel, supported by a marine grade plywood backer.

.5 All horizontal and vertical corners on countertops to be provided with seamless sanitary cove or radius.

.6 Standard front edges: 32 mm Box Marine. Reinforces edge with concealed hardwood.

.7 Provide 100 mm tall x 25 mm deep stainless steel backsplashes at all stainless steel tops:
splash backs and splash ends to be turned down at least 13 mm at

wall. Where faucets are located in splash backs, fabricate depth of splash backs 50 mm with provision made to receive required fixture.

.5 **Finishing of Wood Surfaces**

.1 Polymerizing two component catalytic conversion varnish factory finish system especially formulated for chemical reagent resistance. The individual components of the system used must be chemically compatible to assure perfect adhesion and top quality, durable final finish.

.2 All surfaces shall be carefully prepared and sanded free of machine marks before and between finish coats.

PART 3 -- EXECUTION

3.1 **Workmanship**

.1 All work to be performed by skilled mechanics. Tool marks on finished work will not be acceptable. Set nails on all finished work.

.2 Do as much handwork as is required for first quality results.

.3 Obtain accurate dimensions on the job for all work of this Section. No extra will be allowed for making good precut material which does not fit the job condition.

.4 This subcontractor must machine assemble and completely finish all materials in his plant before shipment. Units and countertops, etc. are to be shipped prefinished for assembly and installation by his own forces.

.5 Assembled units shall be of such size as will not present difficulties of entry into the building and rooms where required.

3.2 **Co-ordination**

.1 Carefully examine Mechanical and Electrical drawings and specifications for water, gas, drainage and air piping, faucets, traps, ventilation ducts, sinks, electric receptacles fixtures and wiring specified under the Mechanical and Electrical Sections. Co-ordinate the work with these trades and make provision in the construction of the fitments to accommodate this work. Cut tops for sinks and provide wood or steel bearers for support. Methods of construction shall be such as to permit Mechanical and Electrical work being concealed in the fitments, cut and frame accordingly, provide removable access panels in the units to provide proper access for installation and repairs.

.2 Coordinate keying of locks installed in 35 mm doors with Division 08710.

3.3 **Measurement**

.1 This Contractor shall take, at the site, all measurements of space and conditions to which his work must conform. Measurements shall be taken prior to the fabrication of his work and in ample time to avoid delays in the work.

3.4 **Owner's Equipment**

.1 Throughout the job, spaces have been provided for Owner's equipment. Obtain the exact size of these units and modify, if necessary, all millwork

to suit this equipment.

3.5 **Installation**

.1 Provide rough hardware, nails, expansion shields, screws, brackets, furring and strapping and incidentals required to assemble and install the fitments in their proper location. Units to be adequately fastened and secured in place with concealed fixings wherever possible.

3.5 **Installation (Cont)**

.2 Do all framing in accordance with best standard practice.

.3 Fitments shall be installed level, plumb and true and complete in all respects.

.4 Where permitted, nail with small headed finishing nails. Countersink nail heads with nail setter. Where components are fastened with screws or bolts countersink screw and bolt heads and provide wood plugs matching surrounding wood.

.5 Install plastic laminate components using concealed fastening devices.

.6 Where cabinetwork abuts other building elements provide wood trim matching cabinetwork except where otherwise detailed.

.7 Protect the work from damage during storage, handling, installation and until the building is turned over to the Owners. Make good all damages and loss without expense to the Owner.

.8 Touch up all marks, joints, set all nails, sand and make good finish after installation.

.9 Check operation of all movable parts and, if necessary, adjust to ensure proper and smooth functioning.

.10 Coordinate installation work with other finishing trades.

.11 Sink installation:

.1 Cut hole and clean the countertop with alcohol.
.2 Apply Tremco, Tremsil #200 silicone sealant to cuts.
.3 Apply a bead of Tremsil on the top before installing sink.

Millwork Contractor and General Contractor to ensure Division 15 installs as specified.

.12 Upon completion of installation inspect work of this Section and touch up, where required, minor or damaged surface finish to restore it to original condition. Replace damaged components which in the opinion of the Consultant, cannot be satisfactorily repaired.

3.6 **Hardware Installation**

.1 Locate concealed European style hinges in accordance with manufacturer of hinge and with best standard practice. Set knobs, locks, and cylinders square with doors and escutcheons plumb. Apply accurately and neatly, to operate quietly and smoothly. Knobs shall turn easily, bolts slide freely and smoothly.

.2 All cupboard doors and drawer locks except as noted below, shall be keyed alike in each room unless otherwise stated. All such keys shall be labelled as to their lock location and shall be turned over to the Owner. All locks,

slide bolts, etc. shall be supplied with the appropriate strikes and screws. Provide slide bolts at all locked pair of doors on interior side of door leaf without lock.

NOTE: Provide locks on all cupboard doors and drawers unless noted otherwise. No locks to be provided on doors below sink units.

.3 All pilaster strips, where specified, shall be recess mounted and installed with the numbers on the pilaster at equal heights.

.4 At completion of the work, moving parts shall be gone over, made to work easily, smoothly and efficiently. Work carefully cleaned down and left in complete and finished condition satisfactory to Architect.

End of Section

1.0 GENERAL

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of the Contract, Supplementary Conditions, and the General Requirements of Division 1, form part of this section, and must be read in conjunction with the requirements of this section. The work of this section shall comply with all requirements of Division 1 – General Requirements.

1.2 SECTION INCLUDES

.1 Provision of all labour, materials, equipment and incidental services necessary to provide batt and blanket insulation.

1.3 REFERENCES

.1 CSA-B111; Wire Nails, Spikes and Staples.
.2 CAN/ULC-S102; Surface Burning Characteristics of Building Materials and Assemblies.
.3 CAN/ULC-S114; Determination of Non-Combustibility in Building Materials.
.4 CAN/ULC-S702; Standard for Mineral Fibre Thermal Insulation for Buildings.

2.0 PRODUCTS

2.1 INSULATION

.1 **Thermal Insulation**: mineral fibre, processed from rock or slag, to CAN/ULC-S702, Type 1; thicknesses as shown on the drawings;
  .1 Thermal Resistance: RSI 0.74/25mm.
  .2 Acceptable Products
    .1 Rockwool Curtainrock 80, by Rockwool LLC.
    .2 CW8 Mineral Fibre Insulation, by Johns-Manville.
    .3 Thermafiber® RainBarrier 45, by Owens Corning Canada Inc.

.2 **Fire Blanket Insulation**: mineral fibre processed from rock, slag, or glass, to CAN/ULCS702 Type 1, non-combustible to CAN/ULC-S114, thickness as shown on the drawings;
  .1 Fire Hazard Classification: flame spread 25 or less, smoke developed 50 or less, to CAN/ULC-S102.
  .2 Thermal Resistance: RSI 0.71/25mm.
  .3 Acceptable Products
    .1 Unfaced Thermal Fiber Glass Insulation, by Johns-Manville.
    .2 Thermafiber SAFB, by Owens Corning Canada Inc.
    .3 Rockwool AFB, by Rockwool LLC.

.3 **Sound Attenuation Insulation**: mineral fibre processed from glass, to CAN/ULC-S702, Type 1, thickness as shown on the drawings;
  .1 Acoustical Performance:
    .1 Airborne sound transmission loss: To ASTM E90.
    .2 Rating sound insulation: To ASTM E413.
    .3 Sound absorption co-efficients: To ASTM E423.
    .4 NRC: 0.95 at 50mm thickness.

.2 Acceptable Products
- .1 Sound Attenuation Batt Insulation, by Owens Corning Canada Inc.
- .2 Sound-SHIELD® Insulation Batts by Johns-Manville.
- .3 Noise Reducer Sound Attenuation Batt, by CertainTeed Canada .

2.2 ACCESSORIES

.1 Insulation clips: impale type, perforated 50 x 50mm cold-rolled carbon steel 0.8mm thick, self-adhesive back, spindle of 2.5mm diameter annealed steel, length to suit insulation, 25mm diameter self-locking washers.

.2 Tape: CCMC approved, Tuck 20502 Sheathing Tape, by Canadian Technical Tape Ltd., Montreal PQ.

3.0 EXECUTION

3.1 INSULATION INSTALLATION

.1 Install Thermal Insulation to maintain continuity of thermal protection to building elements and spaces.

.2 Where no means of securing is present, retain insulation in position with insulation clips, installed as recommended by manufacturer. Insulation clips shall be spaced 400mm vertically.

.3 Fit insulation closely around electrical boxes, pipes, ducts, frames, and other objects in or passing through insulation. Do not compress insulation to fit into spaces.

.4 Keep insulation minimum 75mm away from heat emitting devices such as recessed light fixtures.

.5 Do not enclose or build over insulation until it has been inspected and approved by Consultant.

.6 Install Sound Attenuation insulation in non fire-rated interior wall assemblies, as shown on the drawings.

.7 Install Ceiling Sound Attenuation insulation in non fire-rated ceiling assemblies, as shown on the drawings. Lay batts loosely over ceiling assembly, butted together.

.8 Install Fire Blanket/Sound Attenuation insulation in all fire-rated interior wall and ceiling assemblies, where indicated as having fire resistance ratings on the drawings.

END OF SECTION

1 GENERAL

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of the Contract as supplemented in Section 00 73 00, and the General Requirements form part of this section, and must be read in conjunction with the requirements of this section.

1.2 SECTION INCLUDES

.1 Built-up membrane roofing, cold-applied method.

1.3 REFERENCES

.1 ASTM D4601: Standard Specification for Asphalt-Coated Glass Fibre Base Sheet Used In Roofing.

.2 CSA A123.4: Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems.

.3 CGSB 37-GP-9Ma: Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.

.4 CGSB 37-GP-52M: Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric.

.5 CAN/CGSB-51.33: Vapour Barrier Sheet, Excluding Polyethylene, for Use In Building Construction.

.6 CAN/ULC-S704: Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

.7 CAN/ULC-S706: Standard for Wood Fibre Thermal Insulation for Buildings.

.8 Must be in compliance with Ontario Building Code Act: sections 3.1.15 (Roof Covering) and 5.2.2.2. (Determination and Wind Load) or Part 11 (Renovations); and all support sections.
Submit evidence if requested of compliance by a Third Party Verified Listed Assembly (such as Underwriters Laboratory; Factory Mutual or Florida Building Code).

1.4 SYSTEM DESCRIPTION

.1 Roofing System: three ply cold-applied built-up roofing system with vapor barrier, rigid board insulation, composite ply roofing membrane, aggregate surfacing and roof pavers.

.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.

1.5 SUBMITTALS

.1 Make Submittals in accordance with Section 01 00 00.

.2 Product Data

.1 Submit Product data for each major component, including membrane, vapour retarder, rigid board insulation, adhesives and pavers. Highlight critical criteria for proper installation.

.3 Shop Drawings

.1 Submit Shop Drawings for prefabricated work and details.

.2 Include plans, sections, details in accordance with performance requirements,

and for attachment to other portions of the Work.

.3 Sloped Insulation: Indicate degree of slope and layout of sloping insulation on roof surfaces. Ensure positive drainage to roof drains.

1.6 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.

1.7 TEST REPORTS

.1 Submit test reports as specified in Section 01 00 00.

.2 Product Test Reports: based on the evaluation of comprehensive tests conducted by an independent testing agency of the specified roofing Products.

.3 Manufacturer Field Inspection Reports: manufacturer's written acceptance of roofing installation based on regular inspections.

1.8 QUALITY ASSURANCE

.1 Manufacturer: qualified manufacturer having roofing systems listed by UL and approved for use by Factory Mutual.

.2 Installer: a company and persons specializing in the application of built up roofing, with minimum 8 years documented experience and approved to apply roofing system by manufacturer.

.3 Conform to CRCA Roofing Specifications and roofing membrane manufacturer's instructions.

1.9 PRE-INSTALLATION MEETINGS

.1 Conduct pre-installation meeting.

.2 Meeting: prior to commencement of deck installation, review and document methods and procedures related to roof deck and roofing system construction, including the following:
- .1 representatives of the Owner,
- .2 authorized architect, engineer,
- .3 roofing Subcontractor, roofing manufacturer, and installers of roof accessories and roof-mounted equipment.

.3 Review methods and procedures related to roofing installation, including manufacturer's written installation instructions.

.4 Review construction schedule and confirm availability of Products, Subcontractor personnel, equipment and facilities.

.5 Review deck installation criteria and finishes for conformance with roofing system criteria, including issues of flatness and fastening.

.6 Review structural loading conditions and limitations of roof deck both during and after roofing application.

.7 Review flashing details, special roofing details, roof drainage, roof penetrations, equipment curbs, and other conditions affecting roofing installation.

.8 Review governing regulatory requirements, and requirements for insurance and certificates as applicable.

.9 Review safety requirements, including temporary fall-arrest measures.

.10 Review field quality control procedures.

1.10 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 Celsius.

.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.

1.11 ENVIRONMENTAL REQUIREMENTS

.1 Do not apply any roofing materials during inclement weather.

.2 Comply with manufacturer's recommendations for minimum and maximum temperatures and humidity during application.

.3 Do not install Products when temperatures are below -5 degrees C.

.4 Consider effects of wind chill on adhesives and ensure they will not prematurely set before proper adhesion takes place.

.5 Keep water-based Products from freezing. Do not apply water-based Products if temperatures are below 5 degrees C.

1.12 WARRANTY

.1 Submit extended warranties in accordance with the General Conditions of the Contract.

.2 Installer's Extended Warranty: standard OIRCA 2 year warranty, commencing from the date of Substantial Performance of the Work.

.3 Manufacturer's Extended Warranty: The Manufacturer shall issue a non-prorated warranty for a period of Twenty Years. All components including the vapor retarder, insulation, cover board, membrane, flood coat, perimeter flashings including metal shall be covered under this warranty. Wind uplift warranty shall cover wind velocity up to a

maximum wind speed of not greater than 117km/h (73 mph).

Warranty shall include inspections in years 2, 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.
- Sealing of flashing seam
- Filling of pitch pockets
- Repairs to blisters and ridges
- Caulking at metal details as required
- Written inspection report
- Removal of light debris from roof
- Cleaning of drain screens

1.13 ADDITIONAL WARRANTY SERVICES

.1 The manufacturer shall provide to the owner access to an Online Data Base. All pertinent details regarding this project shall be entered on the data base such as:

- Store roof plans, roof dimensional information, roof assembly types, roof inspection reports, roofing budgets, roof specs, etc. all per building.:
- Generate roof replacement budgets and capital plans
- Schedule inspections and recommended roof replacements
- Provide designated Board employees secure access to this inventory system through a username and password. Once access is granted, all information and functions should be accessible and retrievable to the Board employee.
- Provide training to the Board employee to use the Online Roof Management Program.
- The supplier must provide examples of web-based roof inventory systems they have created for other clients.
- Roof condition by category
- Construction of the roof system including all components.
- Inspection schedule (warranty requirements)
- Substantial completion date.
- Accurate future budgetary reports for a minimum of 20 years
- Condition photos on a per roof basis
- Aerial images via Google Satellite
- Service Activity – what was done and by whom
- Warranty information
- Leak history/sensitivity
- Leak reporting service
- Square footage reports of all roof areas
- CAD Drawings
- Specifics on drainage, perimeter and interior projection flashings, slope and drainage.
- Supporting documents.
- Emergency Leak call service.
- Hand Held Infra-red analysis reports.

2 PRODUCTS

2.1 ROOF SYSTEM MANUFACTURERS

.1 Products and systems specified herein are based on the BurMastic Cold-Applied system by Tremco Canada as per Tender 6862-KP-18.

2.2 MATERIALS

.1 Primer: non-fibrated, asbestos free, water-based, low-VOC formulation; to CGSB 37-GP-9Ma; equivalent to Tremco Improved Tremprime WB.

.2 Roof Vapour Retarder: Self adhering 1.0 mm (40 mil) thick, self adhered air and vapour control membrane consisting of SBS rubberized asphalt laminated to slip-resistant, cross-laminated polyethylene surface film, with release paper backing. Provide substrate primer as recommended by manufacturer. AVC Membrane and Primer by Tremco Canada.

.3 Roof Insulation: Polyisocyanurate rigid board; to CAN/ULC-S704, Type 3, Class 2, closed cell type:
- .1 Board Size: (4-0" x 4-0") 1220 x 1220mm.
- .2 Long Term Thermal Resistance (CAN/ULC-S770): (R6.0) RSI 1.04 per (1") 25mm thickness of board.
- .3 Compressive Strength: (20psi) 140kPa minimum.
- .4 Dimensional Stability (ASTM D2126): < 2 percent linear change.
- .5 Water Absorption (ASTM C209): < 1 percent by volume.
- .6 Edges: square.
- .7 Faces: non-asphaltic, fibre-reinforced felt facers both sides.
- .8 Combustibility: meets CAN/ULC-S107-M87 and CAN/ULC-S126-M86.
- .9 Thickness: minimum two layers required, total thickness: 7.5 inches.
- .10 Acceptable Products:
  - .1 Trisotech Roof Insulation by Tremco Canada.

.4 Overlay Board: (1/2") 13mm thick asphalt-coated (6 sides) fiberboard, to CAN/ULC-S706, Type II, Class 1.

.5 Roofing Ply Membrane: polyester-glass-polyester tri-laminate reinforced asphalt-coated sheet, (0.055") 1.4mm thick, (31 lb/100ft^2) 1.5 kg/m^2 weight, to ASTM D4601, Type II; BURmastic Composite Ply HT by Tremco Canada.

.6 Flexible Flashing Membrane: (0.045") 1.14 mm thick, reinforced EPDM/SBR elastomeric sheeting; TRA by Tremco Canada.

.7 Aggregate Ballast: pea gravel free of fines, long splinters, dust or foreign matter, nominal (3/8") 10mm diameter.

2.3 ACCESSORIES

.1 Adhesive for Roof Insulation Boards and Overlay Boards: Two component (1:1 ratio) solvent free, elastomeric urethane adhesive. Asbestos free, low odor and does not contain any bitumen or VOC's. Tremco Low Rise Foam Adhesive.

.2 Adhesive for Aggregate Ballast and Roofing Plies: Asbestos-free, cold-process asphalt adhesive; Tremco BurMastic Adhesive.

.3 Adhesive for Flashing Membranes: Single-component, bitumen-modified, moisture cure polyurethane; Tremlar –LRM-V by Tremco Canada.

.4 Mechanical Fasteners: Flat-head, countersunk, self-tapping screws; size, type and length in accordance with FMG; corrosion resistant coating in accordance with FM 4470, with locking plastic or metal plates.

.5 Pavers: (24" x 24" x 2" thick) 610 x 610 x 50mm thick, precast concrete paver units; diamond surface pattern; color as selected by Owner.

.6 Stack Flashings: to CSA-B272, insulated aluminum stack jacks complete with bitumen protection dam and screw-secured cover;
.1 SJ-26/SJ-27, by Thaler Metal Industries Ltd., Mississauga ON.
.2 Flash-Tite VSC-S Series, by Lexcor, Etobicoke ON.

.7 Roof Penetration Flashings: to CSA-B272, insulated aluminum, complete with bitumen protection dam and screw-secured cover;
.1 Thaler Metal Industries Ltd., Mississauga ON, or
.2 Flash-Tite™, by Lexcor, Etobicoke ON.

.8 Irregular Roof Protrusion Flashings: Pre-fabricated mastic sealer pockets; (5") 127mm high x appropriate diameter to exceed diameter or width of protrusion by (2") 50mm. Pockets to be sealed with pourable self-leveling sealant;
.1 Chemlink Advanced Construction Products.
.2 Hi-Tuff TPO Molded Sealant Pockets by Lexcan Limited.

.9 Roof Drains: as specified in Section 22 14 26.

.10 Prefinished Sheet Metal: for flashing & copings exposed to view, (24ga.) 0.7mm minimum base thickness commercial quality sheet steel to CSA-S136, hot-dip galvanized to CAN/CSA-G164, prefinished with factory applied 2-coat silicon-modified polyester system, Stelco 8000 Series finish; color as selected by Owner.

.11 Miscellaneous Sheet Metal: for hook strips, fastening strips, metal bellows, and other flashings generally concealed from view; (22ga.) 0.93mm galvanized steel.

.12 Cant Strips: purpose made asphalt-impregnated fiberboard, (3" x 3") 75 x 75 mm size.

.13 Stripping Membrane: Vinyl-coated fiberglass mesh; Burmesh by Tremco Canada.

.14 Stripping Adhesive: Single-component bitumen modified polyurethane, vertical grade, Tremlar LRM-V by Tremco Canada.

.15 Pitch Pan: pre-manufactured type; (24 gauge) 0.7mm thick galvanized steel sheet, minimum (4") 100mm high.

.16 Pitch Pan Filler: Quick set grout. Tremseal PP Sealer by Tremco.

.17 Sealants: as specified in Section 07 92 00.

.18 Termination Bar: (1/8") 3mm thick aluminum bar, (1") 25mm wide profile, pre-drilled for mechanical attachment.

.19 Prefabricated Control or Expansion Joint Flashing: sheet butyl reinforced with closed cell urethane foam backing, seamed into metal flashing flanges, including sheet butyl counter flashing each side.

3 EXECUTION

3.1 EXAMINATION

.1 Inspect existing conditions to ensure they are suitable for roofing work to begin. Do not proceed until unacceptable conditions are corrected.

.2 Ensure substrate is solid, clean, dry and free of any contaminants prior to commencing any roofing work.

.3 Ensure Products are dry prior to installation. Replace damaged Products.

3.2 PREPARATION

.1 Protect existing roofing from damage with minimum (1/2") 13 mm thick plywood runways.

.2 Prime metal and concrete surfaces designated to be covered with asphaltic Products.

.3 Apply primer at an average rate of (200 ft^2/gal.) 4.9 m^2/litre. Allow to cure.

.4 Ensure primer does not enter building through cracks and other openings.

3.1 VAPOUR RETARDER

.1 Adhere roof vapour retarder to existing substrate with approved primer at manufacturer's recommended rate.

.2 Overlap vapour retarder minimum (4") 100mm for side laps and (6") 150mm for end laps.

.3 Extend vapour retarder under cant strips and blocking. Extend to perimeter and deck protrusions.

.4 Seal roof vapour retarder to wall air/vapour barrier system with flexible flashing membranes to ensure continuity of building air/vapour barrier envelope.

3.2 INSULATION AND OVERLAY BOARD

.1 Install insulation boards to maintain continuity of thermal envelope. Minimize joints.

.2 Adhere base layer of roof insulation to vapour retarder with approved adhesive at manufacturer's recommended rate.

.3 Adhere intermediate layer of roof insulation to base layer of roof insulation with approved adhesive at manufacturer's recommended rate.

.4 Adhere tapered roof insulation where indicated and in accordance with approved layout.

.5 Fit insulation tight to roof penetrations.

.6 Firmly butt insulation boards. Do not jam or deform boards.

.7 Minimize lipping between adjacent boards.

.8 Stagger joints minimum (12") 300 mm.

.9 Adhere single layer of overlay board over roof insulation with approved adhesive at manufacturer's recommended rate.

.10 Stagger overlay board seams over base layers of insulation board seams.

3.3 CANT STRIPS

.1 Install cant strips at intersections of roofing and vertical surfaces.

.2 Embed in a continuous bed of approved adhesive applied to overlay boards.

.3 Lay true to line, level and with flush, butt joints and accurately mitred corners.

3.4 ROOF MEMBRANE

.1 Install three plies of roof membrane in shingle fashion, starting at roof low point. Apply membrane perpendicular to overlay board joints. Conform to manufacturer's recommended method.

.2 Overlap starter strips (26") 660mm with first ply, then overlap each succeeding ply (25") 625mm.

.3 Place ply sheets to ensure water will flow over or parallel to, but not against, exposed edges.

.4 Shingle in direction to shed water. Extend ply membranes over and terminate beyond cants and cut evenly.

.5 Embed plies in approved adhesive, at manufacturer's recommended rate, and solidly coating each ply for full width.

.6 Ensure complete and continuous seal and contact between adhesive and ply membranes, including ends, edges and laps without wrinkles, fish mouths or blisters.

.7 Do not step or walk on felts during or immediately after application until adhesive has set.

.8 Install each ply so that it shall be firmly and uniformly set, without voids, into adhesive. Thoroughly and effectively broom or roll each membrane application to ensure full adhesion.

.9 Lap ply membrane ends (6") 150 mm. Stagger end laps (39") 1 metre minimum.

.10 Overlap previous day's work (24") 600 mm, as required.

.11 Terminate all ply layers to outer edge of roof perimeter.

3.5 ELASTOMERIC FLASHINGS

.1 Provide membrane flashings in accordance with manufacturer’s written installation guidelines.

.2 Install flashings to ensure the roof is watertight at the end of each working day.

.3 Extend flashing membrane minimum (6") 150 mm over roof membrane.

.4 Extend flashing membranes minimum (10") 250 mm up vertical surfaces.

.5 Secure flashings at (8") 200 mm OC. Secure vertical flashings through termination bar.

.6 Overcoat lap edges with end lap stripping adhesive and membrane.

.7 Tie-in leading edge of elastomeric sheet flashing with stripping ply membrane embedded between alternate courses of stripping ply adhesive.

.8 Canted Eave:

.1 Extend reinforced elastomeric sheeting over outside face of cant and extend minimum (1") 25 mm below blocking. Mechanically fasten with (1½") 38mm common roofing nails, (8") 200 mm OC.

.2 Extend reinforced elastomeric sheeting down over cant strip and embed in flashing adhesive from top of cant to at least (6") 150 mm beyond toe of cant onto roof.

.3 Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends (4") 100 mm and adhere with flashing adhesive.

.9 Canted Eave with Fascia

.1 Extend reinforced elastomeric sheeting over outside face of cant and fascia and secure to underside of fascia. Mechanically fasten with (1½") 38mm common roofing nails, (8") 200 mm OC.

.2 Extend reinforced elastomeric sheeting down over cant strip and embed in flashing adhesive onto roof surface a minimum of (6") 150 mm.

.3 Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends (4") 100 mm and adhere with flashing adhesive.

.10 Low Parapet Wall Flashing

.1 Seal exposed joint between the wall and roof deck for airtight 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 and adhere with flashing adhesive.

.4 Extend elastomeric sheeting up and over parapet at least (1½") 38mm and face nail with 38 mm common roofing nails, (8") 200 mm OC.

.11 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.

.12 Flashing At [Edges] [and] [Gutters]

.1 Fabricate and install new one-piece [edge.] [gutter with downspouts. Slope gutter to downspouts.]

.2 Prior to setting and nailing horizontal flanges of gutter, uniformly trowel a (0.60") 1.5mm thick layer of cold flashing adhesive to roofing surface designated to receive metal flange.

.3 Nail flange to wood blocking (3") 75mm OC, staggered.

.4 Prime metal flange with asphaltic primer.

.5 Adhere sufficiently wide strip of elastomeric sheeting completely to flashing surface with flashing adhesive. Ensure complete bond and continuity without wrinkles or voids lap sheeting ends (4") 100 mm and adhere with flashing adhesive. Elastomeric sheeting to cover gravel stop completely and overlap onto adjacent roof a minimum of (6") 150 mm.

.6 Seal edge of flashing membrane at metal upturn.

.13 Wall Flashing

.1 Seal exposed joint between the wall and roof deck for airtight 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 and adhere with flashing adhesive.

.4 Elastomeric sheeting width: sufficient to extend at least (6")150 mm beyond toe of cant onto roof surface and (8") 200 mm above the roof surface.

.5 Secure top of elastomeric sheeting to vertical plane with termination bar. Mechanically fasten (12") 300 mm OC. Overcoat bar with end lap stripping adhesive and membrane.

.14 Building Expansion Joints

.1 Fill joint with loose insulation.

.2 Provide ([1/2"][3/4"]) [13][19]mm thick plywood to top of wood blocking, secured one side only; as specified in Section 06 10 00.

.3 Apply foam rubber or (1") 25 mm thick mineral fibre insulation to top of plywood.

.4 Install elastomeric sheeting centred over expansion joint.

.5 Fully adhere sheeting to horizontal and vertical blocking surfaces with flashing adhesive. Press sheeting into adhesive. Ensure complete bond and continuity

without wrinkles or voids.

.6 Elastomeric Sheeting Width: Sufficient to extend onto adjacent roofing minimum (6") 150 mm.

.7 Lap sheeting ends (4") 100 mm and adhere with flashing adhesive.

.15 Expansion Joint at Wall

.1 Extend vapour retarder from deck level up wall sufficiently and secure to wall.

.2 Fill joint with loose insulation.

.3 Install blocking, sheathing and compressible insulation as detailed on Drawings and as specified in Section 06 10 00.

.4 Adhere elastomeric sheeting completely to flashing surface, cant and roofing with flashing adhesive.

.5 Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends (4") 100 mm and adhere with flashing adhesive.

.6 Elastomeric Sheeting Width: sufficient to extend at least 150 mm beyond toe of cant onto roof surface and (8") 200 mm above the roof surface.

.7 Secure top of elastomeric sheeting to vertical plane with a termination bar. Mechanically fasten (12") 300 mm OC. Overcoat bar with end lap stripping adhesive and membrane.

.16 Area Divider

.1 Install elastomeric sheeting centered over area divider extending onto roof membrane a minimum of (6") 150 mm beyond toe of cant on either side.

.2 Fully adhere sheeting with flashing adhesive. Press sheeting into adhesive. Ensure complete bond and continuity without wrinkles or voids.

.3 Lap sheeting ends (4") 100 mm and adhere with flashing adhesive.

.17 Control Joint

.1 Install elastomeric sheeting centered over joint.

.2 Fully adhere sheeting to horizontal and vertical blocking surfaces with flashing adhesive. Press sheeting into adhesive. Ensure complete bond and continuity without wrinkles or voids.

.3 Flashing Width: Sufficient to extend onto adjacent roofing minimum (6") 150mm.

.4 Lap sheeting ends (4") 100mm and adhere with flashing adhesive.

.18 Curb Flashing

.1 Fully adhere sheeting to horizontal and vertical blocking surfaces with flashing adhesive. Press sheeting into adhesive. Ensure complete bond and continuity without wrinkles or voids.

.2 Elastomeric Sheeting Width: Sufficient to extend from top of curb down onto adjacent roofing minimum (6") 150mm. Mechanically fasten sheeting on top face of curb.

.3 Lap sheeting ends (4") 100 mm and adhere with flashing adhesive.

.4 If membrane does not completely cover sleeper, secure top edge with a termination bar. Mechanically fasten (12") 300 mm OC. Overcoat bar with end lap stripping adhesive and membrane.

.19 Projection Flashing

.1 Apply flashing adhesive to prepared area and Provide aluminum base over pipe and set into the flashing adhesive.

.2 Select proper step of rubber cap and cut off above index ring.

.3 Install cap onto base collar and press edge to ensure proper seal.

.4 Provide clamp around pipe and rubber cap. Prime flange.

.5 Install elastomeric sheeting with stripping ply adhesive and membrane.

.6 Cover flange completely. Extend flashing minimum (4") 100 mm onto adjacent roofing. Remove wrinkles and voids. Lap flashing ply ends (4") 100 mm.

.20 Cartwheel and Collar

.1 Provide cartwheel and collar flashing around projection using elastomeric sheeting and flashing adhesive.

.21 Coping

.1 Test mortar bond of coping units. Remove loose mortar from bell joint and clean surfaces.

.2 Pack flashing adhesive into bell joint and extend up onto bell approximately (3") 75mm and down onto shank of adjoining unit a similar distance.

.3 Cut proper lengths of (6") 150 mm wide reinforcement membrane and dry trowel membrane into flashing adhesive; tight and wrinkle-free.

.4 Overcoat reinforcing membrane with flashing adhesive.

.22 Pitch Pans

.1 Uniformly apply a (1/8") 3mm thick layer of flashing adhesive to surfaces designated to receive metal flange.

.2 Install pre-manufactured pitch pan into adhesive. Prime flange prior to installation.

.3 Ensure minimum (2") 50mm clearance between projection and side wall.

.4 Fully adhere elastomeric sheeting to flashing surface with flashing adhesive. Cover flange completely. Extend flashing at least (4") 100 mm onto adjacent roofing. Ensure complete bond and continuity without wrinkles and voids. Lap

sheeting ends minimum (4") 100 mm.

.5 Fill pitch pan (1") 25mm from top with pitch pan base filler.

.6 Fill remainder with rubberized elastomer mastic. Crown top of mastic to ensure water run-off.

.23 Equipment Stands (Pipe)

.1 Provide (8") 200mm high sleeve flashing with (4") 100mm wide flange. Flange to extend completely around flashing periphery. Solder joints. Double solder vertical joints.

.2 Nail flange to wood blocking minimum (3") 75mm OC; staggered.

.3 Prime flange with asphaltic primer.

.4 Install elastomeric sheeting to stand and roofing with continuous (0.60") 1.5mm thick application of flashing adhesive.

.5 Sandwich top edge of sheeting between two layers flashing tape.

.6 Secure top of sheeting with stainless steel drawband. Seal top of drawband and sheeting-to-pipe interface. Provide watershed and tool neatly.

.7 Fabricate umbrella and install drawband; cover sleeve flashing minimum (3") 75mm. Install immediately above sleeve flashing. Tighten drawband.

.8 Wipe clean top of umbrella and projection with metal cleaner. Prime surface with metal primer.

.9 Seal projection-to-sheet metal interface. Provide watershed and tool neatly.

.24 Piping Through Roof Boxes

.1 Install wood blocking as specified in Section 06 10 00.

.2 Provide two-piece pipe box. Fabricate bottom portion with (4") 100mm flange. Notch top section to fit over piping. Provide openings (8") 200mm above the roof surface.

.3 Set flange in mastic, nail flange to wood blocking at (3") 75mm OC. Prime flange.

.4 Fill box interior with mineral fibre insulation.

.5 Fasten top and closure detail to bottom.

.6 Clean surfaces of box and piping with metal cleaner and then prime. Seal joint between box and piping.

.7 Install elastomeric sheeting with flashing adhesive and membrane.

.25 Roof Drain

.1 Install drain assembly in accordance with manufacturer's written installation guidelines.

.2 Plug and seal drain to prevent water entry until service connection is completed.

.3 Provide (24" x 24") 600mm x 600mm size elastomeric sheeting reinforcement, centered over drain; and fully adhered with flashing adhesive. Remove wrinkles and entrapped air.

.4 Apply mastic to exposed edge of membrane inside the drain opening.

.5 Reclamp flashing collar to drain in bed of flashing adhesive.

.6 Trim excess sheeting within drain.

.26 Roof Drain Insert

.1 Cut (9") 225 mm OD opening through membrane and insulation; coinciding with existing drain opening.

.2 Install roof drain insert into existing drain pipe in accordance with drain insert manufacturer's written installation guidelines.

.3 Adhere drain flange to membrane with flashing adhesive.

.4 Provide (36" x 36") 914mm x 914mm size elastomeric sheeting reinforcement, centered over drain; and fully adhere sheeting with flashing adhesive. Remove wrinkles and entrapped air.

.5 Trim excess sheeting within drain.

.6 Seal leading edge of sheet with reinforcing membrane embedded between alternate continuous courses of flashing adhesive.

3.6 SURFACING

.1 Install concrete pavers on pedestals where indicated on Drawings.

.2 Flood coat roof surface with cold-process asphalt adhesive, applied at manufacturer's recommended rate.

.3 Immediately broadcast aggregate ballast into cold adhesive at a rate of (416 lb/sq) 20 kg/m^2, covering flood coat completely.

.4 Do not use power buggies or heavy equipment to distribute ballast.

.5 Rake out aggregate to a neat, even surface.

3.7 FIELD QUALITY CONTROL

.1 Contractor Inspection: Prior to application aggregate surfacing, inspect completed membrane and flashing for punctures, tears, and discontinuously sealed seams.

.2 Apply additional layer of membrane over punctures and tears, extending minimum (12") 300mm beyond damaged area in all directions, and seal seams.

.3 Manufacturer's Field Service: arrange for manufacturer's technical representative to regularly (daily) inspect the roofing application and confirm that the roofing system

installation is in strict accordance with manufacturer's recommendations.

3.8 CLEANING

.1 Refer to Section 01 00 00.

.2 Clean drains, gutters and downspouts of debris, ensuring free drainage.

.3 Clean adjacent roof surfaces, levels and ground level areas of debris and excess Products.

3.9 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

PART 1 - GENERAL

1.1 **General Requirements**

.1 Comply with requirements of Division 1.

1.2 **Related Sections**

.1	Masonry	Section 04200
.2	Rough Carpentry	Section 06100
.3	Built-up Asphalt Roofing:	Section 07513
.4	Aluminum Entrances and Curtain Wall	Section 08900
.5	Air Barrier	Section 07196

1.3 **Guarantee**

.1 Provide the following guarantee in accordance with the General Conditions, notwithstanding the time provision therein:

Two (2) years materials and labour.
Twenty (20) years manufacturers warranty

1.4 **Samples**

.1 Submit two 2 sets of samples of manufacturer's full range of precoated metal finishes, or custom colours as specified.

1.5 **Design and Performance Criteria**

.1 Appearance: neatly and evenly lay out and install components. Exposed fastening devices not permitted.

.2 Effects of wind: resist positive and negative wind pressures without detrimental effects.

.3 Water control: prevent passage of water.

.4 Thermal movement: Accommodate expansion and contraction of component parts without buckling, failure of joints, undue stress on fasteners and other detrimental effects.

.5 Compatibility: Components shall be compatible with dissimilar metals and materials with which they are in contact or fastened to so as to prevent corrosion, staining and other detrimental effects. If required, treat or separate contact surfaces with inert and non-staining insulation material to achieve compatibility.

1.6 **Job Conditions**

.1 Schedule and coordinate installation of metal flashing components with work of other Sections where it is integral or contiguous therewith.

.2 Install metal counter and cap flashings immediately after installation and inspection of roofing membrane base flashings.

PART 2 - PRODUCTS

2.1 **Materials**

.1 Precoated Sheet Steel

.1 Meet requirements of CSSBI Technical Bulletin No. 7, Proven Colour.

.2 Base metal: galvanized sheet steel meeting requirements of ASTM A446, Grade A, zinc coating designation Z275, 24 ga.

.3 Colour: Stelco or Dofasco 8000 Series: Colour to be selected by Consultant from full range of colours.

2.1 **Materials (Cont'd)**

.2 Galvanized Sheet Steel: Hot dip galvanized, cold rolled with stretcher level degree of flatness to ASTM A 526; zinc coating designation Z275.

.3 Cleats and Edge Strips: Non-corrosive metal compatible with sheet metal, thickness as required to provide rigid support and positive securement for metal flashings.

.4 Mechanical Fastening Devices: Non-corrosive metal compatible with sheet metal.

.5 Sealant: One of the following:
.1 Two-part polysulphide to CGSB 19-GP-24M.
.2 One part low modulus silicone to CGSB 19-GP-28M.
.3 Dymeric by Tremco.

.6 Asphaltic Paint: Alkali resistant asphalt based enamel: CGSB 1-GP-108M.

2.2 **Fabrication General**

.1 Shop fabricate metal flashing components to profiles indicated. Where flashings are required but not detailed follow applicable requirements of SMACNA Architectural Manual. Provide minimum 24 ga. material for all components unless otherwise indicated.

.2 Provide components free from distortion, waves, twists, buckles and other defects detrimental to performance and appearance. Form sections square, true and accurate to size.

.3 Double back exposed edges at least 12 mm.

.4 Seams: space seams uniformly at maximum 3 m o.c. Unless otherwise indicated, use flat locked seams, lapped 25 mm. Make horizontal seams in directions of water flow. Mitre and seal corners. Make allowance for expansion.

.5 Unless otherwise indicated, counter flashings shall completely cover base flashings.

.6 Furnish everything necessary for complete metal flashing installation, including clips and fastening devices.

.7 Back paint metal flashings with asphaltic paint.

2.3 **Sleeve Flashing System**

.1 Aluminum 1.5 mm thick 3-part flashing system by Thaler Roofing Specialities Products. Conduit flashing – MEF-1A, vandal proof stack flashing SJ -31

.2 Fabricate sleeve flashings square or circular and of size to suit components being flashed. Unless otherwise indicated, fabricate sleeves 450 mm high.

.3 System shall consist of bitumen protection cup, sleeve with flange and rain collar.

.4 Inside of jacket base flange and all sides of protection cup still be coated with bituminous paint.

.5 Size sleeves to allow minimum 25 mm thick insulation between component and sleeve.

PART 3 - EXECUTION

3.1 **Installation**

.1 Provide all metal flashings required to render roof and wall systems watertight, whether specifically shown on Drawings or not.

.2 Provide under this Section, concealed sheet metal components forming part of air and vapour barrier system, located within building envelope and not provided under work of other Sections. Unless otherwise detailed provide galvanized sheet steel, minimum 0.7 mm thick.

.3 Clean surfaces to be covered with metal flashings of dirt and other foreign matter. Drive projecting nails flush with substrate. Do not apply metal flashings over substrates likely to cause rupture.

.4 Provide underlay of resin sized paper under metal flashings installed over masonry, concrete or wood. Lay underlay dry as sheet metal work is installed. Secure in place and lap joints 100 mm.

.5 Provide sheet metal flashing at roof curbs, copings, penetrations, at junction of roof to wall, and where shown on Drawings.

.6 Protect all membrane flashings with metal counter flashings.

.7 Wherever possible, secure flashings to supporting building elements with concealed continuous edge strips; avoid exposed surface fasteners.

.8 Fill and seal seams with sealant; rivet corners.

.9 Where flashing is punctured by bolts, provide sheet lead or neoprene washers, 6 mm larger than bolt hole.

.10 Where flashing is installed around circular components and upper flashing edge is exposed, provide draw band around upper edge of flashing collar.

.11 At reglets in masonry walls, secure metal flashings to reglet with mechanical fasteners at maximum 610 mm o.c.

.12 Except where premoulded pipe flashings are provided by Section 07513 install sleeve flashing systems at penetrations through roof membrane. Install systems in accordance with manufacturer's directions. Insulate between penetrating elements and sleeve with 25 mm thick fibrous insulation. Sweat solder or weld on rain collar.

.13 Imperfections in metal flashing work such as holes, dents, creases, or oil-canning will not be accepted.

End of Section

1.0 GENERAL

.1 The General Conditions of the Contract, Supplementary Conditions, and the General Requirements of Division 1, form part of this section, and must be read in conjunction with the requirements of this section. The work of this section shall comply with all requirements of Division 1.

1.0 RELATED WORK

.1 Fire stopping and smoke seals within mechanical assemblies (i.e inside ducts, dampers) and electrical assemblies (i.e. inside cable trays) and at mechanical and electrical penetrations are specified in Division 21 and 26 respectively.

.2 Coordinate work of this section with other sections as required to properly execute the work and as necessary maintain satisfactory progress of the work of other sections.

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 45 00 – Quality Control.

.3 Divisions 21 and 26.

1.2 REFERENCES

.1 Underwriter’s Laboratories of Canada (ULC)

.1 CAN-S115, Fire Tests of Firestop Systems.

1.3 SUBMITTALS

.1 Submit duplicate 300 x 300 mm samples showing actual firestop material proposed for project.

.2 Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.

.3 Submit manufacturer’s engineering judgement identification number and drawing details when no ULC or cUL system is available. Engineering judgement must include both project name and contractor’s name who will install firestop system as described in drawing.

.4 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. Include manufacturer’s specifications, training letter, and technical data for each material including the composition and limitations, documentation of ULC or CUL firestop systems to be used.

.5 Submit material safety data sheets provided with product delivered to job site.

1.4 MOCK-UP

.1 Construct mock-up in accordance with Section 01400 – Quality Control.

.2 Construct mock-up showing service penetrations, fire separation and floor assemblies. Mock-up may be part of finished work.

.3 Allow 48h for inspection of mock-up by Consulatnt before proceeding with membrane work.

1.5 MANUFACTURER'S REPRESENTATIVE

.1 A manufacturer's representative is to be on site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures and at commissioning stage to certify acceptance completed installation. Training will be done as per manufacturer's written recommendations published in their literature and drawing details.

2.0 PRODUCTS

2.1 MATERIALS

.1 Use only firestop products that have been ULC or cUL tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements and fire-rating involved for each separate instance.

.2 Fire stopping and smoke seal systems: in accordance with CAN-S115.

.1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN-S115 and not to exceed opening sizes for which they are intended.

.2 Firestop system rating: as indicated on drawings.

.3 Service penetration assemblies: certified and tested by ULC or cUL in accordance with CAN-S115.

.4 Service penetration firestop components: certified and tested by ULC or cUL in accordance with CAN-S115.

.5 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.6 Non-curing, re-penetrable intumescent sealants, caulking or putty material for use with flexible cables or cable bundles.

.7 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal. Consult with Consultant and damper manufacturer prior to installation ULC or cUL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

.8 Intumescent sealants or caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed,

flexible cable or cable bundles and plastic pipe. No silicone based firestop are allowed to be applied on plastic pipes.

.9 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.10 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.11 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.12 Sealants for vertical joints: non-sagging.

3.0 EXECUTION

3.1 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.2 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with ULC certification or UL Products Certified for Canada (CUL) and manufacturer's instructions.

.2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Tool or trowel exposed surfaces to a neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

3.3 INSPECTION

.1 Notify Consultant when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.

3.4 SCHEDULE

.1 Firestop and smoke seal at:

.1 Penetrations through all fire-resistance rated masonry, concrete, and gypsum board partitions and walls including walls required to provide a fire separation but having no required fire resistive rating .

.2 Edge of floor slabs at curtain wall and precast concrete panels.

.3 Top of fire-resistance rated masonry and gypsum board partitions.

.4 Intersection of fire-resistance rated masonry and gypsum board partitions.

.5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.

.6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.

.7 Openings and sleeves installed for future use through fire separations.

.8 Around mechanical and electrical assemblies penetrating fire separations.

.9 Rigid ducts: greater than 129 cm^2: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

3.5 CLEAN UP

.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

PART 1 - GENERAL

1.1 **General Requirements**

.1 Comply with requirements of Division 1.

1.2 **Related Sections**

.1 Painting — Section 09900

1.3 **Definition**

.1 Caulking = Sealant.

1.4 **Qualifications**

.1 Work of this section is to be done by Contractors of recognized standing having personnel with experience in this type of work and who have the necessary equipment to carry out the work.

.2 Use only sealants which are proven to be compatible with materials they are in contact with. Notify Consultant prior to start of work should any sealant specified be considered unsuitable for the purpose intended.

1.5 **Guarantee**

.1 Provide the following guarantee in accordance with the General Conditions, notwithstanding the time provisions therein, that the caulking work will not leak, crack, crumble, melt, shrink, run, loose adhesive or colour or stain adjacent materials for the following period.

.1 **Two years on material and labour for interior work**.

.2 Examine drawings, details and specifications prior to tendering to ensure that the materials and the joint details will satisfy the conditions of the guarantee. Submission of tender and commencement of work shall imply an unqualified guarantee.

1.6 **Product Delivery, Storage & Submittals**

.1 Deliver sealants in sealed containers bearing manufacturer's name, brand reference standard to which sealant complies.

.2 Store materials in a dry area having an ambient temperature within limitations recommended by material manufacturer.

.3 Submit product cut sheets.

1.7 **Job Conditions**

.1 Unless otherwise specified, apply sealants when air temperature is between 10 degrees C and 25 degrees C. when air temperature is above 25 degrees C or below 10 degrees C follow sealant manufacturer's recommendations regarding application.

2. Coordinate work of this Section with that of Section 09900. Prior to start of work review installation procedures with Consultant, where caulking is located adjacent to painted surfaces.

PART 2 - PRODUCTS

2.1 **Materials**

.1 Sealants

.1 Class A Sealant: Dymeric by Tremco
Meeting CGSB 19.24

.2 Class C Sealant: Acrylic Latex by Tremco
Meeting CGSB 19-GP-17M

.3 Class E Sealant: Proglaze by Tremco
Meeting CGSB 19-GP-9Ma

.4 Materials shall be standard colours as selected by the Consultant, free from ingredients which will stain masonry.

.2 Primers, thinners, cleaners: As recommended by sealant manufacturer, non-staining type.

.3 Premoulded backup for sealant: Round, closed cell polyethylene of size to suit joint, causing 30% compression of backing when in place. Dow Ethafoam or approved equal.

.4 Bond breaker: Closed cell polyethylene or vinyl foam tape, self-adhering one side.

.5 Materials must comply with 'low emitting' LEED requirements.

PART 3 - EXECUTION

3.1 **Examination**

.1 Before any caulking is done, a representative of the sealant manufacturer and the caulking contractor must inspect all joints or rebates to receive sealant. The work of others must be examined insofar as it affects the work of this section.

.2 Ensure that joints and rebates are of sufficient width and depth for sealant installation.

.3 Do not commence installation of sealants until conditions are acceptable.

.4 Commencement of the work implies that the contractor accepts full responsibility that the caulking will perform without failure for the full period of the guarantee.

3.2 **Inspection**

.1 The sealant manufacturers' representative must carry out periodic inspections during application and submit a written report to the Consultant immediately after each inspection.

.2 The caulking contractor shall notify the Consultant when the work is completed for inspection. Do not cover work until approved. Take out and recaulk all defective work.

3.3 **Preparation**

.1 Clean and prepare joints to be caulked to produce clean sound surfaces for sealant adhesion.

.2 Remove dust, paint, loose mortar and other foreign matter. Dry joint surfaces.

3.3 **Preparation (Cont'd)**

.3 Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sandblasting.

.4 Remove oil, grease and other coatings from non-ferrous metals with joint cleaner.

.5 Prepare concrete, masonry, glazed and vitreous surfaces to sealant manufacturer's instructions.

.6 Examine joint sizes and correct to achieve depth ratio one half of joint width with minimum width and depth of 6 mm maximum width 25 mm.

.7 Install joint filler to achieve correct joint depth.

.8 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.9 Apply bond breaker tape where required to manufacturer's instruction.

.10 Prime side of joints to sealant manufacturer's instructions immediately prior to caulking.

.11 Seal joints in surfaces to be painted before surfaces are painted. Where surfaces to be sealed are primed in shop before sealing, check to make sure prime paint and sealant are compatible. If they are incompatible inform Consultant and change sealant to compatible type approved by Consultant.

.12 Check form release agent used on cast in place concrete for compatibility with sealant and primer. If they are incompatible inform Consultant and change sealant to compatible type approved by Consultant or clean concrete to Consultant's approval.

.13 Install bond breaker tape and back up joint where joint backing is not required or cannot be installed (so that sealant will adhere only to sides of joint).

3.4 **Application**

.1 Apply sealant using gun fitted with suitable nozzle. Use sufficient pressure to fill voids and joint solid. Superficial pointing with skin bead is not acceptable.

.2 Tool surface of sealant smooth, concave, free from ridges, wrinkles, sags, air pockets and embedded foreign matter.

.3 Apply sealants in accordance with following table:

Joint Width	Sealant Depth
5 mm	5 mm
10 mm	7 mm
15 mm	10 mm

20 mm	12 mm
25 mm	15 mm

.4 Where recommended by sealant manufacturer, vent exterior joints in accordance with such recommendation.

3.5 **Cleaning**

.1 As work progresses, remove sealant smears and stains from adjacent surfaces. Use cleaning method recommended by sealant manufacturer.

.2 Leave adjacent surfaces in neat and clean condition.

3.6 **Schedule**

.1 Apply sealant at the following interior locations:

.1 Between dissimilar materials in exposed locations except where specifically indicated otherwise with Class A sealant.

.2 Concealed air/vapour barrier joints except those sealed under work of other Sections with sealant compatible with surfaces being caulked.

.3 Perimeter of door, window, louvre and screen frames with Class C sealant.

.4 Control joints in masonry elements with Class A sealant.

.5 Perimeter of fire extinguisher cabinets, access panels, and control panels with Class A sealant.

.6 Between counter tops and wall with Class E sealant.

.7 Where shown on Drawings.

End of Section

PART 1 - GENERAL

1.1 **General Requirements**

.1 Comply with requirements of Division 1.

1.2 **Related Sections**

.1	Caulking at frame perimeters:	Section 07900
.2	Finish Hardware:	Section 08710
.3	Glazing:	Section 08800
.4	Painting:	Section 09900

1.3 **Qualifications**

.1 Acceptable manufacturers: Member of The Canadian Steel Door & Frame Manufacturers' Association.

.2 Reference standards: Unless otherwise specified, meet requirements of "Canadian Manufacturing Specification for Steel Doors and Frames" published by the Canadian Steel Door & Frame Manufacturers' Association.

.3 Fire protection requirements: fire rated doors, frames and screens shall bear ULC labels.

.4 One manufacturer is to provide doors and frames unless specified otherwise.

1.4 **Guarantee**

.1 Provide the following guarantee in accordance with the General Conditions, not withstanding the time provision therein.

.1 **Three years on materials and labour.**

1.5 **Submittals**

.1 Submit shop drawings in accordance with Section 01300.

.2 Clearly indicate each type of frame, door, material, core thickness reinforcements, glazing stops, location of anchors, exposed fastenings and finishes.

1.6 **Work Supplied to Other Trades**

.1 Supply frames and anchors to other Sections where it is necessary to build frames into work of other Sections.

.2 Supply instructions required for accurate positioning and proper installation of components supplied to other Sections.

1.7 **Design Requirements of Doors & Frames**

.1 Exclusion of water.

.2 Prevent air infiltration in excess of 0.5 cubic feet/minute/linear foot.

.3 U factor of 0.56 or less

.4 S.T.C. 20.

PART 2 - PRODUCTS

2.1 **Materials**

.1 Sheet Steel: Cold rolled steel with stretcher level degree of flatness, meeting requirements of ASTM A366 Class 1.

Finish:

.1 W25 wipe coated zinc finish to ASTM A526.

.2 Hot dipped galvanized zinc to ASTM A526M for all doors and frames where indicated.

.2 Core Material:

.1 Fire rated doors: in accordance with fire test requirements.

.2 Exterior doors: semi-rigid glass fibre insulation minimum density of 24 kg/m^2.

.3 Interior doors, except fire rated doors: honeycomb core of rigid pre-expanded resin impregnated Kraft paper having maximum 20mm hexagonal shaped cells.

.3 Finishing Materials:

.1 Touch up paint: zinc rich paint CGSB 1-GP-181M.

.2 Metal filler: two component epoxy type.

.3 Shop primer: zinc or lead chromate type.

.4 Door Bumpers: Gray neoprene double stud.

2.2 **Reinforcement & Hardware Preparation**

.1 Templated hardware: prepare work in accordance with templates supplied by Section 08710. ANSI Standards will not necessarily be used. Drill and tap doors for templated hardware. Provide door latch guide.

.2 Blank, reinforce, drill and tap doors and frames for concealed, mortised and surface mounted hardware and concealed magnetic contacts. Provide door closer reinforcement at all steel doors and frames whether closer is required by hardware list or not.

.3 Hardware reinforcements shall be minimum 3.4mm thick.

.4 Guard boxes: 0.9 mm (20 ga.) steel welded to back of frame at hardware cutouts where mortar or other materials could obstruct hardware operation.

.5 Provide steel angle high frequency top hinge reinforcing in doors and frames. Weld both legs of angle to adjoining surfaces.

2.3 **Doors**

.1 Construct fire rated doors in accordance with fire test requirements.

.2 Provide all doors of seamless construction with no visible seams or joints on faces and vertical edges. Render joints invisible by grinding, filling and dressing smooth.

.3 Exterior doors: : 1.6 mm (16 ga.) thick base sheet steel of urethane core construction. Fully weld vertical seams for full height of door and grind smooth.

.4 Interior doors: 1.2 mm (18 ga.) thick base sheet steel of honeycomb core construction. Mechanically interlock, with adhesive, face sheets at vertical edge to form a tight straight joint. Tack weld every 150 mm for full height of door. Fill all seams with epoxy and grind smooth.

.5 Provide condensation weep holes at bottom edge of exterior doors.

.6 Provide flush end steel closures at top edge of all exterior doors and where required for attachment of hardware, weather stripping and concealed magnetic switches.

.7 Prepare doors as required for louvres, glazing and between glass blinds where indicated. Surround openings in flush doors with minimum 1.2mm thick steel edge channels, welded to both face sheets. Where prepared openings in doors exceed 35% of the total door area, face sheets at vertical edges must be continuously welded.

.8 Provide 0.9 mm thick removable glazing stops of zinc coated steel channels mitred at corners, accurately fitted into position and fastened with countersunk Phillips, flathead sheet metal screws.

.9 Glazing stops at outside of exterior doors shall be rendered non-removable.

.10 Doors to be square and true. Maximum twist 3mm measured on the diagonal of the door.

.11 Construct rail and stile doors in same manner as flush doors.

.12 Undercut doors where shown or required to suit floor finish.

2.4 **Frames**

.1 Provide welded frames of 1.6 mm thick sheet steel to profiles shown on Drawings.

.2 Shop assemble components with accurately cut joints. Mitre outside corner joints of frames. Weld joints on inside of profile; grind welds, flush and sand to smooth uniform surface.

.3 Glazing stops shall be minimum 0.9 mm thick steel, drilled and secured with oval headed screws.

2.4 **Frames (Cont'd)**

.4 Drill interior door frames for double stud rubber bumpers. Drill strike jamb of each single frame for 3 bumpers. Drill head member of double door frames for 2 bumpers.

.5 Provide full height 3.4 mm thick steel reinforcement at hinge side of all frames.

.6 Provide steel channel head reinforcement for door frames wider than 915 mm.

.7 Tack weld two removable 1.2 mm thick steel spreader channels to inside faces of door frames at base.

.8 Provide adjustable base clips for anchorage to floor at bottom of each door jamb.

.9 Provide 0.9 mm guard boxes at all strike and hinge reinforcements.

.10 Provide welded on drip at head of exterior door frames.

.11 For screens with between the glass blinds, prepare frame to accept tilt control knob assembly.

.12 Prepare frames as required to accommodate wiring to electrical hardware devices.

.13 Provide removable mullions where indicated.

.14 Provide 1.2 mm thick continuous steel closer panels at all exposed backs of head and jamb frame conditions.

.15 Prepare frames as required to accommodate supplementary steel supports provided by Section 05500.

.16 Provide 1.6 mm thick anchors for frames.

2.5 **Transom Panels**

.1 Provide insulated metal transom panels at head of doors where shown on drawings.

.2 Construct panels in manner specified for hollow metal doors.

.3 Secure panels to frame with concealed fastenings.

PART 3 - EXECUTION

3.1 **Frame & Screen Installation**

.1 Set frames plumb, square, level and at correct elevation.

.2 Allowable limit of distortion shall be 1.5mm out of plumb at each jamb, measured on face of frame, resulting in maximum twist of frame of 3mm measured from upper corner to lower diagonal corner.

3.1 **Frame & Screen Installation (Cont'd)**

.3 Generally anchorage of frames shall be by means of standard anchors. Where standard anchors cannot be used, provide special anchors to ensure proper installation. Method of anchorage shall not be visible when frames are installed.

.4 Provide minimum 3 anchors at each jamb. At frames exceeding 2150 mm in height provide one additional anchor for each additional 610mm or part thereof.

.5 Anchor intermediate vertical frame members to structure above as required to ensure stability. Where required, provide steel frame extensions. Provide flexible connection at structure to allow for deflection.

.6 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 950mm wide. Remove temporary spreaders after frames are built-in.

.7 Remove spreader channels only after frames are securely anchored in place.

3.2 **Doors**

.1 Install doors after wet finishes are completed.

.2 Doors must be square and true within frame. Maintain approximately 3mm between perimeter outside edge of sides and head of door and inside edge of frame.

.3 Exterior doors and fire doors must seal tight against weatherstrip and smoke gaskets.

.4 Install transom panels where indicated on drawings.

.5 Install hardware in accordance with hardware supplier's instructions.

.6 Adjust operable parts to ensure proper operation.

3.3 **Touch-up**

.1 Patch damaged shop primer. Remove rust, sand damaged and abraded surfaces and touch-up with prime paint matching original finish.

.2 Touch-up damaged zinc coating with zinc rich paint prior to application of shop primer.

End of Section

PART 1 - GENERAL

1.1	**General Requirements**	.1	Comply with requirements of Division 1.	
1.2	**Related Sections**	.1	Installation of finish hardware	Sections 06200, 08100
		.2	Hardware for cabinetwork:	Section 06400
1.3	**Scope of Work**	.1	Supply only of	
			.1 Finishing Hardware	
1.4	**Quality Assurance**	.1	The products listed in the finishing hardware schedule establish the minimum quality standards for this project. Deviations are not permitted.	
		.2	Companies tendering this project shall retain a qualified Architectural Hardware Consultant (A.H.C.) who will assume responsibility relative to their profession.	
		.3	Finishing Hardware companies tendering on this project shall BID only those products specified, or for the purpose of tendering products listed here in as equivalents. Alternates will be allowed only as outlined in Section 2.1.	
		.4	The Architect's Consultant will be provided with a copy of the approved hardware schedule and all approved change notices to complete a quality assurance inspection at completion of the project. It will be the hardware supplier's responsibility to correct any hardware found to be improperly supplied, including installation, painting and reworking of doors and/or frames.	
1.5	**Handling, Delivery and Storage**	.1	Package finishing hardware for each opening, identified shall correspond with hardware schedule.	
		.2	Copy of finishing hardware schedule shall accompany hardware shipments.	
		.3	Deliver all hardware to job site and obtain signed receipt.	
		.4	The general contractor shall provide on site an adequate, enclosed, lockable, clean and dry storage area. Access to locked storage area will be the responsibility of the general contractor.	
		.5	All hardware shall be checked in jointly by representatives of the general contractor and hardware supplier to avoid discrepancies.	
		.6	The general contractor shall protect the finish and function of the installed hardware from the other trades (paint, plaster, cleaners, etc.) during the construction period.	

1.6 **Warranty**

.1 Submit a written warranty covering finish hardware against defects in materials and workmanship. The warranty period shall be two years generally and five years for closers. Warranty commences on date of Substantial Completion.

.2 Hardware products found defective within warranty period shall be removed by the general contractor or owner and returned to the distributor for evaluation.

1.7 **Submittals**

.1 Submit templates when requested to contractor for use by installers and fabricators as required for proper location and installation of hardware.

.2 Submit 4 (four) copies of the hardware schedule complete with a list and legend of abbreviations used. It is the Suppliers responsibility to thoroughly check the Hardware Schedule and working drawings to ensure, all handlings are correct, product will function as listed and that there are no errors or omissions before submitting for approval.

.3 Upon request submit physical samples of each type of hardware for the project. Samples which may be required shall be tagged for their intended use and shall be incorporated into the supply of finishing hardware.

.4 Supply wiring schematics and product information for all electronic hardware supplied under this section.

1.8 **Codes and Regulations**

.1 All hardware listed or furnished shall meet requirements of Federal, Provincial and Local Codes having jurisdiction over this installation.

PART 2 - PRODUCTS

2.1 **Manufacturers**

.1 The following is a list of acceptable manufacturers for work under this contract. The listed acceptable alternative manufacturers must provide products which are of equal quality of better than the specified manufacturers products.

	Manufacturer As Specified	**Acceptable Alternative Manufacturer**
Hinges	Stanley	Hager
Locks	Schlage	No substitution
Exit Devices	Sargent	Von Duprin (Full stainless steel)
Closers	LCN4041 Cush	Sargent 351 PS
Kickplates	Gallery	Hager/CBH
Push/Pulls	Gallery	Hager/CBH
Overhead Stops	Sargent Glynn Johnson	
Weatherstrip	Hager	KN Crowder National Guard

PART 3 - EXECUTION

3.1 **Execution**

.1 The contractor installing the hardware shall carefully follow manufacturer's instructions for installation of all finish hardware.

.2 The finish hardware installer shall be experienced in the installation of architectural hardware and have general knowledge of the functions of the various types of hardware.

.3 Thru bolts for door pulls are to be counter sunk and concealed by push plates where push plates are listed.

.4 Manufacturer's fasteners supplied are to be used. It is the installers responsibility to ensure fasteners are not over tightened or stripped by use of screw guns, etc.

.5 Provide finished hardware for all display cases. Refer to Architectural drawings for locations.

3.2 **Keying**

.1 All locks shall be interchangeable core and to be keyed to a factory registered master key system.

.2 Furnish the following quantities of keys:

2 Grand master keys
3 Master keys
2 Change keys per lock
3 Construction keys

.3 All permanent Cores and Keys are to be delivered to the end user.

3.3 **Adjusting**

.1 It is the hardware installer's responsibility to adjust the hardware as per the manufacturer's specifications. Final adjustments to closers shall be made at final completion of products.

3.4 **Documentation**

.1 The finish hardware supplier shall include copies of the as-built finishing hardware schedule, and maintenance manuals to the owner on completion of this project.

3.5 **Schedule**

.1 Supply the following finishing hardware.

End of Section

PART 1 - GENERAL

1.1 **General Requirements**
.1 Comply with requirements of Division 1.

1.2 **Related Sections**
.1 Metal Doors and Frames Section 08100
.2 Finishing Hardware Section 08710

1.3 **Qualification**
.1 Work of this Section is to be done by Contractors of recognized standing having personnel with a minimum of five years experience in this type of work and who have the necessary equipment to carry out the work. Manufacturers and Contractors are to comply to the Standards of the "Insulated Glass Manufacturers of Canada Ltd." latest edition.

.2 Approved Manufacturers of Sealants, Glazing Tapes, Splines etc. are as follows:

.1 Tremco Canada Ltd.

1.4 **Guarantee**
.1 Provide the following guarantee in accordance with the General Conditions, notwithstanding the time provision therein, as follows.

.1 **Five years material and labour should defects in factory sealed insulating units such as, but not limited to, obstruction of vision due to dust or film forming on inner glass surfaces occur.**

1.5 **Product Delivery & Storage**
.1 Deliver materials to site only as required.

.2 All units are to be crated and stored upright, covered, ventilated in a dry and safe location.

.3 Leave all materials in their original cartons or wrapping until required.

.4 Identify all glass delivered to job with Manufacturer's labels which are to remain in place until final cleaning.

1.6 **Protection**
.1 Protect work of other trades from damage resulting from work of this Section.

.2 Identify glazed openings immediately following glass installation. Do not apply tapes directly to glass.

PART 2 - PRODUCTS

2.1 **Materials**
.1 **Setting Blocks:** neoprene, Shore 'A' duro-meter hardness of 70 to 90 points; spacer shims, 40 to 50 points, as recommended by glass manufacturer.

.2 **Glazing Compound:** non-hardening modified oil type meeting requirements to CGSB 19-GP-2M.

2.1 **Materials (Cont'd)**

.3 **Glazing Sealant:** one part polysulphide to CAN2-19.13-M82 or one part silicone to CGSB 19-GP-18M.

.4 **Glazing Tape:** Polyshim 2 Tape by Tremco

.5 **Glazing Gasket:** E.P.D.M. Glazing Gasket by Tremco

.6 ***Tempered Safety Glass (TG):*** 6 mm and 10 mm thick fully tempered float glass to CAN2-12.1. Tempered glass identification must be sandblasted into glass and shall be visible after installation.

.7 **Fire Rated Glass (FRG):** 8 mm thick polished, clear ceramic laminated glass. Each lite shall bear permanent non-removable label certifying it for use in tested fire rate assemblies in accordance with ASTM E2074-00, ULC standards,CAN4 S-104 and CAN4 S-106.
Impact safety resistance to ANSI Z97.1 and CPSC 16CFR1201.

.8 **Insulating Glass:** 6 mm thick PPG Industries Inc. Solarban 60 Low-E high performance glass, clear shading coefficient 0.44

.9 **Exterior Glass:** 6mm thick PPG Industries Solexia, tint to match existing.

.10 **Safety Film:** 100 microns thick, clear polyester film with pressure sensitive adhesive; Scotchtint Shatter Resistant Window Film by 3M.

.11 **Low-E Coating:** PPG Comfort-ES low-emissivity coating.

2.2 **Fabrication**

.1 **Double Glazed Exterior Insulated Glass Units:**

.1 Outer Light - Tinted Tempered Exterior Glass
Air Gap - 13 mm Argon gas filled air space
Inner Light - Insulating Glass, tempered, with Low-E coating.

.2 Provide tempered safety glass (TG) in all lights and sidelights of doors, both on exterior and interior except where noted otherwise..

PART 3 - EXECUTION

3.1 **Glass Installation General**

.1 Do not glaze when ambient or surface temperature is less than 5° C. Ensure that glazing rabbets, stops and glass are dry, free of frost, grease, oil, dust, rust and other substances detrimental to adhesion of compounds and sealants.

.2 Carefully remove glazing stops and reinstall after glazing.

.3 Provide clearance at perimeter edge of glass on all four sides, minimum equal to glass thickness. Accurately size glass to fit openings, allowing for expansion in accord with glass manufacturer's recommendations.

.4 Site cutting of glass is prohibited unless approved by the Consultant.

.5 Provide sealer space between face of glass and glazing stops of minimum 3

mm.

3.1 **Glass Installation General (Cont'd)**

.6 Clean sealing surfaces at perimeter of glass and sealing surfaces of rabbets and stop beads before applying glazing tapes, gaskets and compounds. Use solvents and cleaning agents recommended by manufacturer of sealing materials.

.7 Install glazing tapes uniformly with accurately formed corners and bevels. Ensure that proper contact is made with glass and rabbet interfaces.

.8 Set glass on setting blocks, spaced as recommended by glass manufacturer. Provide at least one setting block at quarter points from each corner.

.9 Centre glass in glazing rabbet to maintain specified clearances at perimeter on all four sides. Maintain centred position of glass in rabbet and provide the required sealer thickness on both sides of glass.

.10 Use spacers and shims in accordance with glass manufacturer's recommendations.

.11 Mark each pane of glass with approved means to indicate presence of glass.

3.2 **Interior Glazing**

.1 Unless otherwise indicated glaze interior openings as follows:

.1 Apply glazing tape to permanent stop; centre glass in opening and set glass on setting blocks, align edges and press home.

.2 Apply glazing tape to removable stops and install stops. Trim tape for neat appearance.

3.3 **Exterior Glazing**

.1 Unless otherwise indicated glaze exterior openings as follows:

.1 Apply glazing tape to permanent stop; butt tape joints and weld together; do not overlap joints; daub tape corners with sealant.

.2 Set glass on setting blocks, align edges and press home to ensure adhesion at all points.

.3 Apply heel bead of sealant around perimeter of glass, maintaining 5 mm bite to glass and positive bond to frame. Completely seal void around glass edges. Sealant shall partially fill channel between glass and removable stop.

.4 Install removable stops; insert spacer shims between glass and stops at approximately 610 mm o.c. not less than 6 mm below sight lines. Fill remaining void with glazing compound or sealant to sight line and trim to clean line leaving no voids or depressions.

.5 Glazing gaskets may be installed in lieu of backfilling with sealant or glazing compound after setting removable stops.

3.4 **Completion**

.1 Tighten all stops and ensure they are properly secured.

.2 Remove dirt, scum, plaster, paint spatter, and other harmful and deleterious matter from glass promptly and completely, before they establish tight adhesion.

.3 Avoid using abrasive, steel wool, razor blades, solvents, alkaline or other harsh cleaning agents.

.4 Remove excess sealant using solvents as recommended by sealant manufacturer.

.5 Remove glazing compound droppings promptly from all surfaces as the work progresses.

.6 Replace scratched or otherwise damaged glass.

.7 After inspection by Consultant remove all labels and polish glass.

.8 Wash down exposed surfaces with a mild solution of tri-sodium phosphate in warm water and dry with soft clean wiping cloths, polish all glass.

3.6 **Schedule**

.1 Provide glazing for the following elements and components:

.1 Exterior aluminum windows and vents

.2 Metal Doors, Frames, Screens, and Transoms.

.3 Other glazing shown on Drawings and not covered in other Sections.

.2 Provide the following glass Types:

.1 **Double Glazed Insulating Units:** all exterior glazed elements and where indicated on documents.

.2 **Tempered Glass (TG):** doors, sidelights, and transoms at entrances and exits, and other location where indicated on drawings.

.3 **Fire Rated Glass (FRG)**: doors, sidelights, screens and transoms requiring a fire resistive rating and other location where indicated on drawings.

End of Section

PART 1 GENERAL

1.1 **General Requirements**

.1 Comply with requirements of Division 1

1.2 **Related Sections**

.1	Cast in Place Concrete	Section 03300
.2	Masonry	Section 04200
.3	Wood Blocking	Section 06100
.4	Sealant	Section 07900
.5	Metal Doors & Frames	Section 08100
.6	Finishing Hardware	Section 08710
.7	Glazing	Section 08800

1.3 **Reference Standard**

.1 Do sealant work in accordance with Section 07900, unless otherwise specified herein.

.2 Do glazing work in accordance with Section 08800, unless otherwise specified herein.

1.4 **Qualifications**

.1 Work of this section is to be done by Manufacturers of recognized standing, having personnel with minimum five years experience in this type of work and who have the necessary equipment to carry out the work.

1.5 **Guarantee**

.1 Provide the following Guarantee in accordance with the General Conditions of the Contract, notwithstanding the time provisions therein. **Ten years material and labour to cover the following**:

.1 Replace any window unit whose finish shows any defects such as but not limited to delamination, blistering or excessive fading.

.2 Replace or repair any window unit with air and water leakage, defects and malfunctions under normal usage.

1.6 **Submittals**

.1 Shop Drawings

.1 Submit shop drawings in accordance with the General Conditions.

.2 Clearly indicate materials and large scale details for head, jamb and sill, profiles of components, elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes and fasteners.

.3 All shop drawings for curtain wall systems must bear the stamp of a professional engineer.

3 Maintenance Data

.1 Submit maintenance data for cleaning and maintenance of aluminum windows for incorporation into maintenance manual.

1.7 **Inspection & Testing**

.1 The Owner may appoint and pay, out of the allowances carried in Section 01020, for an independent inspection agency to inspect and test the work of this section as directed by the Consultant.

1.8 **Work Supplied to Other Trades**

.1 Supply to other Sections anchors, inserts and items required to be built into work of other Sections.

.2 Ensure accurate setting of built-in items; where necessary provide templates, diagrams or other suitable means of instruction.

1.9 **Acceptable Manufacturer**

.1 Product

.1 Product Qualifications: The Specification and drawings are based on products as manufactured by Kawneer Company Inc.

Acceptable Alternate Manufacturers:
Alumicor Ltd. or Aerloc Industries Ltd. with similar profiles, materials performance specifications and finishes that meet the standards established by this Specification. The manufacturer will be responsible for the supply, installation, and guarantee of this Section.

PART 2 - PRODUCTS

2.1 **Materials**

.1 Window Systems:

.1 Window Systems: Kawneer Trifab 451 UT (thermal) Storefront System complete with Kawneer DUAL IsoLock® Thermal Break with two (2) 1/4" (6.4 mm) separations consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.

.1 Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.

.2 Aluminum Window Extrustions: Extruded alloy AA 6063-T54 mechanically straightened and free of marks and be of size and shape as specified and detailed. Minimum extrusion wall thickness of 2.5 mm.

.3 Aluminum Plate and Sheet: AA 1100 alloy.

.4 Steel Sections and Plates: to CSA GRO 21-M1978 Type 300W. Hot dip galvanized with minimum zinc coating of 600 g/M^2.

.5 Bolts and Anchor Bolts: to ASTM A307-7613, hot dip galvanized with minimum zinc coating of 600 g/M^2 to CSA G16a-1972.

.6 Steel Reinforcing: For screens to CSA G40.2, Class H.

.7 Flashings: 2 mm aluminum finished to match windows and entrances.

.8 Glass and Glazing Materials: Conform to the requirements of Section 08800 Glazing.

.9 Caulking Materials

.1 Sealant: two part polytremdyne terpolymer to CAN/CGSB-19.24-M80; acceptable product: Tremco Dymeric; Colour selected by Consultant.

.2 Primer: As recommended by sealant manufacturer.

.3 Joint backing: foamed, closed cell polyethylene rope, minimum 12 mm wider than joint, compressed when installed.

.10 Foam Sealant: One component polyurethane foam sealant "Insta Seal" by

Insta-Foam.

2.1 **Materials (Cont'd)**

.11 Sills: 3 mm formed or extruded aluminum shapes of proper size and fastening type to suit wall conditions and as detailed, complete with joint covers and drip deflectors.

.12 Operable Venting Hardware: Top hinged open-out vents to have extruded aluminum hinges with stainless steel pins, clear anodized aluminum under screen roto operators with rotating disk handle.

.13 Vent Screens
.1 Standard top hinge open out bug screen configuration.

.14 Miscellaneous Materials
.1 Flexible Flashings: 1 mm thick Perm-A-Barrier flexible flashing by W.R. Grace & Co. of Canada.
.2 Bituminous paint: alkali resistant asphaltic enamel.
.3 Bedding compound: non-hardening and non-skinning.
.4 Assembly Screws: Stainless steel.
.5 Anchor Screws and Bolts: Stainless steel.
.6 Gaskets: E.P.D.M.
.7 Thermal Break: 13mm extruded, rigid polyvinyl chloride keyed into aluminum members.
.8 Aluminum Closures: Closures, caps, flashings and panels as detailed fabricated from 14 gauge aluminum laminated to 19 mm fir plywood backing. Finish to match window frame.
.9 Aluminum Plate Sill: 6mm bent aluminum plate as detailed. Finish to match window frame

2.2 **Fabrication General**

.1 Aluminum components shall be extruded Section and shapes unless otherwise specified.

.2 Framing shall consist of closed tubular aluminum sections reinforced if necessary, thermally broken.

.3 Open channel profiles are not acceptable.

.4 Make allowances for deflection of structure. Ensure that structured loads are not transmitted to windows.

.5 Design work so that it will not be distorted nor fasteners overstressed from expansion and contraction of metal.

.6 Internally reinforce framing members where fastening for work of other sections is required and to withstand loads and deflection within allowable limits.

.7 Fastenings shall be concealed where possible. Where concealed fasteners cannot be used, use countersunk flathead screws with finish to match base metal on which they occur.

.8 Manufacturer's name plates on windows and doors are not permitted.

2.2 **Fabrication General (Cont.)**

.9 Insure any moisture entering or forming inside systems drains to the exterior.

.10 Fabricate aluminum sills to profiles indicated to suit wall conditions. Provide drip deflectors at sill ends and at abutting vertical surfaces. Open ends of sills shall be fitted with neatly applied closure plates. Unless otherwise detailed provide flush slip joint at intermediate sill joints.

.11 Stools, cap flashings, closures, covers and trim shall be extruded or formed to profiles shown and unless otherwise shown, minimum 3 mm thick.

2.3 **Ventilator Units**

.1 Ventilator frames shall consist of inner and outer aluminum frame sections joined by means of an interlocking thermal barrier. Thermal barrier shall completely prevent metal to metal contact in any form. Vent corner shall be cut at 45 degrees, swaged with 3 heavy-duty reinforcing angles per corner. **Screwed corners on vents will not be permitted.**

2.4 **Finishes**

.1 Aluminum windows and vents: clear anodized finish matching existing.

PART 3 - EXECUTION

3.1 **Framing**

.1 Erect and secure framing systems and window units plumb, square and level, free from warp, twist and superimposed loads.

.2 Anchor framing systems to supporting building elements; provide brackets, anchors and clips as required. All devises for anchoring shall have sufficient adjustment to permit correct and accurate alignment. After alignment rivet, weld or otherwise positively lock anchoring devices to prevent movement other than that required to accommodate expansion, contraction and deflection.

.3 Anchor immediate vertical frame members to structure above as required. Where support for intermediate vertical frame members is not available directly above head, provide frame extensions to structure above. Provide flexible connection at structure to allow for movement.

.4 Anchor window jamb members to adjacent building elements near top and bottom and at maximum 600 mm in between.

.5 Provide necessary inserts to be built into work of other Sections as required for anchorage of framing.

.6 Set frame members in bedding compound to ensure watertight assembly.

.7 Metal to metal joints between abutting components shall be sealed weathertight.

.8 Use concealed fastenings where possible; where not possible, use flathead screws in countersunk holes. Match exposed fastenings with base metal on

which they occur.

3.2 **Glazing**

.1 Glaze openings in accordance with window and glass manufacturer's recommendation and Glazing Section 08800 so as to achieve weathertight installation.

3.3 **Sealants**

.1 Seal joints in accordance with window and sealant manufacturer's recommendations and in accordance with Sealants Section 07900.

.2 Provide caulking between framing members and adjoining work and where required to render work of this Section weathertight.

.3 Provide for continuity of air and vapour barrier in all locations; join up with air/vapour barrier components of adjacent systems.

.4 Install polyurethane foam sealant in all voids between framing and surrounding building elements.

.5 Where indicated provide membrane flashing located within or abutting framing systems. Secure membrane flashings to frames and to adjacent work mechanically or with adhesive lap membrane flashings at joints minimum 100 mm and seal.

.6 Where indicated, and where required to maintain continuity of air barrier, install galvanized sheet metal closures at terminations of framing systems and effectively seal to adjacent building elements.

3.4 **Sill Installation**

.1 Install metal sills with uniform wash to exterior level in overall length, straight in alignment with plumb upstands and faces. Use maximum lengths possible allowing for expansion.

.2 Secure sills in place with anchoring devices locate at ends and at 600 mm o.c. in between.

.3 Fasten drip deflectors with self tapping stainless steel screws.

3.5 **Covers, Closures & Trim**

.1 Provide stools, covers, closures and trim as indicated and as required to provide complete and finished installation.

3.6 **Final Cleaning and Adjustment**

.1 When instructed by Consultant and after the Substantial Completion of the project, perform the following work:

.1 Remove any protective coatings or tapes from windows.
.2 Wash all interior and exterior work installed under this section with a mild solution of tri-sodium phosphate and water.
.3 Rinse all surfaces and polish with a soft dry cloth.
.4 Reset and tighten all glazing studs.
.5 Adjust all operating vents.
.6 Touch up any scratches and abrasions on frames.

End of Section

1.0 GENERAL

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of the Contract, Supplementary Conditions, and the General Requirements of Division 1, form part of this section, and must be read in conjunction with the requirements of this section. The work of this section shall comply with all requirements of Division 1 – General Requirements.

1.2 SECTION INCLUDES

.1 Provision of all labour, materials, equipment and incidental services necessary to provide acoustic panel ceiling systems including the following:

.1 Non-load bearing steel stud systems

.2 Steel ceiling & soffit suspension systems

.3 Gypsum board

. .4 Sheathing Board

.5 Taping & Jointing

.6 Accessories

1.3 REFERENCES

.1 ASTM C473; Test Methods for Physical Testing of Gypsum Panel Products.
.2 ASTM C475; Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
.3 ASTM C630/C630M; Specification for Water-Resistant Gypsum Backing Board.
.4 ASTM C645; Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.
.5 ASTM C840; Specification for Application and Finishing of Gypsum Board.
.6 ASTM C954; Specification for Steel Drill Screws for the Application of Gypsum Board.
.7 ASTM C1002; Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases.
.8 ASTM C1047; Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
.9 ASTM C1178; Specification for Glass Mat Water-Resistant Gypsum Backing Board.
.10 ASTM C1395/C1395M; Specification for Gypsum Ceiling Board.
.11 ASTM C1396/C1396M; Specification for Gypsum Board.
. .12 ASTM D3273; Test Method for Resistance to Mold Growth on the Surface of Interior Coatings in an Environmental Chamber.
.13 ASTM-E90; Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
.14 ASTM-E119; Test Methods for Fire Tests of Building Construction and Materials.
.15 CAN/CGSB-51.34; Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.16 CAN/CGSB-71.25; Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.

.17 CAN/ULC-S102; Building Materials and Assemblies, Standard Method of Test for Surface Burning Characteristics

.18 CAN/ULC-S114; Determination of Non-combustibility of Building Materials.

.19 CAN/CSA-S136; Cold Formed Steel Structural Members.

1.4 QUALITY ASSURANCE

.1 MANUFACTURER/FABRICATOR

.1 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.

.2 INSTALLATION/APPLICATION

1. Installers or applicators of the Products specified herein, shall be competent in the skills required to perform such tasks. Installation/ shall be performed in accordance with industry standards specified herein, warranty requirements, and in accordance with generally accepted, industry best practices.

.3 DOCUMENTATION

. 1 If requested by the Consultant, submit documentation to support the competency of firms and personnel.

.4 PRE-APPLICATION MEETING

.1 Convene a pre-application meeting for the Products specified in this section. Attendees must include, as a minimum, representatives of the following:

.1 Contractor (Site Superintendent & Project Manager)

.2 Application Subcontractor (Site Foreman & Project Manager)

.3 Product Manufacturer and/or Distributor (Technical Representatives)

.4 Related Subcontractors whose work is affected by that of this Section.

1.5 SUBMITTALS

.1 Samples: Submit samples in accordance with Section 01 30 00.

.2 Submit duplicate (4" x 4") 102mm x 102mm samples of each type of gypsum board panels in specified finishes.

1.6. **SYSTEM REQUIREMENTS**

.1 Performance Requirements: Fabricate and install systems as indicated but not less than that required to comply with ASTM C754 under the following conditions:

.1 Standard systems: Maximum deflection of l/240 of partition height.

.2 Systems to receive water resistant gypsum board or backer board: Maximum deflection of l/360 of partition height.

.3 Interior suspended ceilings: Maximum deflection of l/360 of distance between supports.

.4 Exterior soffits and interior vestibule ceilings: Withstand minimum positive and negative pressure of 0.95kPa with maximum deflection of l/360 of distance between supports.

.2 Partition Walls

.1 Partitions exceeding 9m in height are considered tall walls. Use double structural studs back-to-back 610mm on center. Attach studs back to back with screws approximately 1220mm on center. Alternately, use engineered steel stud assemblies. Refer to ~~Section 05 41 00.~~ **Refer to structural drawings for structural design requirements.**

.2 All stud assemblies requiring wind load resistance design shall be Engineered Steel Stud assemblies ~~as specified in Section 05 41 00.~~ **Refer to structural drawings for structural design requirements.**

.3 Fire Resistance Ratings: Where fire resistance classifications are indicated, provide materials and application procedures identical to those listed by UL/ULC or tested according to ASTM-E119 for type of construction shown.

.4 Acoustical Ratings: Where sound ratings are indicated, provide materials and application procedures identical to those tested by manufacturer to achieve Sound Transmission Class (STC) scheduled or indicated in accordance with ASTM-E90.

1.7. **DELIVERY, STORAGE & HANDLING**

.1 Deliver material to site promptly without undue exposure to weather.

.2 Deliver in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade.

.3 Store above ground in dry, ventilated space.

.4 Protect materials from soiling, rusting, or damage.

.5 Store board to be directly applied to masonry walls at 21°C for 24 hours prior to installation.

1.8. **ENVIRONMENTAL REQUIREMENTS**

.1 Maintain temperature minimum 10°C, maximum 21°C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost-free surfaces.

1.9. **SEQUENCING**

.1 Co-ordinate installation of ceiling suspension systems with work of mechanical and electrical trades. Allow for completion of major items of work by mechanical and electrical trades prior to installation of ceiling grid systems.

2.0 PRODUCTS

2.1 **STEEL MATERIALS**

1 Sheet Steel: Cold-rolled, commercial grade structural quality sheet steel, to ASTMA924/a924M; Zinc-Coated (Hot Dip Galvanized) to ASTM A653/A653M; coating designation Z275.

2.2 **PARTITION FRAMING**

.1 Partition Stud Framing: to ASTM C645, stud sizes as indicated, roll-formed from 0.53mm thick, hot-dip galvanized sheet steel. Knock-out service holes at 460mm centres.

.2 Partition Floor & Ceiling Tracks: to ASTM C645, 0.91mm thickness hot-dip galvanized sheet steel, widths to suit stud sizes, 32mm flange height for standard applications; 50mm flange height for deflection applications.

.3 Stiffener Channels: 38mm or 64mm width, 1.3mm thick hot-dip galvanized sheet steel, cold rolled channels.

2.3 **FURRING SYSTEMS**

.1 Metal furring runners, hangers, tie wires, inserts, anchors: to ASTM C645.

.2 Drywall Furring Channels: 0.53mm core thickness hot-dip galvanized, steel channels for screw attachment of gypsum board.

.3 Sound Isolation Clips: RISC-1 Sound Isolation Clips, by PAC International Inc.

2.4 **FLAT CEILING SUSPENSION SYSTEM**

.1 Suspension System: tested in accordance with ASTM C635, roll formed from hot dip galvanized, sheet steel; USG Drywall Suspension System by CGC Inc., or an approved alternative, and as follows:

.1 Main Tees: 38mm x 38mm, single web construction.

.2 Wall-to-Wall Main Tees: 38mm x 38mm, single web construction.

.3 Cross Tees: 38mm x 38mm, single web construction.

.4 Cross Channels: 73x22mm, with 37mm face width.

.5 Wall Channels: 40x25mm, "C" channel.

.6 Wall Molds: 38 x 25mm "L" profile.
.7 Splice and Transition clips: purpose-made, roll formed from hot-dip galvanized steel sheet by USG, or an approved alternative.
.8 Suspension wire: 2.75mm galvanized wire.

2.5 **BOARD MATERIAL**

.1 Standard Board: to ASTM C36, regular 16mm thick, 1220mm wide x maximum practical length, ends square cut, edges tapered.
.1 AirRenew Essential Gypsum Board, by CertainTeed Gypsum Canada Inc.
.2 Sheetrock® Gypsum Board, by CGC Inc.
.3 Gold Bond Gypsum Board, by National Gypsum.
.4 ToughRock®, by G-P Gypsum (Georgia-Pacific)

.2 Fire Rated Board (Type C): to ASTM C36, (5/8") 16mm thick, (48") 1220mm wide x maximum practical length, ends square cut, edges tapered.
.1 AirRenew Essential Type C Gypsum Board, by CertainTeed Gypsum Canada Inc.
.2 Sheetrock® Firecode Type C, by CGC Inc.
.3 Gold Bond Fire-Shield C Gypsum Board, by National Gypsum.
.4 ToughRock™ Fireguard C Gypsum Board, by Georgia Pacific.

.3 Fire Rated Board (Type X): to ASTM C36, Type X to ASTM E119, (5/8") 16mm thick, (48") 1220mm wide x maximum practical length, ends square cut, edges tapered.
.1 AirRenew Essential Type X Gypsum Board, by CertainTeed Gypsum Canada Inc.
.2 Sheetrock® Firecode Type X, by CGC Inc.
.3 Gold Bond Fire-Shield Gypsum Board, by National Gypsum.
.4 ToughRock™ Fireguard Gypsum Board, by Georgia Pacific.

.4 Moisture Resistant Gypsum Board: to ASTM C36, with water resistant facing, Type X to ASTM E119, 16mm thick, 1220mm wide x maximum practical length;
.1 M2Tech® Moisture and Mold Resistant Type X Gypsum Board, by CertainTeed Gypsum Canada Inc.
.2 Sheetrock Mold-Tough Panels, by CGC Inc.
.3 Gold Bond XP Gypsum Board, by National Gypsum.
.4 ToughRock® Mold-Guard, by G-P Gypsum (Georgia-Pacific)

.5 Abuse Resistant Gypsum Board: to ASTM C36, with water resistant facing, Type X to ASTM E119, 16mm thick, 1220mm wide x maximum practical length;
.1 M2Tech® Extreme Impact Type X HPD Gypsum Board, by CertainTeed Gypsum Canada Inc.
.2 Sheetrock Glass-Mat Mold-Tough VHI Fire code X Panels, by CGC Inc.

.6 Interior Ceiling Panels: to ASTM C1395, Type X to ASTM E119, 16mm thick, 1220mm wide x 2440mm long;
.1 Sheetrock® Interior Ceiling Board, by CGC Inc.
.2 Easi-Lite Lightweight Interior Ceiling Board, by CertainTeed Gypsum Canada Inc.
.3 Gold Bond Interior High-Strength LITE, by National Gypsum.
.4 ToughRock™Span 24, by G-P Gypsum (Georgia-Pacific)

.7 Tile Backer Board: to ASTM C1178, standard Type X to ASTM E119, 16mm thick,1220mm wide x 2440mm long;
- .1 DensShield® Tile Backer, by G-P Gypsum (Georgia-Pacific).
- .2 Diamondback Tile Backer Type X, by CertainTeed Gypsum Canada Inc.
- .3 Gold Bond e²XP® Tile Backer, by National Gypsum.

.8 Glass Mat Exterior Sheathing Board: to ASTM C931, C1177, and C1278; standard 16mm thick, 1220mm wide x maximum practical length;
- .1 DensGlass Gold Exterior Guard, by G-P Gypsum (Georgia-Pacific).
- .2 Securock® Glass-Mat Sheathing, by CGC Inc.
- .3 GlasRoc™ Sheathing by CertainTeed Gypsum Canada Inc.
- .4 Gold Bond e²XP® Extended Exposure Gypsum Sheathing, by National Gypsum.

2.6 **ACCESSORIES**

.1 Hanger Wire: 4.8mm galvanized pencil rod.

.2 Screws
- .1 For interior board: #6 or #8 bugle head, to ASTM C954, hardened and phosphate plated, drywall screws. Use self-drilling type for heavier thickness framing material.
- .2 For exterior sheathing board: self-tapping, corrosion-resistant, screws and plates, Deklite by DeckFast, or equivalent.

.3 Laminating Compound: as recommended by gypsum board manufacturer for laminating multiple layers of gypsum board, or for laminating gypsum board to masonry or concrete.

.4 Corner Beads: 0.53mm thick, commercial grade, hot-dip galvanized sheet steel, to ASTM C645, perforated flanges, one piece length per location, refer to drawings for details and locations;
- .1 "D-100" series, by Bailey Metal Products.

.5 Drywall Trims: 6063-T5 extruded aluminum trims and moldings, factory primed finish for site painting, one-piece length per location, by Fry Reglets. Refer to drawings for details and locations;
- .1 Reveal Molding: Drywall Reveal Molding, non-vented, "DRM 50-50" Series (13mm wide x board thickness).
- .2 Reveal Molding: Acoustic Ceiling Reveal Molding WDM 50-50.
- .3 Reveal Molding: Ceiling Reveal Molding DRWT 50-50.
- .4 F Reveal Molding: F Reveal Molding 13mm x 16mm.
- .5 Control Joint: DRM 50-50 2PC, and DRM 50-50 3PC.
- .6 Z Reveal Molding: DRMZ 50-50.
- .7 Curved Inside Corner- DRMC-IS-600 – 150 mm radius – Finish prime painted

.6 Polyethylene: to CAN/CGSB-51.34.

.7 Acoustical Sealant: to Section 07 92 00.

.8 Firestop and Smoke Sealants: to Section 07 84 00.

.9 Insulating Strip: rubberized, moisture-resistant, 3mm thick, closed cell neoprene strip, 12mm wide, with self sticking permanent adhesive on one face; lengths as required.

.10 Joint Tape: Paper tape, nominal 50mm wide.

.11 Joint Compounds: to ASTM C475, dry powder for mixing with water, or ready-mix compounds;

.1 Standard Interior Use Joint Compound

.1 DensArmor™ Sandable Joint Compound, by Georgia-Pacific.

.2 ProFin Taping and Joint Compound, by CertainTeed Gypsum Canada Inc.

.3 Sheetrock Setting-Type Joint Compound, by CGC Canada Inc.

.12 Water: potable

3.0 EXECUTION

3.1 GENERAL

.1 Perform work in accordance with ASTM C840 except where specified otherwise.

3.2 PARTITION CONSTRUCTION

.1 Align top and bottom partition tracks at floor and ceiling and secure at 610mm o.c. maximum.

.2 Secure partitions under acoustic ceiling grids with partition clips at 1220mm o.c. maximum and additionally at ends of return walls, and above each door jamb.

.3 Install polyethylene dampproof course under stud shoe tracks of partitions on slabs on grade.

.4 Place studs vertically at 406mm or 610mm o.c. as scheduled, and not more than 50mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.5 Erect metal studding to tolerance of 1:1200.

.6 Attach studs to bottom and ceiling track using screws.

.7 Coordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.8 Coordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.9 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.10 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.11 Frame openings and around built-in equipment, cabinets, access panels, on four sides.Extend framing into reveals. Check clearances with equipment suppliers.

.12 Install steel studs or furring channels between studs as required for attaching electrical and other boxes.

.13 Extend framing above suspended ceilings for fire and sound separations and to form plenum areas as indicated.

.14 Extend partitions to underside of floor/roof deck above except where noted otherwise on drawings. Provide cross-bracing above ceilings, where recommended by manufacturer.

.15 Where partitions are fire, smoke, or sound separations, and occur parallel to, and under structural members, offset and continue partitions to underside of floor/roof deck above to maintain continuity of partition.

.16 Maintain clearance under beams, joists, and structural slabs to avoid transmission of structural loads to studs. Use 50mm leg ceiling tracks or double track slip joint as indicated.

.17 Install continuous insulating strips to isolate studs from uninsulated surfaces, or dissimilar metals.

.18 Install two continuous beads of acoustical sealant or insulating strip under studs and tracks around perimeter of sound control partitions.

3.3 **FURRING INSTALLATION**

.1 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.

.2 Furr for gypsum board faced vertical bulkheads within or at termination of ceilings.

.3 Install wall furring for gypsum board wall finishes where indicated.

.4 Furr openings and around built-in equipment, cabinets, access panels, on four sides.Extend furring into reveals. Check clearances with equipment suppliers.

.5 Furr, beams, columns, pipes and exposed services where indicated.

.6 Install sound isolation clips and channels to assemblies indicated where scheduled on the drawings.

3.4 **CEILING SYSTEM INSTALLATION**

.1 Erect metal framing to tolerance of 1:1200.

.2 Install perimeter wall molds or channels level and straight, above elevation equal to thickness of board ceiling finish.

.3 Install main channels/tees in parallel rows 1220mm o.c., supported on hanger wire at maximum 1220mm o.c. Align cross channel slots from one main runner to the next. End splices must be fully interlocked.

.4 Install cross channels perpendicular to hanger channels at 405mm o.c. for moisture resistant board, soffit panels, and cement board; 610mm o.c. for all other installations. Screw fasten ends of furring channels to wall angles.

.5 Provide wind support posts at 1220mm o.c. each way at exterior soffit applications.

.6 Install additional cross channels within 200mm of parallel running walls where wall moulds or angles are not present.

.7 Install cross channels parallel to, and at exact locations of steel stud partition header track.

.8 Install standard cross tees at long edges of all rectangular light fixtures.

.9 Frame openings and around built-in equipment, cabinets, access panels, on four sides with cross tees. Extend framing into reveals. Check clearances with equipment suppliers.

.10 Ceiling suspension system shall not be used as primary support for mechanical/electrical equipment, other than those items penetrating the ceiling membrane or, to be installed on the underside of the ceiling. Other equipment must have its own support system.

.11 Fire Rated System

.1 Install additional cross channels 200mm each side of ceiling board butt joints for full length of joint.

.2 Install additional cross channels 200mm from long edges of light fixture openings for additional board support.

.3 Install additional wire hangers at all corners of light fixtures and at centre points of supporting cross tees.

.4 Install ceiling edge fascias where indicated on the drawings.

.5 Construct ceiling suspension systems to the following minimum fire rated designs:

.1 Up to 1 1/2 hours: UL Design G-528.

.2 Up to 2 hours: ULC Design I-517.

.3 Up to 3 hours: UL Design G-529.

3.5 BOARD APPLICATION

.1 Do not apply gypsum board until bucks, anchors, blocking, electrical and mechanical work are approved.

.2 Apply single layer gypsum board to wood or metal furring or framing using screw

.3 Apply double layer gypsum board to wood or metal furring or framing using screw fasteners for first layer, and laminating adhesive for second layer. Maximum spacing of screws 305mm o.c.

.4 Apply single layer gypsum board to concrete or concrete block surfaces, where indicated, using laminating adhesive.

.5 Apply moisture resistant gypsum board to walls and ceilings in Pool, Change Rooms, Washrooms, Janitor's rooms, and garbage rooms. Apply silicone sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads.

.6 Apply cement board panels to all exterior soffit surfaces and interior surfaces where noted and scheduled.

.7 Apply tile backer board to all wall surfaces to receive ceramic tile finish. Apply using screw fasteners, at 305mm o.c maximum spacing.

.8 Apply 13mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, in partitions where perimeter sealed with acoustical sealant.

.9 Apply glass mat gypsum sheathing board in single layer, to exterior side of load bearing steel studs, using pan-head screw fasteners. Maximum spacing of screws 305mm o.c.

.10 Install abuse resistant gypsum board on all interior wall locations to height of 2400 above finished floor and where noted or detailed. Install regular gypsum board from 2400 height to U/S of structure.

3.6 INSTALLATION OF ACCESSORIES

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure with screws at 152mm o.c., or using contact adhesive for full length.

.2 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.3 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.4 Construct control joints of back-to-back casing beads, set in gypsum board facing and supported independently on both sides of joint.

.5 Provide continuous polyethylene dust barrier behind and across control joints.

.6 Locate control joints at changes in substrate construction, at approximately 10000mm spacing on long corridor runs, at approximately 15200mm on ceilings.

.7 Construct expansion joints as detailed, at building expansion and construction joints. Provide continuous dust barrier.

.8 Install access doors to electrical and mechanical equipment where specified in Section 08 31 13 and by Mechanical and Electrical subtrades. Rigidly secure frames to furring or framing systems.

.9 Install continuous aluminum soffit vents as indicated on the drawings. Install vent strip straight and true to line.

.10 Provide DRMC-IS-600 – 150 mm radius aluminium inside corner as supplied by Fry Reglet Architectural Metals for installation as wall floor transition base at green screen wall in New Design Tech Classroom 8-5. Finish to be prime painted. Tape and finish to blend seamlessly with gypsum board wall and green screen floor. Paint to match green screen wall paint

3.7 TAPING AND JOINTING

.1 Provide levels of gypsum board finish for locations as follows, in accordance with Gypsum Association GA 214, Recommended Specification: Levels of Gypsum Board Finish.

.1 Level 1: Ceiling plenum and concealed areas, except provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings.

.2 Level 2: Gypsum board substrate at tile, except remove tool marks and ridges.

.3 Level 3: Gypsum substrate under textured or applied coatings such as plaster.

.4 Level 4: Gypsum board surfaces to receive paint finish.

.2 Interior Gypsum Board

.1 Pre-fill

.1 Use setting-type joint compound. Mix joint compound according to manufacturer's directions.

.2 Fill joints between boards flush to top of eased or beveled edge.

.3 Fill joints of gypsum board above suspended ceilings in fire-rated partitions.

.4 Wipe off excess compound and allow compound to harden.

.2 Taping (Level 1)

.1 Butter taping compound into inside corners and joints.

.2 Center tape over joints and press down into fresh compound.

.3 Remove excess compound.

.4 Tape joints of gypsum board above suspended ceilings.

.3 First coat (Level 2)

.1 Use taping or all-purpose drying-type compound.

.2 Immediately after bedding tape, apply skim coat of compound and allow to dry completely in accordance with manufacturer's instructions.

.3 Apply first coat of compound over flanges of trim and accessories, and over exposed fastener heads and finish level with board surface.

.4 Second coat (Level 3)

.1 After first coat treatment is dried, apply second coat of compound over tape and trim, feathering compound 2 inches beyond edge of first coat.

.5 Third coat (Level 4)

.1 After second coat has dried, sand surface lightly and apply thin finish coat to joints, fasteners and trim, feathering compound 2 inches beyond edge of second coat.

.2 Allow third coat to dry. Apply additional compound, and touch-up and sand, to provide surface free of visual defects, tool marks, and ridges, and ready for application of finish.

.3 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.

.4 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.5 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

END OF SECTION

PART 1 - GENERAL

1.1 **General Requirements** .1 Comply with requirements of Division 1.

1.2 **Related Sections** .1 Finishing of Concrete Slabs: Section 03345

.2 Sealants Section 07900

1.3 **Reference Standards**

.1 Do tile work in accordance with installation manual 200-1979 (Revised 1989), 'Ceramic Tile', by Terrazzo Tile and Marble Association of Canada and CSC Architectural Specification Study 09300 on Ceramic Tile.

.2 American National Standards Institute (ANSI) / Ceramic Tile Institute (CTI)

.1 ANSI A108.1, Specification for the Installation of Ceramic Tile (Includes ANSI A108.1A-C, 108.4-.13, A118.1-.10, ANSI A136.1)

.3 American Society for Testing and Materials (ASTM)

.1 ASTM C144, Specification for Aggregate for Masonry Mortar.

.2 ASTM C207, Specification for Hydrated Lime for Masonry Purposes.

.4 Canadian General Standards Board (CGSB)

.1 CGSB 71-GP-22M, Adhesive, Organic, for Installation of Ceramic Wall Tile

.2 CAN/CGSB-75.1, Tile Ceramic

.5 Canadian Standards Association (CSA)

.1 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A5, A8, A23.5, A362, A363, A456.1, A456.2, A456.3)

1.4 **Qualifications** .1 Installer: Work to be performed by a qualified Contractor and who has personnel with experience of successful work on similar projects, and who has the necessary equipment to complete the work.

1.5 **Guarantee** .1 Provide the following guarantees in accordance with the General Conditions, not withstanding the time provisions therein, including but not limited to such defects as cracks and delamination, except where proven the defect is a direct result of structural failure.

.2 Provide certificate of quality compliance from tile manufacturer.

.3 Provide certificate of quality compliance from tile installer upon satisfactory completion of installation.

.1 **General Tile Work - 2 years**

1.6 **Submittals**

.1 Samples:

.1 Prior to ordering materials submit, for Consultant's review, duplicate samples of each tile, trim, fitting and base, mounted on panels complete with grout and mortar joints. Also submit samples of mitre cut base (if indicated on Finishes Drawings and Colour Schedule) and field tiles.

.2 Maintenance Data:

.1 Submit manufacturer's maintenance data for inclusion into the maintenance manuals specified in Division 1. Also submit manufacturer's specification sheets for mortar and grout systems installed.

.3 Maintenance Materials:

.1 Supply a minimum 2%, but not less than 2 boxes, of each tile specified, for maintenance purposes after all deficiencies have been completed. Store material where directed by Consultant.

.2 Maintenance materials to be of same run as materials installed.

1.7 **Site Mock-Up**

.1 Prior to commencing work, review all details and provide mock-up for Consultants review. Mock-up will remain in place throughout installation as a representation of finish work standard and may become part of the finished work if approved by Consultant.

.2 Review tile patterns and layout with Consultant, on site, prior to commencing work.

1.8 **Product. Delivery & Storage**

1 Deliver materials to site in original unopened containers. Store in safe dry protected area free of moisture. Take precautions so no foreign matter contaminates materials.

1.9 **Environmental Conditions**

.1 Do not install tiles when ambient air temperature and substrate temperature is less than 12°C.

.2 Maintain a temperature of between 12°C to 20°C in areas of work for 24 hours prior to and during installation and for duration of curing time.

.3 Inspect areas to receive work and certify surfaces are acceptable for installation. Do not commence installation until improper conditions have been corrected.

1.10 **Protection**

.1 Exclude construction traffic from areas to receive tile, during installation and for duration of curing time.

PART 2 - PRODUCTS

2.1 **Tile General**

.1 Specifications for tile and supporting accessories is based on materials manufactured and/or distributed by Olympia Tile International Inc., at 1-800-268-1613 or 416-785-6666.

.2 Tile: CAN2-75T-M77, except that no blisters or chips will be allowed; colours and patterns selected by Consultant.

2.2	**Ceramic & Porcelain Tile**	.1	Colour to be selected by Consultant. Refer to Section 00865 Colour Schedule.
		.2	All tiles to be flush on the wall face. May need to build up substrate of areas where tiles are not as deep as field wall tiles. Refer to Section 00865 Colour Schedule for tiles specifications.
2.3	**Mortar/ Adhesives & Grout**	.1	All interior wall tile to use Ultra/Mastic 1.
		.2	All floor tiles to use Karalastic/Karabond.
		.3	Colour to be selected by Consultant. Refer to Section 00860 Colour Schedule for material selections.
		.4	Provide “Grout Boost” Stain resistant grout additive by Specialty Construction Brands Inc, to grout for all porcelain floor tile applications.
		.5	Unless otherwise indicated all grout lines on walls to line up with grout lines on floors in all directions.
2.4	**Transition Strips**	.1	Provide Schluter Schiene or Quadec transition strips in satin anodized aluminum at the top edge and exposed side edges of porcelain tiles (where indicated on the finishes drawings and interior elevations).
		.2	Transitions strips are required to clean up edge of tiles where different thicknesses of tiles are specified and vertical edges. Refer to interior elevations for notes regarding location of transition strips.
		.3	Provide Schluter Quadec in brushed stainless steel for at outside corners where tile meets tile. Refer to interior elevations and detail sheets for notes.
		.4	Grind all sharp edges smooth. Careful attention to corner conditions to ensure smooth finish to touch.
		.5	Use full length strips where possible. All connecting transition strips to have a seamless appearance and smooth to the touch.
2.5	**General Materials**	.1	Water: Potable and non-staining
		.2	Portland Cement: CAN3-A5-M83.
		.3	Sand: CSA A82.56-M1976.
		.4	Control Joint Sealant: Urethane sealant equal to Vulkem 245 self leveling sealant manufactured by Mameco Canada Ltd. Colour to match grout. Architect to make final colour selection.
		.5	Tile Sealer: Polished tiles are recommended to be sealed prior to grouting. Use MORE™ Grout, Ceramic & Porcelain Sealer, Ready to use, reapply 1-3 years for commercial applications.
		.6	Grout Haze Remover: Grout Haze-Epoxy/ Urethane, MORE™ Coating Striper. Test in an inconspicuous area to make sur the product is achieving the desired results and is not damaging the finish of the surface, Ready to use as needed.
		.7	Grout Haze Cementitious Remover: MORE™ Acidic Cleaner, 1:4 ratio dilution

with water, as needed.

PART 3 - EXECUTION

3.1 **Inspection**

.1 Examine floors for defects that are detrimental to installation and bonding of tile.

.2 Examine drywall surfaces for adequate fixing, plumb, joint filling and freedom from waves.

.3 Examine masonry and concrete surfaces for soundness, excessive moisture, efflorescence and variation tolerance.

3.2 **Preparation**

.1 Substrates to be clean and free of foreign matter and minimum 10° C.

.2 Clean substrates as required to produce acceptable surface.

.3 Where substrate conditions require it, apply leveling coat and allow to cure.

3.3 **Tile / Stone General**

.1 Finished work shall be level, plumb, or sloped as shown, true, square and free of defective, chipped, broken, discoloured or blemished tiles. Maximum allowable finished surface variation is 3 mm in 3 m when measured, in any direction, with a 3 m straightedge.

.2 Lay out tile patterns symmetrically within each area using full tiles where possible, and to patterns shown. Unless otherwise indicated provide stacked pattern. Review with architect/interior designer on site prior to installation of any and all tiles.

.3 Joints shall be parallel, uniform, neat, straight, square and completely filled.

.4 Fit tile or stone accurately against and around interruptions, penetrations and abutting dissimilar surfaces. Wherever possible, drill holes for penetrating elements to ensure neat fitting.

.5 After setting, sound tiles and replace hollow backed tiles.

.6 Provide tile manufacturer's standard trim pieces at changes in 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 and edges: bullnose.
.3 Internal vertical corners and unexposed edges: square butt joint.
.4 Top of base: curved surface cap.

3.4 **Floor Tile Installation**

.1 At floors shown to be sloped install setting bed to slopes indicated screed and tamp firmly, minimum 20 mm thick, with reinforcing mesh embedded approximately in centre of setting bed. Lap mesh 50 mm at joints.

.2 Over setting bed trowel or brush on bond coat approximately 1.5 mm thick, or apply evenly over back of tiles. Set tiles onto setting bed and beat firmly and evenly in place so as to achieve true, uniform and properly bonded installation but without causing damage to tiles.

.3 Provide minimum 1% slope to floor drains.

3.4 **Floor Tile Installation (Cont'd)**

.4 Floor tiles at floors without slopes, and base tiles may be installed with the thin set method using dry set mortar.

.5 Unless otherwise indicated provide 3 mm wide joints.

.6 Provided caulked control joints at 6 m on centres.

3.5 **Wall Tile Installation**

.1 Install tile on dry wall surfaces with organic adhesive or thin set bond coat (TTMAC 200-5 & -5A). Install wall tile on masonry or concrete with organic adhesive or dryset mortar (TTMAC 200-3, -3A).

.2 Use presanded dry set mortar or latex Portland Cement mortar for setting tile on glass fiber reinforced concrete backer board base as follows:

.1 Fill space between edge of board & tub or shower receptor with mortar.
.2 Fill backer board joints and joints between backer board and other materials solid with mortar. Apply skim coat of mortar and embed fiberglass tape over joints.
.3 Apply mortar setting bed in one coat to 2.4 mm minimum thickness after tiles are beat in. Initially apply mortar coat smoothly, then notch.

.3 Set wall tile in adhesive with 2 mm joint maximum both vertically and horizontally. Carry tile to ceiling unless otherwise indicated.

.4 At internal corners where tile abuts tile, tile and grout one plane before commencing work on intersecting plane to ensure proper filling of void at corners. Grout corner joint with sealant, same colour as mortar grout.

.5 Do tile work before ceilings are begun. Provide level and straight termination 50 mm above ceiling heights.

.6 On cast-in-place concrete wall, use bonding agent before applying adhesive.

.7 Install joint filler and seal behind escutcheon plates at every pipe penetrating tile work.

.8 Consult and review tile patterns with architect/interior designer on site prior to installation.

3.6 **Grouting**

.1 Remove mortar and adhesive from tile face as work progresses with CLEAN water.

.2 Commence grouting not earlier than 24 hours after setting tiles unless otherwise directed by grout manufacturer.

.3 Force maximum grout into joint so as to fill them flush, leaving no voids.

.4 Promptly as work progresses remove excess grout from adjacent tile surfaces with CLEAN water before grout establishes tight permanent adhesion.

.5 Cure grout in accordance with manufacturer's directions, minimum of 10 days.

		.6	Use MORE™ Surface Acidic Cleaner - to remove grout haze from the surface. Product supplied by Olympia Tile & Stone.
3.6	**Grouting (Cont'd)**	.7	Seal all polished tiles with manufacturer's recommended sealer prior to grouting. Review and consult architect prior to tile installation and grouting.
3.7	**Control Joints**	.1	Provide control joints at substrate control joint locations, at abutting dissimilar materials.
		.2	Unless otherwise detailed provide control joints 10 mm wide and fill with control joint sealant.
3.8	**Cleaning**	.1	Thoroughly clean tiles in accordance with manufacturers' instructions rinse with clean water and polish with clean dry cloths.
		.2	Deep Cleaning: MORE™ Alkaline Cleaner, 1:4 ratio dilution with water, as needed.
		.3	Remove all grout haze from all tiles.

End of Section

PART 1 - GENERAL

1.1 **General Requirements**

.1 Comply with requirements of Division 1.

1.2 **Related Sections**

.1 Cast-in-place Concrete: Section 03302

.2 Masonry: Section 04200

.3 Sealants: Section 07900

1.3 **Submittals**

.1 Samples:

.1 Colours and Patterns, unless otherwise specified herein or shown on Drawings, shall match terrazzo in existing building.

.2 Submit two samples, 300 mm x 300 mm x 20 mm of each type of finish to be used on the work. Make changes in mix and prepare new samples of changed mix if required by Consultant, until samples are approved.

1.4 **Product Handling**

.1 Deliver products to site and store packaged materials in original unopened containers with manufacturer's labels and seals intact.

1.5 **Protection**

.1 Prohibit all traffic on terrazzo floors during installation, for 48 hours after installation, for 48 hours after initial grinding and application of curing compound, and 48 hours after final grinding, polishing and until final sealing.

.2 Cover finished surfaces with stout fibre reinforced "Kraft" paper. Secure in place with gummed tape. Remove cover when requested by Architect.

PART 2 - PRODUCTS

2.1 **Materials**

.1 Cement: To CAN/CSA-A5, type 10 grey for under bed and white for topping.

.2 Sand: Fine and coarse aggregates to CAN/CSA-A23.1.

.3 Water: Potable.

.4 Marble Chips: Soundness and abrasion resistance. Grade chips in accordance with TTMAC standard.

.5 Pigments: Non-fading mineral pigments in colours to match existing.

.6 Divider Strips: 3 mm thick white alloy zinc with depth of 32 mm.

.7 Accessories: Base caps and base divider strips, separator strips, purpose made and of same material to match divider strips.

2.1 **Materials (Cont'd)**

.8 Expansion Strips: 3mm thick white alloy zinc laminated both sides 3mm black neoprene with depth of 32mm.

.9 Curing Compound: To manufacturer's standard.

.10 Cleaning Compound: To TTMAC standard 1001.

.11 Sealing Compound: To TTMAC standard 2001.

.12 Finishing Compound: To TTMAC standard 3001.

.13 Reinforcing Mesh: 50mm x 50mm No. 16 x No. 16 steel mesh, welded, galvanized after fabrication conforming to CSA G30.5.

.14 Slip Sheet: 2 mil polyethylene film to CGSB 70-GP-1, type 1.

PART 3 - EXECUTION

3.1 **Workmanship**

.1 Do terrazzo work in accordance with CSC Architectural Specification Study on Portland Cement Terrazzo, produced in cooperation with Terrazzo, Tile and Marble Association of Canada (TTMAC).

3.2 **Installation**

.1 Install terrazzo after concrete slabs have cured 28 days.

.2 Install divider strips true and level to detailed pattern.

.3 Slope finished terrazzo floors to drains.

.4 Produce terrazzo finished surfaces to match samples.

.5 Floors: Floating terrazzo: broom clean base slab. Fill all voids with loose sand. Apply 1 ply polyethylene slip sheet over sand lapping joints minimum 100 mm.

.6 Bases:
.1 Terrazzo bases to TTMAC detail to match existing.

.7 Clean, seal and finish terrazzo surfaces to TTMAC recommendations.

3.3 **Preparation of Substrate**

.1 Saturate base slab with water. Remove free water. Apply slurry consisting of a thick paste of cement and water immediately preceding application of underbed.

3.4 **Underbed**

.1 Provide underbed of thickness such that the finished thickness of terrazzo and underbed combined is not less than 64 mm.

.2 Carefully place underbed to exact level, minimum 16 mm below finished floor level.

.3 Build up underbed as may be required, to form any platforms, curbs and the like where indicated.

.4 Cover underbed with 4 mil polyethylene film and allow to cure for a minimum of 24 hours before removing polyethylene film and placing terrazzo topping.

3.5 **Divider Strips**

.1 Install divider strips in underbed while it is still in a plastic state. Locate divider strips as shown. If locations not shown, locate divider strips to form regular panels maximum 900 m x 900 m to Architect's approval.

.2 Where floor finish changes from terrazzo to other type of flooring at door openings and the like, extend terrazzo into opening and terminate against divider strip.

3.6 **Terrazzo Topping**

.1 Soak underbed, remove excess water and place a slurry consisting of cement and colour using same proportions as used for topping.

.2 Use stainless cement, coloured if required to match approved sample and marble chips.

.3 Wet topping mixture, mix thoroughly and apply to underbed while slurry is still wet.

.4 Sprinkler topping with wetted marble chips using same formula used in topping mix to ensure finished surface will consist of marble chips to match approved samples.

.5 Roll topping with heavy rollers to compact topping and remove excess water and cement.

.6 Hand trowel to level terrazzo topping flush with top of divider strips and cure.

3.7 **Surfacing of Terrazzo**

.1 Surface and grout terrazzo when it has set sufficiently hard. Surface by machine rubbing with #24 grit or finer abrasive blocks. Use plenty of water during grinding.

.2 Immediately following initial grinding, flush terrazzo surfaces thoroughly using water only and apply a grout to fill voids. Mix grout in same proportions of cement and colour as used for topping. Allow grouted surface to cure for at least 48 hours and then resurface by machine rubbing using #120 grit abrasive blocks and plenty of water.

.3 Following removal of grout, scrub thoroughly using machine scrubbers and Type 1001 cleaner. Rinse with clean water and then dry thoroughly. Dry clean with industrial vacuum cleaning machine, removing all traces of dust.

.4 Apply first coat of Type 2001 sealers, as soon after cleaning as possible. Apply sealer in accordance with manufacturer's written directions, and wipe off excess sealer before it dries.

.5 Apply second coat of Type 2001 sealer in same manner as first, but not until all other work is complete and terrazzo has been cleaned again as

previously specified above.

.6 Apply two coats of surface finish Type 3001.

3.8 **Repair to Existing Terrazzo**

.1 Repair existing terrazzo floors and coved bases as indicated. Remove existing topping in complete squares to the nearest divider strip.

.2 Reinstated work shall match adjacent existing terrazzo in all respects including chip and matrix proportion and colour and divider strip type and pattern.

.3 Where replacement is necessary, finish patched areas as specified for new work.

End of Section

1.0 GENERAL

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of the Contract, Supplementary Conditions, and the General Requirements of Division 1, form part of this section, and must be read in conjunction with the requirements of this section. The work of this section shall comply with all requirements of Division 1 – General Requirements.

1.2 SECTION INCLUDES

.1 Provision of all labour, materials, equipment and incidental services necessary to provide acoustic panel ceiling systems including the following:

.1 Acoustic ceiling panels

.2 Suspension grid systems

.3 Hangers and inserts

1.3 REFERENCES

.1 ASTM-C635; Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.

.2 ASTM-C636; Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

.3 CAN/CGSB-51.34; Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.

.4 CAN/CGSB-92.1 Sound Absorptive Prefabricated Acoustical Units.

.5 CSA-B111; Wire Nails, Spikes and Staples.

.6 CAN/ULC-S102; Surface Burning Characteristics of Building Materials.

1.4 REGULATORY REQUIREMENTS

.1 Fire-resistance rated floor/ceiling and roof/ceiling assembly: certified by a Canadian Certification Organization accredited by Standards Council of Canada.

1.5 DESIGN REQUIREMENTS

.1 Maximum deflection: 1/360th of span to ASTM-C635 deflection test.

1.6 **QUALITY ASSURANCE**

.1 MANUFACTURER/FABRICATOR

.1 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.

.2 INSTALLATION/APPLICATION

1. Installers or applicators of the Products specified herein, shall be competent in the skills required to perform such tasks. Installation/ shall be performed in accordance with industry standards specified herein, warranty requirements, and in accordance with generally accepted, industry best practices.

.3 DOCUMENTATION

. 1 If requested by the Consultant, submit documentation to support the competency of firms and personnel.

.4 PRE-APPLICATION MEETING

.1 Convene a pre-application meeting for the Products specified in this section. Attendees must include, as a minimum, representatives of the following:

.1 Contractor (Site Superintendent & Project Manager)

.2 Application Subcontractor (Site Foreman & Project Manager)

.3 Product Manufacturer and/or Distributor (Technical Representatives)

.4 Related Subcontractors whose work is affected by that of this Section.

1.7 **SUBMITTALS**

.1 SUBMITTALS:

.1 Make submittals in accordance with Section 01 30 00.

.2 SAMPLES:

.1 Submit duplicate (4" x 4") 102mm x 102mm samples of each type of acoustical panels in specified finishes.

.3 CLOSEOUT SUBMITTALS

.1 Maintenance Materials

.1 Provide acoustical ceiling panels amounting to ±2% of gross ceiling area for each pattern and type required for project, in accordance with Section 01 78 00.

.2 Extra materials shall be from same production run as installed materials, in unopened packages clearly identified as to its contents.

.3 Store where directed.

1.8 MOCK-UPS

.1 Construct mock-ups in accordance with Section 01 30 00.

.2 Construct one 3mx 3m mock-up of each type of acoustic panel ceiling in place, complete with wall molds suspension system grid and panels.

.3 Allow for review by Consultant. Correct deficiencies.

.4 Approved mock-up may form part of the finished Work, and shall serve as the minimum standard for work of this type.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Permit wet work to dry before commencement of installation.

.2 Maintain uniform minimum temperature of 15°C and humidity of 20 - 40% before and during installation.

.3 Store materials in work area 48 hours prior to installation.

2.0 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

.1 Suspension Grid

.1 CertainTeed

.2 Armstrong World Industries

.3 CGC

.2 Acoustic Panels

.1 CGC

2.2 STEEL MATERIALS

.1 Sheet Steel: Cold-rolled, commercial grade structural quality sheet steel, to ASTMA635/A635M; Zinc-Coated (Hot Dip Galvanized) to ASTM A653/A653M; coating designation Z275.

2.3 SUSPENSION GRID SYSTEMS

.1 Intermediate duty suspension grid systems, all components to be sheet steel to ASTMC635, galvanized to ASTM A653/A653M. Die cut components; double web main tees with rectangular bulb and rolled cap on exposed face; shop painted baked enamel finish.
Cross tees with rectangular bulb and web extended to form positive interlock with main tee webs, lower flange extended and offset to provide flush intersection.

.2 Standard Grid (**AC1**): (15/16") 23mm wide exposed T-grid;
- .1 Colour: white.
- .2 Acceptable Products:
  - .1 Prelude XL, by Armstrong.
  - .2 15/16" EZ Stab Classic System, by CertainTeed.
  - .3 Wall Molds: 23mm wide;
    - .1 Colour: to match grid.
    - .2 Prefabricated shadow mold profile for all ceilings.

2.4 ACOUSTIC CEILING PANELS

.1 Lay-in Acoustic Panels (AC1): to ASTM E1264 Type IV Form 2 Pattern E, square-cut edges for standard grid;
- .1 Panel Size: (24" x 48") 610mm x 1220mm & (12” X 48”) 305MM x 1220mm
- .2 Finish: factory-applied latex paint.
- .3 Colour: White.
- .4 Pattern: fine textured.
- .5 Fire Resistance: Class A - Firecode.
- .6 NRC: 0.55.
- .7 CAC: >35.
- .8 Acceptable Products
  - .1 2315 Firecode Radar by CGC

2.5 ACCESSORIES

.1 Hanger Wire: galvanized soft annealed steel wire, 3.6mm diameter for access tile ceilings to ULC/UL tested design requirements for fire rated assemblies, 2.6mm diameter for other ceilings.
- .1 Hanger Inserts: purpose-made for individual substrate.

.2 Carrying Channels: 38mm or 64mm, hot-dip galvanized steel.

3.0 EXECUTION

3.1 EXAMINATION

.1 Do not install ceiling suspension system or acoustical panels and tiles until the work above ceiling has been inspected by Consultant.

3.2 SUSPENSION SYSTEM INSTALLATION

.1 Install suspension system in accordance with ASTM-C636, to manufacturer's instructions, ULC/UL requirements, and this specification.

.2 Secure hangers to overhead structure using attachment methods acceptable to Consultant.

.3 Install hangers spaced at maximum 1220mm centres and within 150mm from ends of main tees.

.4 Where mechanical or electrical equipment prohibit installation of hangers, provide carrying channels as required to span under equipment.

.5 Lay out system according to reflected ceiling plan.

.6 Ensure suspension system is coordinated with location of related components.

.7 Install wall mold level to provide correct ceiling height.

.8 Completed suspension system to support superimposed loads, such as lighting fixtures, diffusers, grilles, and speakers.

.9 Support light fixtures with additional ceiling suspension hangers at each corner and at maximum 600mm around perimeter of fixture.

.10 Supplementary support hangers for all tile-mounted mechanical and electrical fixtures shall be provided by those trades.

.11 Interlock cross members to main runner to provide rigid assembly.

.12 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.

.13 Finished ceiling system to be square with adjoining walls and level within 1:1000.

3.3 EXPANSION JOINTS

.1 Supply and install "Z" shaped metal trim pieces at each side of expansion joint. Design to accommodate plus or minus 25mm movement and maintain visual closure. Finish metal components to match adjacent exposed metal trim. Provide backing plates behind butt joints.

3.4 ACOUSTIC PANEL INSTALLATION

.1 Install lay-in panels in correct seated position in ceiling suspension system.

.2 In fire rated ceiling/floor and ceiling/roof systems, secure lay-in panels with hold-down clips and protect over light fixtures, diffusers, air return grilles and other appurtenances according to ULC/UL design requirements.
Note: In accordance with ANSI / UL 263 Item III. Floor-Ceilings and Roof-Ceilings item 10. Acoustical Materials, hold down clips only required for ceiling panels weighing less than 1 lb. per SQ.FT.

3.5 COORDINATION

.1 Coordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

3.6 INSPECTION AND CLEANING

.1 Thoroughly inspect all ceiling tiles and remove any chipped, marked, scratched, stained, discoloured or otherwise damaged units, and replace with new units. Do not take replacement units from maintenance materials.

.2 Thoroughly inspect all ceiling grid and remove any marked, scratched, dented or otherwise, damaged pieces, and replace with new.

END OF SECTION

1.0 GENERAL

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of the Contract, Supplementary Conditions, and the General Requirements of Division 1, form part of this section, and must be read in conjunction with the requirements of this section. The work of this section shall comply with all requirements of Division 1 – General Requirements.

1.1 SECTION INCLUDES

.1 Sheet vapour retarder .

.2 Sleepers.

.3 Plywood subfloor

.4 Wood flooring, nailed.

.5 Surface finishing.

.6 Existing wood flooring refinishing

1.2 RELATED SECTIONS

.1 Section 06100 - Wood Framing: Wood subfloor surface.

1.3 REFERENCES

.1 ASTM E84-12c - Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 CAN/ULC-S102-10 - Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.3 MFMA (Maple Flooring Manufacturers Association).

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide data for flooring and floor finish materials.

.3 Shop Drawings: Indicate floor termination details.

.4 Samples: Submit [two (2) samples illustrating floor finish, colour, and sheen.

1.5 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Installation Data: Manufacturer's MFMA special installation requirements, including special procedures, perimeter conditions requiring special attention.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 10: Submission procedures.

.2 Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, a suggested schedule for cleaning, stripping, and re-finishing, stain removal methods, and polishes and waxes.

1.7 QUALITY ASSURANCE

.1 Products of This Section: Manufactured to ISO 9000 certification requirements.

.2 Perform Work in accordance with MFMA.

.3 Manufacturer Qualifications: Company specializing and experienced in manufacturing the Products specified in this section.

.4 Installer Qualifications: Company specializing in performing the work of this section with experience and approved by the manufacturer.

1.8 REGULATORY REQUIREMENTS

.1 Conform to applicable code for flame/smoke rating requirements in accordance with CAN/ULC-S102.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Section 01 35 26: Environmental conditions affecting products on site.

.2 Do not install wood flooring until wet construction work is complete and ambient air at installation space has moisture content stabilized.

.3 Provide heat, light, and ventilation prior to installation.

.4 Maintain room temperature and relative humidity in accordance with adhesive manufacturer's written instructions for a period of two days prior to delivery of materials, during, and after installation.

2.0 PRODUCTS

2.1 MATERIALS

.1 Flooring: Species and grade stamped on underside of each piece, conforming to the following:

.1 Species: White Hard Maple to match existing.

.2 Grade: First.

.3 Treatment: Acrylic Impregnated.

.4 Cut: Flat Grain to match existing.

.5 Moisture Content: 7 to 9%.

.6 Actual Thickness: 7/8” to match existing.

.7 Actual Width: Match existing

.8 Edge: Tongue and Groove.

.9 End: Square End matched.

.10 Length: Random

2.2 ACCESSORIES

.1 Sheet Vapour Retarder: Black polyethylene, <0.2 mm><<8 mil>> thick; <50 mm><<2 inch>> wide tape for joint sealing.

.2 Sleepers and Shims: Softwood lumber, pressure treated for moisture protection, <50 x 100 mm><<2 x 4 inch>> size.

.3 Sheathing Paper: Asphalt impregnated paper.

.4 Plywood subfloor shall be 15/32" x 4' x 8' APA (or flooring manufacturer approved equivalent) Rated Sheathing, Exposure 1, minimum 4 ply or per MFMA flooring manufacturer design.

.5 Nails: Type recommended by flooring manufacturer.

.6 Wood Plugs: Round shape, <19 mm><<3/4 inch>> diameter x <3 mm><<1/8 inch>> thick, of same species as flooring.

.7 Back Prime Paint: [_____].

2.3 FINISHES

.1 Section 09900: Floor finish.

.2 Floor Finish: Water borne urethane], to achieve low sheen surface; type recommended by flooring manufacturer. Match existing

.3 Floor Stain: penetrating type recommended by flooring manufacturer if required to match existing.

.4 Sealer and Wax: Types recommended by flooring manufacturer.

3.0 EXECUTION

3.1 EXAMINATION

.1 Section 01 70 00: Verify existing conditions before starting work.

.2 Verify that concrete subfloor surface is smooth and flat

.3 Verify wood subfloor is properly secured, smooth and flat to plus or minus [<6 mm in 3 m><<1/4 inch in 10 feet>>].

.4 Verify that required floor mounted utilities are in proper location.

3.2 PREPARATION

.1 Broom clean substrate.

3.3 INSTALLATION

.1 Install flooring to manufacturer instructions.

.2 Place sheathing paper, lap edges and ends <50 mm><<2 inches>>, staple in place.

.3 Place sheet vapour retarder over subfloor surface, lapping edges and ends minimum <150 mm><<6 inches>> and tape seal; in place. Place sleepers over vapour retarder at <300 mm><<12 inches>> on centre. Shim sleepers to level line. Place sheathing paper, lap edges and ends <50 mm><<2 inches>>, staple in place.

.4 Place sleepers over subfloor surface <300 mm><<12 inches>>]on centre. Shim underside of sleepers to level line. Place [sheathing paper] [vapour retarder], lap edges and ends [<50 mm><<2 inches>>]; [staple in place] [tape seal].

.5 Install plywood sheathing over sleepers at 90 degree angle to direction of finished flooring. Attache with nails or staples at 300 mm O.C.

.6 Blind nail flooring in accordance with manufacturer's written instructions.

.7 Lay flooring parallel to existing. Verify alignment as work progresses.

.8 Arrange flooring with square ends set flush and tight.

.9 Terminate flooring at centre line of door openings where adjacent floor finish is dissimilar. Provide divider strips.

.10 Install edge strips at unprotected or exposed edges, and where flooring terminates. Secure metal strips before installation of flooring with stainless steel screws.

.11 Install flooring tight to floor access covers.

.12 At movable partitions install flooring under partitions without interrupting floor pattern.

.13 Provide expansion space at fixed walls and other interruptions.

.14 Install vented cove base by anchoring to walls with base cement, screws or anchors. Mitre inside corners, and use pre molded outside corners.

3.4 FINISHING

.1 Sand flooring to smooth even finish with no evidence of sander marks. Take precautions to contain dust. Remove dust by vacuum.

.2 Mask off adjacent surfaces.

.3 Apply stain as required to match existing and three (3) finish coats in accordance with floor finish manufacturer's written instructions.

.4 Apply first coat, allow to dry and buff with steel wool to remove irregularities. Vacuum clean and wipe with damp cloth.

.5 Apply successive coats. Allow to dry. Lightly buff with steel wool and vacuum clean.

.6 Apply last coat of finish.

3.5 EXISTING WOOD FLOORING REFINISHING

.1 Machine sand existing flooring and refinish as specified for new flooring.

3.6 CLEANING

.1 Section 01 74 00: Cleaning installed work.

.2 Clean and polish floor surfaces in accordance with manufacturer's written instructions.

3.7 PROTECTION OF FINISHED WORK

.1 Section 01 78 40: Protecting installed work.

.2 Prohibit traffic on floor finish for 48 hours after installation.

END OF SECTION

PART 1 - GENERAL

1.1 **Reference** .1 Comply with requirements of Division 1.

1.2 **Related Sections** .1 Concrete Floor Finishing: Section 03345

1.3 **Qualifications** .1 Flooring Contractors shall have a successful record of over 5 years experience in this type of work.

.2 Flooring Contractor(s) shall be established firms, experienced in the field, and appointed as a distributer by the manufacturer of the flooring product specified.

1.4 **Submittals** .1 Samples:

.1 Submit three samples of each colour specified for approval.

.2 Direction of veining or marbleization in the floor tile will be in accordance with instructions issued by the Consultant when colour selection is made.

.2 Maintenance Data:

.1 Furnish the Owner with three copies of manufacturers printed maintenance instruction for inclusion in the maintenance manuals.

.3 Maintenance Materials:

.1 Deliver 5% of each colour pattern and type flooring material required for this project for maintenance use. Store where directed. Clearly identify each box.

.2 Delivery 10 m length rubber base. Store where directed.

.3 Maintenance materials to be same production run as installed materials.

.4 Furnish to the Owner additional materials containing a total of at least 1% of each different colour or design of the indoor resilient athletic surface used on the project.

1.5 **Delivery and Storage** .1 Deliver materials to the job in sealed, original, labeled containers.

.2 Store flooring materials in areas of application for at least 48 hours prior to installation.

1.6 **Environmental Requirements** .1 Maintain minimum 20˚C air temperature at flooring installation area for 3 days before, during and for 48 hours after installation.

PART 2 - PRODUCTS

2.1 **Materials**

.1 **Mastic Fill** (latex underlayment): Bakelite Co. latex underlayment power/liquid or other approved manufacturer.

.2 **Rubber Base (RUB)**: to meet the performance requirements of ASTM F-1861, Type TP and TV, Group 1 (Solid), Standard Specification for Resilient Wall Base.

.1 TighLock Carpet wall base is a wedge shaped toeless base specifically designed to be installed prior to traditional, direct, or double glue down carpet installations.

.2 Tightlock Resilient Topset wall base is specifically designed for resilient installations where there is a transition from resilient flooring to carpet.

.3 6.35mm (1/4") thick – wedge design, ± 100mm (4") high, complete with inside/outside corners.

.4 Should not crack, break, or show any signs of fatigue when bent around a (6.4mm (1/4") diameter cylinder.

.5 Product Performance and Technical Data
ASTM F 1515 (Resistance to Light)……... ΔE<8
ASTM F 925 (Chemical Resistance)…….. Pass
5% acetic acid
70% isopropyl alcohol, mineral oil
5% sodium hydroxide solution
5% hydrochloric acid solution
5% sulfuric acid solution
5% household ammonia solution
5.25% household bleach solution

Vinyl Wall Base:
ASTM E 84/ NFPA 255 (Flame/Smoke)…… Class B, <450
ASTM E 648/ NFPA 253 (Critical Radiant Flux)…….…….. Class I

Rubber Wall Base:
ASTM E 84/ NFPA 255 (Flame/Smoke)…… Class A, <450
ASTM E 648/ NFPA 253 (Critical Radiant Flux)…….…….. Class I

Acceptable rubber base manufacturers: Johnsonite, Nora, Roppe, Armstrong, Mannington.

Refer to Section 00865 Colour Schedule for colour selection(s).

.3 **Metal Edge Strips:** aluminum extruded, smooth mill finish with lip to extend under floor finish, shoulder flush with adjacent floor finish.

2.1 **Materials (Cont'd)**

.4 **Vinyl Composite Tile (VCT):** to ASTM F-1066, Class 2, SS-T-312B (1), Type IV, Composition I, vinyl composite tile with recycled vinyl content. (12" x 12") 305 mm x 305 mm, (1/8") 3.2 mm gauge.

Fire Test Data		
ASTM E 648	Critical Radiant Flux	> 0.45 watts/cm²
ASTM E 662	Smoke	< 450
ASTM 3 84	Flame Spread	< 25
	Smoke Developed	< 50

Static Load Limit	
ASTM F 970	Exceeds 150 psi (10.54kg/cm²)

Acceptable VCT alternatives may include: Mannington Commercial, Armstrong Commercial Flooring, Flextile and Johnsonite Azrock VCT.

Refer to Section 00865 Colour Schedule for colour selections.

.5 **Luxury Vinyl Tile (LVT):** Tandus / Centiva, A Tarkett Company.

Classification: ASTM F1700 Class III Type B
Total Thickness: 3.0mm (0.120")
Wear Layer Thickness: 0.5mm (20 mil)
Adhesive: CENTI 2001 Wet Set, CENTI 6000 SP, CENTI 2000 EP or other Tandus Centiva LVT preferred adhesives.
ASTM F137 (Flexibility)……..…. Pass
ASTM F2199 (Dimensional Stability)……..….. Pass
ASTM F970 (Static Load)……. Pass
ASTM F1914 (Residual Indentation)……...….Excellent
ASTM E648 (Flammability)……..…CRF ≥0.45 watts/cm² NFPA Class 1
ASTM D2047 (Slip Resistance)……... Pass >0.5 ADA Compliant
ASTM E662 (Smoke Density)…… Pass<450 D^{MC}
ASTM F1515 (Resistance to Light)……..….. Excellent
ASTM F925 (Chemical Resistance)……..….. Excellent
ASTM F1514 (Resistance to Heat)…….. Excellent

Refer to Section 00865 Colour Schedule for colour selection(s).

PART 3 - EXECUTION

3.1	**Inspection**	.1	Ensure concrete floors are dry by using test methods recommended by tile resilient flooring manufacturers, and exhibit negative alkalinity, carbonization for dusting.
3.2	**Subfloor Treatment**	.1	Remove subfloor rides and bumps. Fill low spots, cracks, joints, holes and other defects with subfloor filler.
		.2	Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured.
		.3	Apply mastic fill underlayment to entire floor area. Where resilient flooring terminates at adjacent thicker flooring materials apply underlayment to insure top of finished flooring materials are flush. Feather filler sufficiently to eliminate abrupt changes in elevation.
		.4	Prime concrete to floor manufacturer's recommendation.
3.3	**General Application**	.1	All flooring materials are to be installed wall to wall over entire floor areas prior to the installation of any cabinet work.
3.4	**Resilient Base Application**	.1	Set base in adhesive tightly against wall and floor surfaces. Use lengths as long as practicable and not less than 600 mm long.
		.2	Install straight and level to variation of 1:1000.
		.3	Scribe and fit to door frames and other obstructions.
		.4	Wrap base around exterior corners as recommended by base manufacturer. Miter internal corners.
		.5	Apply base to all millwork surfaces in contact with the floor unless otherwise detailed.
3.5	**Resilient Flooring Application**	.1	Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.
		.2	Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width.
		.3	Install flooring to square grid pattern with all joints aligned.
		.4	Cut tile and fit neatly around fixed objects.
		.5	Install flooring in pan type floor access covers. Maintain floor pattern.
		.6	Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.
		.7	Provide reducer strip fully bonded to floor where floor covering terminates exposing edge of floor.
3.6	**Sheet LVT**	.1	Install in accordance with manufacturer’s recommendations.

Installation

3.7 **Protection and Cleaning**

.1 Protect all adjacent surfaces from damage resulting from the work of this scope. Make good all damage.

.2 Prior to final completion, inspect the work and do all necessary replacement or repair. Replace or repair floor covering which has not seated in a level plane with surrounding material. Replace all tile showing broken corners or fracture lines or imperfections of sub floor or adhesive. Replace all damaged rubber base.

.3 Promptly as the work proceeds and on completion, clean-up and remove from the premises all rubbish and surplus material resulting from the work of this Section.

.4 Promptly remove adhesive from surface of resilient materials as work progresses.

.5 Broom clean, free of building materials, rubbish, paint, adhesives, stains and spills.

.6 Final cleaning and initial sealing of VCT flooring is the responsibility of this section. Mop or scrub floors with properly diluted neutral cleaner. Rinse carefully and let flooring dry. With a clean finish mop or finish applicator, apply 2 coats of S-495 floor sealer letting dry 60 minutes between coats.

.7 Owner will be responsible for washing and waxing (if applicable) of resilient floors. Owner reserves the right to reject resilient flooring work for defects which only become apparent after washing and waxing of floors.

End of Section

1.0 GENERAL

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of the Contract, Supplementary Conditions, and the General Requirements of Division 1, form part of this section, and must be read in conjunction with the requirements of this section. The work of this section shall comply with all requirements of Division 1 – General Requirements.

1.2 SECTION INCLUDES

.1 Provision of all labour, materials, equipment and incidental services necessary to cover with paint the interior surfaces of the building or structure, and the building services and accessories not otherwise protected or covered, to the full intent of the drawings and specifications.

.2 Surface preparation of substrates to receive painting and finishing is included in this section of work.

.3 This section of work shall include the painting and finishing of all exposed surfaces of the following substrates:
- .1 Wood
- .2 Steel (Prime-painted & Galvanized)
- .3 Concrete
- .4 Masonry
- .5 Gypsum board surfaces

1.3 REFERENCE STANDARDS

.1 CAN2-85.100, National Standards of Canada, Painting.
.2 Master Painters Institute (MPI) Architectural Painting Specification Manual.

1.4 MATERIALS AND EQUIPMENT NOT TO BE PAINTED

.1 Surfaces not to be painted shall be left completely free of droppings, over-spray, or accidentally applied materials resulting from the work of this Section.

.2 Items not to be painted include concealed structural elements, and equipment furnished with complete factory-applied, coloured paints and finish systems.

1.5 COOPERATION WITH OTHER TRADES

.1 Schedule and coordinate this work with other trades and do not proceed until other work and/or job conditions are as required to achieve satisfactory results.

.2 Examine all specification sections for materials and products and become thoroughly familiar with all provisions regarding painting.

1.6 QUALITY ASSURANCE

.1 Material Manufacturers
.1 All paint and finish products shall be those listed in the MPI manual, latest edition unless otherwise specified or listed herein.

.2 Applicators
.1 The painting subcontractor shall have a minimum of five (5) years documented experience in commercial painting and finishing, and shall maintain a qualified crew of size necessary to fully satisfy the requirements of this section.

.3 Pre-application Meeting
.1 Convene a pre-application meeting for the Products specified in this section. Attendees must include, as a minimum, representatives of the following:
.1 Contractor (Site Superintendent & Project Manager)
.2 Application Subcontractor (Site Foreman & Project Manager)
.3 Product Manufacturers and/or Distributors (Technical Representatives)
.4 Related Subcontractors (ie. Mechanical and/or Electrical)

1.7 MOCK-UP REQUIREMENTS

.1 Finish one complete room of each colour scheme required, showing selected materials, colours and textures. Have Consultant review mock-up for acceptance of colour and finish, prior to ordering of materials for further work.

.2 Consultant reserves the right to change colour and/or finish selection upon review of mock-up, if deemed unacceptable.

.3 Refinish rejected areas until acceptance is achieved.

.4 Once approved by the Consultant, mock-ups shall serve as the minimum acceptable standard for similar work throughout the Project.

1.8 COLOUR SCHEDULE

.1 Refer to the Room Finish Schedule and the Colour Schedule for colours and surface textures of all finishes. The final selection shall rest solely with the Consultant.

1.9 COMPLETION SCHEDULE

.1 Furnish the Consultant with a schedule showing expected completion of the respective coats of paint for the various areas and surfaces. Keep this schedule current as the job progresses.

1.10 SUBMITTALS

.1 Product Codes
.1 Submit a complete list of product codes from the manufacturer(s) proposed for use on this project, for all products listed in finish systems specified herein, in accordance with Section 01 30 00.

.2 Samples

.1 Submit samples of all paints and finishes specified herein, in accordance with Section 01 30 00.

.2 Submit duplicate (8" x 12") 200 x 300mm sample panels of each type of paint and finish application for approval by the Consultant.

.3 Where manufacturer of paint differs from that listed in the colour schedule, employ spectrograph technology to ensure accurate colour match. Selection of the "next nearest colour" by another manufacturer will not be acceptable.

.4 Use birch plywood for wood finishes, gypsum board for paint finishes over smooth surfaces. Refer to Mock-up Requirements for masonry finishes.

.5 Finished work to match approved samples.

.6 The Consultant reserves the right to alter colour selections following sample review.

1.11 DELIVERY, STORAGE AND HANDLING

.1 Paint and finish materials shall be delivered to the site in sealed original labelled containers bearing manufacturer's name, type of paint, brand name, colour designation and instructions for mixing and/or reducing.

.2 Store materials in a heated, dry, well-ventilated, indoor place having a minimum ambient temperature of (45°F) 7°C.

.3 Keep waste rags in metal drums and remove all rags, waste and trash from the building at the end of each working shift.

.4 Provide CO2 fire extinguisher of minimum (20 lb) 9kg capacity in storage area.

.5 Ensure that health and fire regulations are complied with in storage area.

1.12 GENERAL COLOUR REQUIREMENTS

.1 Refer to the Room Finish Schedule and the Colour Schedule for type and extent of finishes, and for individual colour and sheen selections.

.2 Where manufacturer of paint differs from that listed in the colour schedule, employ spectrograph technology to ensure accurate colour match. Selection of the "next nearest colour" by another manufacturer will not be acceptable.

.3 The following, generally, will be painted colour, and sheen to match adjacent surfaces

.1 Access doors

.2 Exposed piping, conduit, and ductwork.

1.13 **ENVIRONMENTAL CONDITIONS**

.1 Temperatures: No painting shall be performed when substrate or ambient air temperatures are below (41°F) 5°C. Minimum allowable temperature for application of Latex paints is (45°F) 7°C.

.2 Relative humidity: shall not exceed 85%.

.3 Moisture content of substrates: Masonry and concrete materials shall be allowed to cure for a minimum of 28 days before application of paints. Substrates shall be measured by electronic moisture meter, to the following maximums:
- .1 Plaster and Gypsum board: 12%.
- .2 Masonry, concrete/concrete block: 12% for solvent based paints.
- .3 Wood: 15%.

.4 Lighting: Painting shall not proceed unless a minimum of (15 cd/ft2) 1.3 lx lighting is provided on the surfaces to be painted.

.5 Ventilation: All areas where painting is proceeding require adequate continuous ventilation and sufficient heating facilities to maintain temperatures above (45°F) 7°C for 24 hours before during and after paint application.

1.14 **MAINTENANCE MATERIALS**

.1 Supply Owner with one clearly identified, new and unopened gallon of each colour and type of paint, stain and varnish used for this work, in accordance with Section 01 78 00.

.2 All colour mixing codes must be clearly labeled, and colour numbers (P1, P2, etc.) must be marked on the container.

1.15 **EXTENDED 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.

2.0 PRODUCTS

2.1 **MATERIALS**

.1 Paint, varnish, stain, enamel, lacquer and fillers shall be of a type and brand herein specified and/or listed under Chapter 5 (Approved Products List) of the MPI manual.

.2 Paint materials such as linseed oil, shellac, turpentine, and any materials not specified herein but required for first class work with the finish specified shall be the highest quality product of an approved manufacturer. All materials shall be compatible with finish paint or coating materials.

2.2 **MIXING**

.1 Paints shall be ready-mixed unless otherwise specified, except that any coating in paste or powder form, or to field-catalyzed shall be field-mixed in accordance with the directions of its manufacturer. Pigments shall be fully ground and shall maintain a soft paste consistency in the vehicle during storage that can and shall be dispersed readily and uniformly by paddle to a complete homogeneous mixture.

.2 The paint shall have good flow and brush properties and shall dry or cure free of sags or runs to yield the desired finish specified.

2.3 **GLOSS LEVELS**

.1

MPI Gloss and Sheen Levels;	Gloss @60°	Sheen @85°
Level G1 – (Flat):	max. 5	max. 10.
Level G2 – (Velvet):	max. 10	10-35.
Level G3 – (Eggshell):	10-25	10-35.
Level G4 – (Satin):	20-35	min.35.
Level G5 – (Semi-Gloss):	35-70.	
Level G6 – (Gloss):	70-85.	
Level G7 – (High Gloss):	85.	

3.0 EXECUTION

3.1 **INSPECTION OF SURFACES**

.1 Examine surfaces to receive paint finishes for defects which cannot be corrected by procedures specified herein, and which may result in unsatisfactory paint finishes. Report items to the Consultant and the Contractor in writing, prior to commencement of work of this section, or after initial prime coat shows defects in substrate.

.2 The application of subsequent prime and finish coats shall be construed as acceptance of the surfaces, and thereafter this subcontractor shall be fully responsible for satisfactory work as required herein.

3.2 **PREPARATION OF SURFACES**

.1 Refer to the MPI manual Chapter 3 for surface preparations not specified in this section.

.

3.3 **PROTECTION**

.1 Protect all adjacent surfaces from paint and damage resulting from the work of this section and make good any damage caused by failure to provide such protection.

.2 Mask all adjacent finishes and surfaces with masking tape as required. Remove tape promptly after final finish coat has been applied and allowed to dry.

.3 Furnish sufficient drop cloths, shields and protective equipment to prevent spray or dropping from fouling surfaces not being painted or where painting has been completed.

.4 Cotton waste, cloths and material, which may constitute a fire hazard, shall be placed in

closed metal containers and removed daily from the site.

.5 Remove and protect, prior to painting operations, all hardware, accessories, device plates, lighting fixtures, factory finished work, and similar items, or provide ample in-place protection such as masking tape. If removed, these items shall be labelled, stored, cleaned if necessary and re-installed following successful completion of the work in each area. Solvents detrimental to lacquer finishes are not to be used for cleaning these items.

3.4 **APPLICATION**

.1 Apply paints and coatings by currently accepted trade methods.

.2 Painting coats specified are intended to cover surfaces satisfactorily when applied in strict accordance with manufacturer's recommendations. Where proper coverage has not been attained, the Consultant may ask for additional coats as required, at no additional cost.

.3 Apply each coat at the proper consistency. Sand lightly between coats.

.4 Tint primers to same colour range as finish coats.

.5 Do not apply finishes on surfaces that are not sufficiently dry. Each coat of finish should be dry and hard before a following coat is applied unless specified otherwise by the manufacturer.

.6 Tint filler to match wood for clear finishes. Work filler well into wood grain and remove excess prior to setting.

.7 Interior woodwork to receive paint or enamel finish shall be back-primed upon arrival on site with enamel undercoater.

.8 All edges of wood doors shall be primed with undercoater, stain, or varnish, as required by specified finish.

.9 Where spraying of paint is required by surface conditions, mask and seal off areas to be sprayed, and back-roll all coats. Provide ventilation for areas to be sprayed.

.10 Where spray painting is specified, finish (100ft2) 10m2 by spraying a sample of the finish upon the request of the Consultant, using materials specified.

.11 Provide complete coverage and hide. When colour, stain, dirt or undercoats show through final coat of paint, provide additional coats until the paint film is of uniform finish, colour, appearance and coverage, at no additional cost to the Owner.

.12 Allow all coats to dry to manufacturer's recommendations before applying succeeding coats.

.13 Touch up all suction spots or "hot spots" in concrete after the application of the first coat, before applying the second coat.

.14 Surfaces to be stained shall appear uniform in shading with colour variations caused only by the natural wood grain.

.15 Barricade areas where finishing is in progress to prevent traffic or other activities, and otherwise protect work until dry. Post "Wet Paint" signs and remove when no longer required.

.16 Replace at the expense of this section, materials soiled or damaged by finishing materials which cannot be removed.

3.5 PAINTING AND FINISHING OF EXISTING MATERIALS AND SURFACES

.1 Remove, label and store, prior to painting of existing materials and surfaces the following items:
- .1 Door hardware signage and accessories,
- .2 Device plates,
- .3 Lighting fixtures,
- .4 Factory finished work,
- .5 Signage where removable.

.2 Where such items are not removable, provide proper masking and protection prior to commencement of painting.

.3 Clean such items if deemed necessary by the Consultant, before being re-installed following successful completion of the work in each area. Solvents detrimental to lacquer finishes are not to be used for cleaning these items.

.4 All surface contaminants such as wax, oils, grease, dirt, tire marks (horizontal surfaces), etc., must be removed from the surface. Oil and grease can be removed by detergent cleaning, followed by a rinse with clean water; solvent cleaning can be used as an alternative on areas with a concentration of oil or grease. All loose and flaking paint must be removed by hand cleaning, power tool cleaning, or pressure washing.

.5 All blisters must be removed from the surface and the edges feathered. Areas showing mildew growth must be treated. Glossy finishes must be ‘dulled’ by sanding, by a TSP treatment, or by sweep blasting to create an anchor pattern to promote adhesion of the new coating.

.6 Rust stains can be removed with an oxalic acid treatment. If large amounts of efflorescence is present, mechanical removal (e.g. abrasive sweep blasting or power tool grinding) may be required, after which acid etching shall be performed.

.7 After any application of muriatic acid, the surface must be flushed with large amounts of clean water to remove any residue, and then allowed to dry thoroughly. The pH of the surface shall be tested, as specified in 1.2 pH Testing before the application of paint. All bare areas must be spot primed.

3.6 CLEAN-UP

.1 Upon completion of the work, remove all paint and varnish spots from floors, glass and other surfaces. Remove from the premises all rubbish and accumulated materials of

whatever nature, not caused by others, and leave this work in clean, orderly and acceptable conditions.

3.7 PAINTING AND FINISHING SCHEDULE

.1 The following titles and code numbers refer to Chapter 4 of the MPI Manual, unless otherwise indicated for type of coating, grade, named products and their manufacturers.

.1 Concrete Finishing Systems (Low contact areas – Mechanical, Electrical and Storage Rooms)
- .1 Concrete Horizontal Surfaces; Premium Grade Finish.
  - .1 INT. 3.2F; (SC-1) Concrete Floor Sealer, Gloss/Sheen – G3.
  - .2 Epoxy Concrete Floor Sealer (SC-2; Garbage & Shipping/Receiving) to Section 09 96 56.13.

.2 Masonry Finishing Systems
- .1 Concrete Masonry Units; Premium Grade Finish.
  - .1 Epoxy; Latex (over latex block filler), Gloss/Sheen - G3.

.3 Metal Finishing Systems
- .1 Structural Steel; Premium Grade Finish.
  - .1 INT. 5.1C; W.B. Dry Fall (over Q.D. shop primer), Gloss/Sheen – G1.
- .2 Metal Fabrications; Premium Grade Finish.
  - .1 INT. 5.1E; Alkyd (over Q.D. metal primer), Gloss/Sheen – G5.
  - .2 Galvanized Metals (not chromate passivated) – High Contact (Doors frames, railings balustrades, etc.) Premium Grade Finish.
    - .1 INT. 5.3C; Alkyd (over cementitious primer), Gloss/Sheen – G5.
- .3 Galvanized Metals (not chromate passivated) – Low Contact (overhead decking, pipes, conduit, ductwork etc.) Budget Grade Finish.
  - .1 INT. 5.3H; W.B. Dry Fall (Low Contact), Gloss/Sheen – G2.

.4 Wood Finishing Systems
- .1 Painted Wood (miscellaneous wood items); Premium Grade (3-coat) Finish.
  - .1 INT. 6.4A; Latex finish, satin.
- .2 Clear Finish Wood (miscellaneous wood items); Premium Grade (3-coat) Finish.
  - .1 INT. 6.4J; Clear Polyurethane (single component) finish, satin.

.5 Plaster & Gypsum Board Finishing Systems
- .1 Gypsum Board; Premium Grade Finish.
  - .1 Epoxy; Latex (over latex primer sealer), Gloss/Sheen – G2.

END OF SECTION

PART 1 - GENERAL

1.1 **General Requirements** .1 Comply with requirements of Division 1.

1.2 **Qualifications** .1 The following manufacturers are acceptable:

.1 Architectural School Products - Mississauga
.2 CVET1 Products Ltd.
.3 Martack Specialties Ltd.
.4 Forbo
.5 Global School Products

1.3 **Guarantee** .1 Provide the following guarantee in accordance with the General Conditions, notwithstanding the time provisions therein to replace whiteboards showing any manufacturing defects which impair proper use of board.

Ten years material and labour.

1.4 **Submittals** .1 Shop Drawings

.1 Provide shop drawings in accordance with the General Conditions. Show dimensional layouts together with fabrication and installation details based on site conditions.

.2 Samples

.1 Submit samples to the Consultant, if requested, for perusal and approval of all materials to be utilized in this installation.

1.5 **Inspecting** .1 Inspect all surfaces for irregularities, trueness, and rigidity and projections and notify the General Contractor for correction.

.2 On completion of the installation all materials and workmanship to be inspected for proper operation, rigidity and appearance, and any defective materials to be replaced with the materials prior to final inspection.

1.6 **Product Delivery & Storage** .1 Deliver whiteboards and tackboards to site in properly packed crates. Store material in dry area within building held off floor on 50 mm x 100 mm blocking.

1.7 **Protection** .1 During installation utmost care is to be taken by workmen to ensure the protection of the work from damage by other trades until the building is ready for occupation and handed over to the owner.

.2 Protection of all materials during the painting operation shall be carried out by the use of polyethylene covering which shall be the responsibility of the painting contractor.

PART 2 - PRODUCTS

2.1 **Whiteboard** .1 12.7 mm thick porcelain enamelled board with minimum 0.75 mm thick steel writing surface laminated to 11 mm impregnated fibreboard core and 0.48 mm thick stretcher levelled zinc coated steel back sheet.

.2 Porcelain enamel finish shall meet requirements of the Porcelain Enamel Institute Standard S104. Acceptable finish: Duracite.

2.2 **Tackboards** .1 6 mm thick natural cork, fine grain, factory laminated to 6 mm thick particleboard, to maximum size of 1.22 x 2.44 m. Tackboards to meet all requirements of O.B.C. for flame spread ratings.

2.3 **Trim** .1 Whiteboard and Tackboards:

.1 Material: Extruded aluminum sections, 6063-T5 alloy.

.2 Design: Series 200 by Architectural School Products (A.S.P.).

.3 Perimeter trim: A.S.P. #207 and #207 divider

.4 Maprail above each whiteboard and tackboard: Kwickgrip display rail.

.5 Rail below each whiteboard: A.S.P. #212.

2.4 **Finishes** .1 Whiteboards: White.

.2 Trim: Clear etched and anodized.

2.5 **Fabrication** .1 Pre-assemble, as far as possible, whiteboards and tackboards in factory.

.2 Trim joints shall be hairline type, neat and tight, mitre corners.

.3 Affix a label to upper right-hand corner of each whiteboard unit, stating manufacturer's recommended care and maintenance instructions.

PART 3 - EXECUTION

3.1 **Installation** .1 Erection of materials to be carried out by competent craftsmen supervised by a foreman with at least two years experience in this specialized field.

.2 Overhead work such as ceiling girds, plumbing, electrical services, communications systems, painting, etc., to be in an advanced stage of completion in order not to impede this sub-contractor. Millwork units forming integral part of the whiteboard/tackboard installation to be located and affixed to the walls before commencing whiteboard/tackboard installation.

.3 Install Whiteboards and tackboards in accordance with manufacturer's printed instructions.

.4 Install whiteboards and tackboards plumb, square, in true plane and fasten securely to substrate.

.5 All fastenings shall be concealed.

. .6 Ensure that where boards are joined the joint is uniform, neat and tight, and the boards are properly aligned.

		.7	Field measure masonry recess for gymnasium whiteboard. Custom fit to allow a maximum of 12 mm space between trim and block.
3.1	**Installation (Cont'd)**	.8	Tackboards to be adhered to wall surface by the use of an adhesive as recommended by the supplier applied in egg-size blobs at approximately 200 mm centres. Tackboards to be pressed firmly into this adhesive to ensure proper adhesion.
		.9	Whiteboards to be joined together by the use of a 14-gauge x 25.4 mm wide steel spline and an extruded polyvinyl slotted insert to ensure a flush butt joint with a hairline appearance.
		.10	All writing boards are to be whiteboards.
3.2	**Cleaning**	.1	Upon completion of all work clean down, remove all stains, loose dirt and excessive adhesive, and leave all elements in a first-class condition at the point of handing over to the owner.

End of Section

PART 1 - GENERAL

1.1 **General Requirements** .1 Comply with requirements of Division 1.

1.2 **Related Sections**
.1 Concrete bases: Section 03300
.2 Wood grounds & blocking: Section 06100

1.3 **Qualifications**
.1 Installation of lockers shall be by locker manufacturer.

.2 This Specification is based on "Emperor" lockers manufactured by Hadrian Manufacturing Inc. The following Manufacturers will also be acceptable provided they conform with requirements specified herein:

.1 "Shanahan" Deluxe 16 distributed by W.G. Wood Sales Ltd.
.2 “Elite” by General Storage Systems (GSS)

1.4 **Submittals**
.1 Shop Drawings

.1 Submit detailed shop drawings showing locker layout, sizes, thicknesses of materials, construction, trim pieces, finishes, numbering and installation details.

.2 Samples

.1 Submit duplicate sets of manufacturer's standard colour samples.

PART 2 - PRODUCTS

2.1 **Locker Materials**
.1 Sheet steel: cold rolled, stretcher levelled, plain commercial galvanized or wipe coated conforming to ASTM A526.

.2 Baked enamel: synthetic type, providing good flexibility, adhesion, hardness and resistance to marring.

.3 Frames: 16 ga steel welded box section.

.4 Doors: 16 ga. outer panel, and 24 ga steel inner panel welded together to form a rigid box construction. Doors shall be flush, proud doors will not be accepted. Doors shall have honeycomb core bonded to inner surfaces. Lighter gauge doors will not be acceptable.

.5 Body: 24 ga steel, formed edges to provide rigid assembly.

.6 Metal Hasp: Single point locking shall be by means of a padlock and 11 ga metal hasp (Padlock N.I.C.), which fit into a recessed steel chrome plated pocket. Plastic or vinyl hasps will not be accepted.

.7 Shelf and bottom: 22 ga steel.

.8 Sloped Tops: 16 ga. steel.

.9 Base: Individual galvanneal box base

2.2 **Existing Relocated Lockers**

.1 Remove and relocate/reinstall existing lockers as shown on drawings.

.2 Reinstall lockers in same manner as for new lockers. Any damage to the locker bodies and locker finish resulting from the work of this section is to be repaired to match existing.

.3 Exterior trim

.1 Provide new continuous trim around all edges of complete relocated locker banks. Colour of trim to match existing.

.2 Provide filler panels where obstructions or if the width does not permit the use of a standard locker. Colour of filler panels to match existing.

.3 Grind all welds smooth, hem all exposed or sharp edges of sheet metal.

2.3 **Locker Finish**

.1 Clean and degrease all metal.

.2 Chemically pre-treat galvanized surfaces, apply two coats of enamel and bake on under controlled temperature conditions.

.3 Produce uniform, smooth, lustrous and hard furniture finish.

PART 3 - EXECUTION

3.1 **Installation**

.1 Securely anchor lockers and associated trim to supporting building elements. Use concealed fasteners.

.2 Install locker batteries and trim sections in true alignment, plumb and level.

.3 Rigidly bolt lockers back to back and side to side in banks.

.4 Provide dummy panels where required or where indicated on Drawings.

.5 Recessed lockers shall be trimmed at each battery end and top with recessed trim as detailed.

.6 Install closures, fillers and trim where shown and where required to provide finished appearance. Provide trim, fillers and closures of profile acceptable to Consultant. Install in longest possible lengths.

.7 Upon completion, test doors, and adjust, if required for proper functions. Touch up minor surface scratches. Replace damaged components as directed by the Consultant.

End of Section

PART 1 - GENERAL

1.1 **General Requirements** .1 Comply with requirements of Division 1.

1.2 **Related** .1 Glazing: Section 08800.

1.3 **Guarantee** .1 Provide the following guarantee in accordance with the General Conditions, notwithstanding the time provisions therein, to replace mirrors should defects in silvering occur.

Ten years material and labour

1.4 **Submittals** .1 Shop Drawings

.1 Submit detailed shop drawings of each component required.

PART 2 - PRODUCTS

2.1 **Fabrication General** .1 Fabricate work true to dimension, square and plumb.

.2 Thickness of metals shall be adequate for the various conditions and intended uses.

.3 Finished work shall be free from warping, open seams, weld marks, rattles, and other defects. Drilling shall be reamed, and exposed edges finished smooth. There shall be no sharp edges.

.4 Fastenings shall be concealed or theftproof type where possible. Exposed fastenings shall be neatly executed and shall be of the same material and finish as the base metal on which they occur.

.5 Washroom accessories of the same materials, construction and finishes, similar in function, design, appearance and conforming to the standards of those specified, manufactured by the following are considered equal subject to the approval of the Consultant:

.1 Bobrick Washroom Equipment of Canada Ltd.
.2 Bradley Washfountain Co.
.3 Frost Metal Products Ltd.
.4 ASI Group Canada (Watrous)

2.2 **List of Components** .1 Model numbers are for washroom accessories manufactured by ASI Watrous and/or Bobrick Washroom Equipment Ltd. Other manufacturers shall certify that materials meet all requirements of this section and submit samples and detail product drawings for the Consultant's approval.

.2 Keyed (tumbler locks) accessories shall be keyed alike with the exception of coin receiving boxes in vending equipment.

2.2 **List of Components (Cont'd)**

.3 Accessories: The following is a complete list of accessories which may or may not apply to this project. Provide accessories according to Schedule 3.3 within this specification.

.1 Type A - Hand Dryer: By Division 16.

.2 Type B - Paper Towel Dispenser: Supplied by Owner. Installed by this section.

.3 Type E - Soap Tank and Dispenser: Supplied by Owner. Installed by this section.

PART 3 - EXECUTION

3.1 **Installation**

.1 Install components at locations shown on drawings. Where location is not given, install as directed by Consultant. Install all components noted to be supplied by Owner.

.2 Fastenings shall be non-corrosive type.

.3 Provide mounting and anchorage devices to be built in to walls and other construction elements as required to securely anchor components in place.

.4 Securely anchor components in place. Method of fastening shall ensure that components will be capable of withstanding expected loads without movement.

.5 Install framed mirrors with concealed wall hinges and lock in place with theft proof screws.

.6 Insulate accessory surfaces to prevent electrolysis due to contact with dissimilar metal surfaces. Use bituminous paint or other approved means.

.7 Coordinate mounting heights of electrical devices prior to roughing-in.

3.2 **Cleaning & Adjustment**

.1 Upon completion of work or when directed, remove all traces of protective coatings or paper.

.2 Test mechanisms, hinges, locks and latches and where necessary, adjust and lubricate and ensure that accessories are in perfect working order.

.3 Remove all sharp edges.

3.3 **Schedules**

.1 Provide the following accessories in the rooms listed as follows:

.1 **New Tech Design Classroom**

Two Item E –Soap Tank & Dispenser
Two item B - Paper Towel Dispenser

End of Section

1.0 GENERAL

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of the Contract, Supplementary Conditions, and the General Requirements of Division 1, form part of this section, and must be read in conjunction with the requirements of this section. The work of this section shall comply with all requirements of Division 1 – General Requirements.

1.2 SECTION INCLUDES

.1 Provision of all labour, materials, equipment and incidental services necessary to provide window shades as follows:
- .1 Manual rolling sun screen shades
- .2 Manual rolling room darkening shades
- .3 Dual roll shades

1.3 REFERENCES

.1 ASTM E84; Surface Burning Characteristics of Building Materials.
.2 NFPA 701; Standard Methods Of Fire Tests For Flame Propagation Of Textiles And Films.
.3 ASTM E162; Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.

1.4 DESIGN CRITERIA

.1 Fabric for blinds to have flame-spread ratings and degree of flame resistance required by the National Fire Code of Canada.

.1 Flame Spread Rating: less than 25.

1.5 SAMPLES

.1 Submit one representative working sample of each type blind in accordance with Section 01 30 00.
.2 Submit duplicate sample sets of manufacturer's standard fabrics for selection by Consultant.

1.6 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 30 00.
.2 Indicate dimensions in relation to window jambs, operator details, head and sill conditions between adjacent blinds corner conditions anchorage details, hardware and accessories details.

1.7 CLOSEOUT SUBMITTALS

.1 Operations and Maintenance Data
- .1 Submit data for inclusion into Operations and Maintenance manuals in accordance with Section 01 78 00.
- .2 Include methods for maintaining installed products, methods of cleaning fabrics, and methods of adjustment.

1.8 EXTENDED WARRANTY

.1 Submit a manufacturer's warranty certificate in the name of the Owner, warranting the Products specified under this section against defects in material or manufacture for a period of Two (2) years from Date of Substantial Performance.

2.0 PRODUCTS

2.1 **ACCEPTABLE MANUFACTURERS**

.1 Solarfective Products Ltd.
.2 Altex SunProject Inc.
.3 HunterDouglas (Nysan Solar Control).
.4 Sun Glow Window Coverings of Canada Ltd.

2.2 ROLLER SHADES

.1 Manual Sunscreen Roller Shades (WS1): chain-drive, manual sunscreen roller shades, soffit-mounted, 65mm tube size, black anodized aluminum fascia's mounting brackets, bottom bar, and end covers;
  .1 Design: 1 blind/window.
  .2 Sunscreen Fabric: medium weight, flame-retardant sunscreen fabric, colour/pattern as selected by Consultant from manufacturer's standard ranges.
  .3 Shading Fabric:
    .1 South and West exposures (3%).
    .2 North and East exposures (5%).
  .4 Locations: **all new exterior windows except for rooms 8-5 and 8-5A**
  .5 Acceptable Products
    .1 Moduline 105 Lite-Lift by Altex SunProject.
    .2 Teleshade by Solarfective.
    .3 RB-500 by Hunter Douglas.
    .4 V-Series Manual by Sun Glow.

.2 Manual Room Darkening Roller Shades (WS2): chain drive manual room-darkening shades, soffit-mounted, 65mm tube size, black anodized aluminum fascia's, mounting brackets, bottom bar, and end covers.
  .1 Design: 1 blind/window.
  .2 Room Darkening Fabric: Black-out material; fiberglass coated fabric, 12 mils thick, 441g/m2 minimum, washable and colorfast, to ASTM E-84, ASTM E-162, ranges.
  .3 Locations: **all new exterior windows in room 8-5 and 8-5A.**
  .4 Acceptable Products
    .1 Moduline 105 Lite-Lift by Altex SunProject.
    .2 Manual Room Darkening Shades by Solarfective.
    .3 RB-500 by Hunter Douglas.
    .4 V-Series Manual by Sun Glow.

.3 Manual Dual Blind Roller Shades (WS3): chain drive manual dual blind roller shades, soffit-mounted, 65mm tube size, black anodized aluminum fascias, mounting brackets, bottom bar, and end covers;
  .1 Design: 1 blind/window.
  .2 Shading Fabric:

.1 As noted in Schedules

.3 Blackout Fabric:
.1 As noted in Schedules
.4 Locations: as indicated on the drawings.
.5 Basis of Design:
.1 Moduline MDL11-140-LL-LL Lite-Lift Dual, by Altex SunProject.
.2 Manual Dual Teleshade by Solarfective.
.3 Gemini Dual Shade by Sun Glow

2.3 FABRICS

.1 Construction of shade blind includes fabric, external bottom bar, and attachment of the shade blind to the roller tube:

.2 Fabric shade cloths shall be woven of vinyl-coated polyester yarn consisting of single thickness non-raveling vinyl fabric, comprising of 20-25% polyester and 75-80% reinforced vinyl (PVC), and dimensionally stable.

.3 Flame retardance: Fabric shall be certified by independent laboratory to pass the small scale vertical burn requirements test; CAN/ULC-S109-M87 and NFPA 701.

.4 Sunscreen Shadecloth Selections: colours as selected by the Consultant;
.1 Solarfective
.1 5% Shadecloth: Solarshield 500 Series
.2 3% Shadecloth: Solarblock 300 Series
.2 SunProject
.1 5% Shadecloth: SC-3400 Series
.2 3% Shadecloth: SC-2000 Series
.3 Hunter Douglas
.1 5% Shadecloth: Shearweave 5000 Series
.2 3% Shadecloth: Shearweave 4000 Series
.4 Sun Glow
.1 5% Shadecloth: CS-105
.2 3% Shadecloth: CS-103
.5 Elite Window Fashions
.1 5% Shadecloth: Transparent
.2 3% Shadecloth: Translucent.

.5 Room Darkening Shadecloth Selections: colours as selected by the Consultant;
.1 Solarfective: SolarStop Blackout Fabric - 4 Ply (1 ply Woven Fibreglass, 3 ply PVC Film).
.2 SunProject: BO-100 Blackout Fabric.
.3 Hunter Douglas: ShearWeave 7000.
.4 Sun Glow: EZ900 Blackout.
.6 Mounting Type:
.1 Ceiling Mounted: as detailed on the drawings.

.7 Shade Orientation:
.1 Regular-roll, shadecloth to roll at window side of roller.

2.4 SHADE ROLLER TUBE

.1 Rigid roller tubes shall be extruded aluminum with reinforced internal ribs to provide maximum span without tube deflection. Tube sizes will depend on shade size, as recommended by manufacturer.

2.5 TUBE END PLUG

.1 Internal tension idler limiter automatically adjusts and controls the amount of torque being generated for constant smooth operation of the shade system. The limiter must automatically release during down-travel, and automatically engage during up-travel of the shade system.

2.6 DRIVE

.1 Shall consist of a heavy duty commercial grade sprocket. Drive sprocket must contain a planetary gear system for increased performance, speed ratio, smoothness, and balance to the shade system. Must provide for infinite positioning of shade system.

2.7 OPERATING CHAIN (MANUAL SHADES)

.1 Shall be No. 10 qualified heavy-duty stainless-steel bead chain 90 lb load test formed in a continuous loop. With stops at highest and lowest positions to prevent overwinding and unrolling. Provide cable guides for all ground floor shades.

2.8 EXTERIOR HEMBAR

.1 Shall be extruded aluminum with recess to secure fabric without visible seams. End plugs shall be screwed securely on ends showing no exposed aluminum. Design allowing shade to be pulled on the hembar. Finish/colour shall match fascia.

2.9 MOUNTING BRACKETS

.1 Shall be 0.60" galvanized steel snap on brackets for ceiling, wall, or recessed mount in ceiling.

2.10 FASCIA'S

.1 One piece 1.7mm thick aluminum front or bottom fascia's.
.2 Finish: black anodized aluminum

2.11 OPERATION

.1 General
  .1 An internal tension idler limiter automatically adjusts and controls the amount of torque being generated for constant smooth operation of the shade system. The limiter automatically releases during down-travel, and automatically engages during up-travel of the shade system.
  .2 Lifting mechanism must accommodate tension modules for maximum shade performance when necessary. The tension modules must also contain a memory lock for torque retention.
  .3 Noise reduction seals must be used for sound isolation and absorption of the mechanism.
  .4 Drive sprocket must contain a planetary gear system for increased operational performance, speed ratio control, smoothness of lift, and balance to the chain and hade system.

.2 Manual Drive

.1 Shade to be able to move freely when pulled on chain. The unit shall consist of a tension activated lifting mechanism. The lifting mechanism must contain a memory lock which shall maintain pre-tensioning when the shade is removed from the cassette bracket and shall not require re-tensioning when shade is reinserted into the bracket.
The roller mechanism must be reversible for future alterations and maintenance on site.

3.0 EXECUTION

3.1 INSTALLATION

.1 Install bracket mounted blinds in accordance with manufacturer's instructions.

.2 Install blinds square, plumb, true to line with operable parts adjusted for correct function.

.3 Secure head rails with stainless steel screws. Use noncorrosive metal fasteners for installation, concealed in final assembly. Install all bottom panels, fascia’s, and end panels to provide concealed installation.

END OF SECTION

PART 1 : GENERAL

1.01 GENERAL REQUIREMENTS

.1 The specifications of Section 21 05 01 apply to and govern all work of Divisions 21, 22 and 23.

.2 Comply with the Instructions to Bidders, the General Conditions of the Contract Documents and all amendments and supplements thereto, and with Division 1.

.3 Include Harmonized Sales Tax (HST) as outlined in General Conditions and Tendering Instructions.

.4 Whenever the word "Consultant" is indicated in all Sections under Divisions 21, 22 and 23 this to be defined as the "Mechanical Engineer" unless specifically indicated otherwise.

1.02 SCOPE OF SPECIFICATIONS

.1 The listing hereinafter of any article, material, operation or method requires that this Division is to provide each item listed of the quality and subject to the qualifications noted, and this Division is to perform each operation prescribed according to the condition stated, providing therefore, all necessary labour, equipment and incidentals.

1.03 SCOPE OF WORK

.1 Related Work Specified Elsewhere

.1 Electrical Division 26

.2 This Division is to include the supply of all labour, tools, equipment and materials for the installing, testing and putting into proper operation the complete system as herein specified, as shown on the drawings, or as is reasonably inferable from either or both.

.3 Equipment items that are supplied as packaged units under this Division are to include all internal wiring, relays, contactors, switches, transformers, motor starters, controls and ancillaries as required for the intended operation, and to be complete with all necessary terminals suitable for connection to power source, and external devices at a single location.

1.04 INTENT OF SPECIFICATIONS AND DRAWINGS

.1 Any specific item or work omitted from one and which is mentioned or reasonably implied in the other is to be considered as properly and sufficiently specified and must be provided by this Division.

.2 Should any discrepancy or conflict appear between these specifications and the drawings which leave this Division in doubt as to the true meaning and intent of the drawings and specifications, a ruling is to be obtained from the Consultant before submitting the tender. If clarification is not sought prior to the closing of tender, the Consultant's decisions are final, conclusive and binding on this Division.

1.05 REGULATION AND PERMITS

.1 All work to be carried out in accordance with the latest editions of all relevant authorities, codes, or regulations including but not limited to Ontario Building Code (OBC), including Part 7, Plumbing; Canadian Regulations for the Construction and Inspection of Pressure Vessels; Ontario Fire Code (OFC); Ministry of Labour Guidelines; Occupational Health and Safety Act; Ontario Electrical Safety Code; Gas Utilization Code; Canadian Heating, Ventilating and Air Conditioning Code; National Fire Protection Association (NFPA); Canadian Standards Association (CSA); and American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) Standards.

.2 All authorized code inspections required by above mentioned laws, rules and regulations, inclusive of any fees, obtaining of permits, issuance of notices are to be arranged and paid for by this Division.

.3 Furnish all necessary certificates as evidence that work installed complied with aforementioned laws and regulations of all governing authorities, prior to acceptance of the work and before the final certificate of payment is issued.

.4 Any deviations from the plans or specifications requested by an official representing one or any of the authorities having jurisdiction over that portion of the work must be brought to the attention of the Consultant prior to proceeding with the change. Any additional costs incurred for extra work performed without instruction from the Consultant will not be considered.

1.06 EXAMINATION OF SITE AND DOCUMENTS

.1 This Division and related sub-trades, before tendering, are to examine the site and all drawings and specifications of other trades and familiarize himself with local conditions, building construction and finishes affecting the work under this section. No allowances are to be made for any extra expense incurred by him through his failure to do so.

1.07 CONTRACT DRAWINGS

.1 The Contract drawings are not intended to be shop or working drawings and all measurements are to be taken from the Architectural dimensioned drawings or in the field. This Division shall make, without any extra expense or credit to the Owner, any necessary changes or additions to the work to accommodate the Architectural or Structural conditions.

.2 Where shop or working drawings are required, this Division shall provide them and submit them to the Consultant for review.

.3 The Contract drawings show the minimum standard acceptable regardless of any lesser standards set by any codes or regulations having jurisdiction.

.4 The Architectural, Structural and Electrical contract drawings are to be examined to ensure that the work of this Division may be satisfactorily completed.

.5 Notify the Consultant upon discovery of any conditions, which adversely affect the work of this Division. No allowances are to be made after awarding Contract for any expenses incurred through failure to do so.

1.08 STORAGE OF MATERIALS

.1 Proper facilities for storage and protection of material and equipment are to be provided at the job site by this Division.

.2 All pipe to be used on the job to be carefully stacked off the floor with ends capped or suitably plugged to prevent the entry of dirt, etc. until such times as when the piping is being installed. Similarly all openings in pressure vessels, tanks, etc., to be kept closed until ready for use. Any piping not suitably protected to be removed from the site and replaced with new.

.3 Equipment located on site, must also be suitably protected to prevent damage from abuse or misuse. Equipment and/or materials damaged after delivery to site is to be replaced or repaired to the satisfaction of the Consultant.

.4 Make known, any hazardous or flammable materials to be used and method of application before using. This Division shall be responsible for proper storage and all necessary safety requirements in the storage and use of all hazardous and flammable materials used in the execution of their work.

1.09 CO-OPERATION OF TRADES

.1 Read specifications and drawings of other trades and conform with their requirements before proceeding with any work specified in Divisions 21, 22 and 23, related to the other trades.

.2 Co-operate with all other trades on the job, so that all equipment can be satisfactorily installed, and so that no delay is caused to any other trade.

.3 Any reworking of installed equipment, piping or ducting to accommodate the installation of other trades work shall be performed at no extra cost.

1.10 CO-OPERATION OF TRADES – LIFE SAFETY AND FIRE PROTECTION SYSTEMS

.1 All life safety systems and fire protection systems and their components shall be verified to ensure that they are functioning according to the intent of their design.

.2 The life safety systems and fire protection systems and their components shall include but not be limited to; fire alarm systems, sprinkler system, standpipe systems, smoke control, ventilation, pressurization, door hold-open devices, elevator recalls, smoke and fire shutters and dampers, emergency power, emergency lighting, etc.

.3 Where life safety and fire protection systems are installed, the commissioning of these integrated systems shall also be performed as a whole to ensure proper operation and inter-relationship between the systems. The commissioning of these integrated systems as a whole shall be the responsibility of Division 26.

.4 Each trade shall carry out their work with care and shall cooperate with Division 26.

1.11 WARRANTY

.1 This Division to warranty products and execution of work under this Division against defects of material and workmanship for one full year after date of Substantial Performance.

.2 Repair defects that are discovered or develop during this period and make good any resulting damage to equipment or building. Repairs to be carried out at no cost to Owner.

.3 Provide extended warranties where indicated in other sections of this Division. Extended warranties to commence on termination of the standard one year warranty and to be an extension of these same provisions.

1.12 CHANGES IN THE WORK

.1 Submit prices for additional work, or work to be deleted, requested by the Consultants with a complete breakdown as follows:

.1 Quantities of all items of equipment and material and unit costs.
.2 Total net cost of material.
.3 Total man hours.
.4 Total labour cost.
.5 Overhead and profit as specified in the Supplementary General Conditions.
.6 All applicable taxes.
.7 Changes to scheduled completion.

1.13 LOCAL UTILITIES

.1 The Contractor before tendering to contact all utilities to determine the local procedures and policies concerning services, and portions of that service which would be supplied or available through the utilities and incur any cost. The Contractor to ensure no delays in construction or service connections.

1.14 EXISTING SERVICES

.1 Where work involves breaking into or connecting existing services, carry out work at times directed by governing authorities, with minimum of disturbance to the premises and its operation.

.2 Before commencing work, establish location and extent of service lines in area of work and notify Consultant of finding.

.3 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

.4 Remove abandoned service lines. Cap or otherwise seal lines at cut-off points, in manner approved by authorities having jurisdiction over service.

.5 Record locations of maintained, re-routed and abandoned service lines. The sub-contractors concerned shall provide this Division with all necessary dimensions required to accurately locate those services.

.6 Where the location of any of these utilities has been shown on the plans, such information is not guaranteed. It is the responsibility of this Division to verify locations, elevations, etc., immediately after they move on the site. If for any reason the information obtained necessitates changes in procedures or design, they must advise the Consultant at once. If this verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Division's.

.7 Where it is necessary to temporarily shut down equipment or services serving essential areas, this Division shall include premium costs to ensure the work force is scheduled for "round the clock" operation in order to minimize disruption and equipment downtime.

PART 2 : PRODUCTS

2.01 MATERIALS

.1 Materials and equipment are specifically named and described in this specification to establish a standard that this Division is to adhere to.

.2 The terms "**approved alternate**", "**alternate manufacturer**" are used to indicate a product or manufacturer which, in the Consultant's opinion, meets the basic performance and quality of the specified product or manufacturer, subject to all the requirements so specified being met. Dimensions, weights, electrical requirements, etc., are not always equal to the specified item. Except where a product or manufacturer is "**base bid**" when an approved alternate product(s) or manufacturer(s) is named, this Division may provide and install the alternate but must be prepared to bear any and all costs incurred by its use.

.3 The term "**base bid**" indicates a product or manufacturer the tender amount must be based on. This Division may list on the tender form an "alternative product or manufacturer" with cost savings (if any) and the Owner shall have the option of accepting or rejecting the alternative.

.4 Whenever an alternate product is not listed in the specifications and is proposed for approval prior to tender close, this Division to guarantee that such proposed alternates are not to adversely affect the space requirements allocated on the drawings for the material, item, plant or equipment specified. This Division agrees to bear any additional expense incurred by the Owner, the General Contractor and other Divisions due to the use of proposed alternates, particularly in connection with any required changes in the work and any additional material and installation costs by any other part of the project. When proposing an alternative product, this Division to make the Consultants aware of any structural, architectural, mechanical or electrical design changes necessary to accommodate the alternative product.

.5 Equipment manufacturers and sub-contractors submitting alternates for this contract, upon written request of the Consultant, are to qualify themselves to have the experience in the successful manufacturer and/or installation of the type of work and quality of materials specified and shown.

.6 Requests for approval to be accompanied with complete specifications for the equipment, showing dimensions, ratings, etc. Approval or rejection of an alternate shall be issued in writing to the applicant.

.7 Any equipment installed without the Consultant's written approval, is to be removed and the correct equipment installed at this Division's expense. No consideration is to be allowed for claims of delay of schedule in this case.

.8 In the event the approved alternate equipment is not available for any reason, the specified equipment is to be installed, any and all costs incurred are the responsibility of this Division.

.9 The Consultant reserves the right to accept or reject an alternative without explanation.

2.02 ACCESS DOORS

.1 The Contractor to supply access doors of adequate size and with appropriate clearances, wherever any equipment, cleanouts, valves, dampers, fire dampers, etc., which require service, maintenance or removal and are built in or concealed behind walls, or ceiling. Doors to be installed by the General Contractor. Coloured thumb tacks are to be used in acoustic tile ceilings.

.2 Access doors to be 14 U.S.S. gauge steel with concealed hinges, anchor straps, screwdriver operated lock, rounded safety corners and dust tight doors that open 180 deg. Doors are to be adequately sized to suit equipment which is to be accessed, but in no case smaller than 8" x 8" (200mm x 200mm).

.3 In acoustic tile ceiling, where access cannot be achieved through tile, install access doors to suit tile. Markers are to be approved colour-coded markers to indicate type of valve or equipment concealed.

.4 Where access doors are to be installed in a fire rated assembly, the access door must have a fire rating equal to or greater than the assembly fire rating. Fire rated access doors to be ULC rated and in accordance with NFPA-80.

.5 Acceptable manufacturers: Acudor, Le Hage, Mi-Fab.

2.03 SUPPORTS

.1 This Division shall furnish and install all special structural work required for the installation of mechanical equipment and motors, etc. All details to meet the approval of the Consultant and drawings are to be submitted for all major steel supports.

.2 Where on the drawings or specifications special isolation bases are noted, these shall be the responsibility of this Division.

.3 All equipment shall be properly aligned on bases before being bolted down.

.4 All floor mounted equipment to be set at least 4" (100mm) above the floor on concrete bases, and anchored securely with anchor bolts unless indicated otherwise. Installation of bases and all associated work to be by Division 3, identified accurately by this Division as to location and dimensions.

2.04 ELECTRIC MOTORS AND WIRING

.1 Refer to drawing schedules for voltage requirements of all motors.

.2 All starters and line voltage wiring shall be supplied by Division 26 unless specified otherwise.

.3 All motors required for this Contract shall be supplied by this Division.

.4 All fractional horsepower motors to have internal overload protection.

.5 Supply electrical disconnect switches where indicated in schedules.

.6 Provide motors of adequate size and type for intended service. Unless stated otherwise, all motors 1 HP (746W) and above to be high efficiency conforming to ASHRAE Standard 90.1 Table 5-1 latest supplement. Unless stated otherwise, use ambient temperature of 104^{o}F (40^{o}C).

2.05 SPECIAL TOOLS AND SPARE PARTS

.1 Furnish spare parts as follows:

.1 One set of V-belts for each piece of machinery (matched for multiple belt drives).
.2 One set of filters for each filter bank, to be installed after substantial completion and prior to balancing.

.2 Identify spare parts containers as to contents and replacement parts number.

.3 Provide one set of special tools where required to service equipment as recommended by manufacturers.

.4 Furnish one grease gun and adaptors to suit different types of grease and fittings.

.5 Provide list of spare parts provided in operating and maintenance instructions.

PART 3 : EXECUTION

3.01 INSTALLATION

.1 Each piece of equipment or material to be checked against the specification and reviewed shop drawing before installation, all clearances and installation instructions are to be strictly adhered to. Failure to comply with the instructions shall result in removal and proper reinstallation of the equipment at no cost to the Owner.

.2 Where mechanical equipment is installed in a fire rated assembly provide fire dampers, drywall enclosure or other as required to maintain the assembly fire rating to the approval of this Division. Include all costs.

3.02 SLEEVES, HOLES AND PATCHING

.1 All cutting and patching to be as specified under the General Conditions and Supplementary Conditions bearing in mind that the integrity of the fire separations are to be maintained at all times.

.2 All holes, pipe chases, etc., through walls and floors that are not fire separation are to be large enough to accommodate the thickness of insulation specified.

.3 All cutting and patching, sleeves, grouting, painting and drywall required by this Division is to be performed by fully qualified craftsmen of that respective trade. All cutting and patching required by this Division to be provided by this Division, unless indicated otherwise.

.4 All holes, pipe chases etc, through walls and floors that are fire separations are to be 1/2" (13mm) larger in diameter than the pipe and the void will be properly firestopped as specified.

.5 Holes through masonry walls are to be sleeved with schedule 40 steel pipe, all other holes to be sleeved with light gauge metal sleeves, unless indicated otherwise.

.6 Holes through exterior walls and roof are to be properly flashed and made weatherproof.

.7 Sleeves for uninsulated pipes are to be sized to allow 1/2" (13mm) clearance between the pipe and the sleeve. The space between the pipe and sleeve to be sealed with rockwool insulation to avoid smoke, sound and dust transmission and firestopped.

.8 Pipes are not to be in direct contact with plaster, concrete or any other finishing material.

.9 Ensure no contact between copper tube or pipe and ferrous sleeve.

.10 This Division to provide detailed dimensioned drawings prior to pouring floors, erecting masonry, or installing roof deck. Drawings to indicate size and location of all openings to ensure correct bridging installed as indicated under Division 5.

.11 This Division is responsible to install sleeves for piping and ducts and frames for openings for grilles, louvres etc., as the construction progresses. If these sleeves and frames are not installed by This Division during construction the cost of cutting openings, chases and installing the sleeves and frames is to be at This Division's expense by the respective trade involved.

.12 Provide sleeves for all ducting penetrating floors and masonry or concrete walls

.13 Ducts penetrating fire separations to have any voids between the duct sleeve and fire separation properly firestopped as specified. Ducts penetrating non fire separations to have any voids between the duct sleeve and separation filled with rockwool insulation to avoid smoke, sound and dust transmission.

.14 Approval of the location, size and proposed method of cutting through structural components must be received before proceeding.

3.03 WORKMANSHIP

.1 Employ an experienced, responsible tradesperson to supervise the work and retain this supervisor on the job throughout the construction period until completion of work, and all mechanical systems are fully operational and have been commissioned and demonstrated to the Owners unless otherwise approved or directed by the Consultant.

.2 Employ only skilled licensed pipe fitters, etc. for execution of work. Workmanship to be first class not only as regards durability, efficiency and safety, but also as regards to neatness of detail.

.3 Set equipment accurately, plumb and level and align hanger rods and steel supporting structures.

.4 Products and installations in the opinion of the Consultant found to be defective; not in accordance with specifications; damaged or defaced; or of poor workmanship to be rejected.

.5 Rejected work is to be repaired or replaced at no cost to the Owner.

3.04 USE OF FANS

.1 While construction is still in progress the use of or running of system ventilation fans for the purposes of ventilation, drying of plaster, etc., will not be permitted.

3.05 BELT DRIVES, SHEAVES AND GUARDS

.1 Provide all belt driven equipment with V-belt drive, designed for at least 150 percent of motor nameplate horsepower rating and in accordance with manufacturer's recommendations for type of service intended. Belt drives to be at least 95 percent efficient. Balance and properly align all drives. Provide matched sets of belts for multiple belt assemblies. Select belts to suit starting torque of driver. Use single belt drives only for motors 2 hp (1492 watt) and smaller.

.2 Provide motor sheaves for one and two belt drives of variable pitch type, with Dodge key adjustments. Supply one set of fixed drive sheaves for drives with two or more belts. Install fixed motor sheaves to obtain the originally specified rpm. After initial test and preliminary adjustment, supply and install a second set of fixed sheaves if necessary, to provide the design flow quantities as established on the job. Obtain correct total flow rate for fans through speed changes and not by throttling.

.3 All equipment that is belt driven must be a complete installation including a sturdy, firmly supported, removable belt guard to give full protection and safety from any rotating part.

3.06 PIPING

.1 All piping for this Division is to be run concealed where possible and grouped so that valves, etc., are accessible through as few access panels or doors as possible, while still maintaining adequate working space.

.2 Piping that does not present a neat workmanlike appearance, in the opinion of the Consultant, is to be reworked according to his instructions without extra cost to the Owner. Arrange piping within pipe chases that have been designed for access of personnel to ensure that access is not impeded.

.3 In specifically designated unfinished areas such as mechanical rooms or existing areas, run pipes neatly parallel or in banks and group valves. Piping may run exposed in these designated areas. The crossing over of pipes must be kept to a minimum.

.4 The piping shown on the drawings is located diagrammatically in the space in which it is intended to run. Co-operate and co-ordinate with the work of other Divisions, also installing pipes, conduits, ducts, etc., within the same area. No extras are to be paid for any relocation of piping to suit the work of other Divisions.

.5 Separation by approved dielectric unions is to be applied to all ferrous and non-ferrous domestic water piping. Separation of ferrous and non-ferrous piping on closed loop systems to be accomplished with the use of brass or bronze fittings and/or valves. All connecting or touching metals that could give rise to electrolytic action to be separated by insulation.

.6 All piping is to be installed with adequate change of direction, expansion joints and anchors, so that the piping and equipment will in no way be strained or distorted by expansion and contraction.

.7 If on the job circumstances require additional change of direction and expansion loops, furnish and install same at no extra cost.

.8 All take-offs from the mains shall be made using swing joints wherever possible.

.9 Hydronic branches serving down feed risers are to be taken from lower sides or bottom of mains and grade down slightly to risers. Branches which serve units above the mains are to be taken from the top or sides of mains.

.10 Anchors are to be provided where necessary to protect equipment and to generally be made from 1/2" (13mm) M.S. plate with structural steel angle and channel sections.

.11 Suitable anchors and guides are to be provided where shown or where necessary for all vibration devices.

.12 Expansion loops are to be located midway between anchors except where shown otherwise. All expansion loops to be cold sprung 50% in accordance with the latest edition of the ASHRAE Guide.

.13 Install all water piping so that lines can be drained. Provide drip tee with 3/4" (19mm) ball valve with cap and chain.

.14 All exposed plumbing piping in finished area to be chrome plated unless indicated otherwise.

3.07 IDENTIFICATION OF PIPING

.1 Identify all visible piping whether fully exposed or in accessible spaces such as above acoustic tile ceilings.

.2 Identify all concealed piping mains in concealed areas such as drywall ceilings and pipe trenches etc. prior to these areas being enclosed.

.3 Identify the medium in the piping with Brimar System #1 or Smillie McAdams Summerlin Ltd. wrap-around pipe markers (or equal) including direction-of-flow arrows.

Medium In Pipe	Background Colour	Lettering Colour
Cold Condensate	Green	White
Domestic Cold Water	Green	White
Domestic Hot Water	Yellow	Black
Domestic Hot Water Return	Yellow	Black
Tempered Water	Yellow	Black
Sanitary Drain	Green	White
Plumbing Vent	Green	White
Natural Gas	Yellow	Black
Compressed Air	Yellow	Black
Heating Water Supply	Yellow	Black
Heating Water Return	Yellow	Black

.4 All piping identification to be done on clean surfaces.

.5 Size all wrap-around labels for the pipe being labelled.

.6 Location:

.1 Locate markers and classifying colour on piping systems so they can be seen from floor or platform.

.2 Identify piping runs at least once in each room. **Note:** in mechanical rooms and where there is a lot of different medium of piping, equipment etc., obstructed views, provide addition piping labels to allow easy tracking of the piping routing throughout the space

.3 Do not exceed 30 ft. (10 m) between identifications in open areas and above T bar ceilings.

.4 Identify both sides where piping penetrates walls, partitions and floors.

.5 Where piping is concealed in pipe chase or other confined space, identify at point of entry and leaving, and at each access opening.

.6 Identify piping at starting and ending points of runs and at each piece of equipment.

.7 Identify piping at major manual and automatic valves immediately upstream of valves. Where this is not possible, place identification as close to valve as possible.

.8 Identify branch, equipment or building served after such valve.

.9 Identify piping in concealed spaces prior to spaces being enclosed.

3.08 VALVE TAGS

.1 All valves installed under this Division to have securely affixed to them an approved valve tag bearing an engraved number which shall be used to identify the valve on an indexed valve list prepared and mounted in a glazed frame in the mechanical or boiler room.

.2 Beside each number on the list of valves to be listed, identify the function normal position, and location of valve so tagged.

.3 Valve tags shall be either engraved lamacoid or plastic valve tags (Brimar B11101-39) with ¼" tall lettering of a colour to contrast with the label colour.

.4 Valve tags shall be colour coded as follows:

System	Tag Colour	Lettering Colour
Domestic piping systems	Green	White

Heating water piping systems	Yellow	Black
Gas	Yellow	Black
Compressed Air piping systems	Black	White

3.09 IDENTIFICATION OF DUCTWORK

.1 Stencil over final finish only.

.2 Use 2" (50mm) high black stencilled letters, eg. "Supply", "Return", "Toilet Exhaust", General Exhaust" with directional flow arrows.

.3 Maintain 30' (10m) maximum distance between markings with at least one identification per run.

.4 Identify ducts each side of dividing walls or partitions and beside each access door.

3.10 IDENTIFICATION OF EQUIPMENT

.1 Provide laminated plastic plates with black face and white centre of minimum size 3 1/2" x 1 1/2" x 1/16" (90 x 38 x 2 mm) nominal thickness, engraved with 1/4" (6mm) high lettering. Use 1" (25mm) lettering for major equipment.

.2 Include Electrical circuit designation on the label.

.3 Mechanically fasten nameplates securely in conspicuous place. Where nameplates cannot be mounted on cool surface, provide standoffs or hang from equipment on short metal chain.

.4 Identify equipment type, number and service or areas or zone of building served.

.5 Submit the wording for the labels for approval prior to engraving and installation

3.11 PAINTING

.1 All field priming and finishing to be performed by Division 9.

.2 Provide field surface preparation, priming and finishing of the work of this Division including exposed bare (or insulated) pipework, fittings, ductwork, miscellaneous metals, supports, and equipment, in accordance with Division 9.

3.12 PLACING IN OPERATION

.1 Prior to acceptance and on completion of work make a complete operational test of systems and work carried out under Division 21, 22, 23.

.2 At all fixtures, adjustments for correct water flow to be made, this is to include hot and cold water systems and flush valves.

.3 At all drains, covers and gratings are to be removed and cleaned, traps cleaned out and drains thoroughly flushed.

.4 All strainers are to be cleaned out after two weeks normal operation.

.5 All filters in fan cabinets are to be removed, thoroughly cleaned and stored for future use, install new filters in units. Bird and insect screens on all louvres to be cleaned. All coils to be combed out where necessary and vacuumed out.

.6 Balancing will be carried out and systems set to designed values, and a report of final actual performance of all equipment and balancing for final space conditions on cooling and heating to be carried out when relative climatic conditions exist. Refer to Section 23 05 93 for more details.

3.13 CLEAN-UP

.1 Avoid accumulation of scrap and debris resulting from the operations of this Division and at all times help maintain the working site in a neat and clean condition. On completion of the contract, remove all scrap and debris resulting from the work of this Division and clean all equipment installed by this Division.

3.14 START-UP SERVICE

.1 Provide services of a qualified technician responsible for assisting the Owner's staff in becoming familiar with operating of systems, co-ordinating work of control manufacturer, acting on any complaints from the Owners, or Consultant regarding operation of any of the systems, installed under this Division.

.2 Provide start-up of major pieces of mechanical equipment or systems, by representative of equipment manufacturer or person qualified and recognized by the equipment manufacturer.

.3 Submit start-up reports on all mechanical equipment and systems verifying correct installation and operating parameters in all modes of operation. Include service reports in operating and maintenance manuals

.4 Notify Consultant prior to start-up on any piece of mechanical equipment or system. Demonstrate operation of all or any mechanical system or equipment as directed by the Consultant in his presence.

3.15 TESTING

.1 Notification of Tests: Consultant must be given at least 48 hours notice of date and time of which any and all tests are to be carried out. Under no circumstances must a test be assumed conclusive unless it has been witnessed by the Consultant or his designated representative.

.2 Test all piping systems for leaks, providing gauges, materials and labour as required. Equipment furnished as part of the permanent installation shall not be used for testing

purposes. Before testing, remove all equipment which is not designed to withstand the test pressures. All piping is to be tested before covering is applied.

.3 Before final payment, test the operation of each system and all equipment installed, make all necessary adjustments and replacements and demonstrate to the satisfaction of the Consultant, that all equipment is operating as intended and without undue noise and vibration.

END OF SECTION

PART 1 : GENERAL

1.01 REQUIREMENTS INCLUDED

.1 Conform to the General Provisions of Section 21 05 01.

1.02 RELATED WORK SPECIFIED ELSEWHERE

.1	Thermal and Moisture Protection	Division 07
.2	Basic Materials and Methods	Section 23 05 01

1.03 QUALITY ASSURANCE

.1 Conform to the 2012 Ontario Building Code (OBC) Compendium containing the Building Code Act, and including all amendments.

.2 Conform to CAN/ULC-S115-11 "Standard Method of Fire Tests of Firestop Systems".

1.04 SUBMITTALS

.1 Submit shop drawings in accordance with Section 23 01 00, paragraph 1.04 for the following items:

.1 Firestopping materials.
.2 Manufacturers literature and installation instructions.
.3 Manufacturers Letter of Certification that project meets or exceeds specified requirements.

PART 2 : PRODUCTS

2.01 FIRE STOP MATERIAL FOR SERVICE PENETRATIONS

.1 Provide materials and systems capable of maintaining effective barrier against flame, smoke and gases.

.2 Comply with the requirements of CAN/ULC-S115-11, and do not exceed opening sized for which they have been tested.

.3 Systems to have an F rating not less than the fire protection rating required for closures in a fire separation.

.4 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens and volatile solvents.

.5 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

.6 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes.

.7 Acceptable Manufacturers:

.1 Hilti
.2 AD Fire Protection Systems
.3 3M Fire Protection Systems
.4 Rectorseal Corporation (Metacaulk)

PART 3 : EXECUTION

3.01 INSTALLATION

.1 Confirm location and extent of fire separations from architectural drawings.

.2 Inspect surface to be firestopped. Report unsatisfactory conditions to Consultant in writing prior to commencement. Initiation of work to be deemed as acceptance of conditions and surfaces.

.3 Store all materials in accordance with manufacturers recommendations as to acceptable ambient temperatures. Damaged or deteriorated materials are not to be used and are to be removed from the site.

.4 Install firestopping and smoke seal material and components in accordance with ULC listing and manufacturers instructions in all piping, tubing, chimney and duct etc. penetrations in new or existing fire separation to provide temperature, flame and smoke rated seals not less than the fire resistance rating of the assembly, or separation.

.5 Seal all holes made by through-penetrations and unpenetrated openings to ensure continuity and integrating of fire separation, including where existing component or device has been removed.

.6 Notify Consultant and/or Authority having jurisdiction for inspection prior to concealing or enclosing fire stopping materials and service penetrations.

.7 Remove excess material and debris and clean adjacent surfaces immediately after application. Leave in a tidy condition.

END OF SECTION

PART 1 : GENERAL

1.01 GENERAL PROVISIONS

.1 Conform to the General Provisions of Section 21 05 01.

.2 Provide work under this Section as shown or specified and in accordance with the requirements of the Contract documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

.1	Plumbing Insulation	Section 22 07 00
.2	Plumbing Piping	Section 22 10 00
.3	Plumbing Fixtures and Trim	Section 22 40 00

1.03 QUALITY ASSURANCE

.1 Requirements of Regulatory Agencies:

.1 Comply with local bylaws and standards.

.2 Comply with regulations under the Ontario Electrical Safety Code (latest edition).

.3 Conform to the 2012 Ontario Building Code (OBC) Compendium containing the Building Code Act, and including all amendments.

.4 Conform to National Plumbing Code of Canada current edition.

1.04 SUBMITTALS

.1 Submit shop drawings in accordance with paragraph 1.04 Section 23 01 00 for the following equipment items:

.1 Cleanouts
.2 System Emergency Shower and Eye Wash Station

.2 Submit inspection certificates obtained from local inspection authorities.

.3 Submit certificates indicating that all required testing has been completed.

1.05 APPROVAL

.1 Additional manufacturers wishing to bid products other than the product specified herein, are to submit to the Consultant prior to Tender close a list of three past installations of products similar to those listed. Complete catalogue data along with deviations from the product specified are to be noted in the submittal to the Consultant. The manufacturer guarantees the proposed substitute product to comply with the product specified and as detailed on the Drawings, unless the deviations are so noted in the submittal for approval.

PART 2 : PRODUCTS

2.05 CLEANOUTS

.1 All cleanouts to be made with standard TY branch of Y branch.

.2 Cleanouts in finished walls to be concealed with Watts/Ancon, Smith 4420, or Zurn square, secured nickel bronze access covers with frames. Size of frame to suit cleanout and block module.

.3 Cleanouts to be placed where shown, but whether shown or not, there is to be a cleanout at the base of every soil stack Watts/Ancon CO-460(H), Smith 4510, or Zurn. Install cleanout on main building drain just before it leaves the building.

2.02 SHOCK ABSORBERS

.1 Shock absorbers shall be Watts Ancon Shok-Gard series, all stainless steel construction with nesting bellows precharged with air. Acceptable manufacturers: Smith, Zurn.

2.03 EMERGENCY EYE WASH STATION AND TEMPERING MIXING VALVE

.1 Fixture Reference **EW-1** – Barrier Free, Emergency Eye /Face Wash station wall mounted with trap, fixture to include the following standard equipment:

.1 Activation: Stainless Steel push flag to operate ½" (13mm) IPS, stay open chrome plated brass ball valve that is equipped with a stainless steel ball and stem.

.2 Receptor: Stainless Steel bowl with wrap around skirt to conceal plumbing. Extends 19" (483 mm) from wall to comply with current Barrier Free standards.

.3 Head: Twin ABS plastic eye/face wash heads in safety green colour with integral flip top dust covers that protect heads and automatically release with water pressure.

.4 Stream Control: steady water flow under varying pressures assured with dual automatic pressure compensation devices.

.5 Strainer: fully serviceable in-line 50x50 mesh strainer to filter debris from reaching the eyewash.

.6 Mounting: complete with wall bracket.

.7 Signage: ANSI compliant identification sign.

.7 Trap: 1 ½" (38mm) IPS satin chrome plated offset trap.

.8 Manufacturers: Bradley: Model S19-220B
Haws: Model 7360BT
Guardian: Model GBF1781

.2 Fixture Reference **TMV -1** – Thermostatic mixing valve (factory set to 85°F – 29.5°C) for single emergency eye wash. Unit shall include a built-in cold water by-pass, rough bronze finish, lead free, solid bimetal thermostat, locking temperature regulator with limit stop factory set for 90 degrees, integral check stops, and dial thermometer.

1. Performance: Unit shall have a flow range of 0.5-GPM to 5-GPM with a maximum pressure loss of 20-PSI and come with a full 1-year warranty.

2. Manufacturers: Bradley Model EFX-8
Haws: Model 9201E
Guardian Model G3600LF

2.04 DIELECTRIC UNIONS

.1 Provide wherever pipes of dissimilar metals are joined.

.2 Provide insulating unions for pipe sizes 2" (50mm) and under and flanges for pipe sizes 2 1/2" (65mm) and over.

.3 Cast brass adapters may be used where approved by the Consultant.

.4 Provide an isolating separation wherever piping may touch dissimilar metal studs, joists, concrete, etc.

PART 3 : EXECUTION

3.01 PLUMBING SPECIALTIES

.1 Cleanouts:

.1 Cleanouts to be the same size as pipe up to 4" (100 mm) and not less than 4" (100 mm) for larger pipes.

.2 Provide cleanouts at the end of mains and branches, at changes in directions, in long straight runs, at the base of all soil stacks and rainwater leaders and where required by code.

.3 Use extended cleanouts for piping installed below grade and in furred ceiling spaces.

.4 Co-ordinate final cleanout elevation and configuration with floor finishes.

.2 Water Hammer Arrestors:

.1 Provide 24" (610 mm) air chambers fabricated from Type L, copper tubing, with capped end, or water hammer arrestors, at each plumbing fixture or fixture group, and wherever else necessary to prevent water hammer.

.3 Emergency Eye Wash Station and Tempering Valve :

.1 Install Emergency Equipment so as to be easily accessible to potential users of the equipment. Location shall have surrounding area free of machinery, equipment or other obstructions.

.2 The mounting heights of the eye wash bowl shall meet the requirements of ANSI Standard Z358.1-1981 and for Barrier Free access.

.3 Tempering Valve should be installed at a location where it can easily be cleaned, adjusted or repaired. The inlets are clearly marked on the valve body casting. Connect the hot water into the inlet marked "HOT" and cold water into the inlet marked "COLD."

.4 The checkstops furnished must be installed on both supply lines as shown above. Use solder or pipe cement sparingly. Supply pipes should be flushed before the valve is connected. Flush outlet pipe and valve as soon as it is connected.

.5 Connect tempered water supply to equipment. The water line shall be thoroughly flushed before equipment is installed.

.6 The emergency equipment is to be clearly identified. The means of identification shall include:

.1 Installation of a highly visible sign at each unit (sign to be provided by unit manufacturer).

.2 The equipment and/or surrounding area shall be painted in a highly visible colour.

.7 Emergency equipment shall be field tested immediately after installation prior to space being occupied.

END OF SECTION

PART 1 : GENERAL

1.01 GENERAL PROVISIONS

.1 Conform to General Conditions, Supplementary General Conditions and Sections of Division 01, as applicable.

.2 Conform to the General Provisions of Section 21 05 01.

.3 Provide work under this Section as shown or specified and in accordance with the requirements of the Contract documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

.1	Plumbing	Section 22 05 00
.2	Plumbing Piping	Section 22 10 00
.3	Plumbing Fixtures and Trim	Section 22 40 00

1.03 CLARIFICATION

.1 Insulation may extend through fire rated separations when used in conjunction with firestopping material specifically tested for this purpose.

PART 2 : PRODUCTS

2.01 GENERAL

.1 Insulating materials by Johns Manville. Manson Insulation, Knauf Insulation and Owens Corning are considered equal.

.2 For adhesives and mastics for applications noted equal products of the following manufacturers will be accepted: Foster; 3M and Ductmate.

.3 All insulation and covering materials are to be non-combustible, and asbestos free. Vapour barrier jacket, and adhesive to be fire retardant to approved standards of fire hazard classification for building materials. Flame spread rating not to exceed 25 and smoke rating not to exceed 50.

2.02 MATERIALS

.1 Domestic Cold Water:

.1 Piping Insulation – Johns Manville Micro-Lok preformed rigid, glass fibre pipe insulation, complying to ASTM C547 with a white factory applied all service vapour barrier jacket of kraft paper reinforced with a glass fibre yarn and bonded to an aluminium foil, with self-sealing longitudinal closure laps and butt strips. Insulation conductivity shall be in the range of 0.22 - 0.28 BTU in/(h.ft^3.^{o}F) with mean temperature of 100^{o}F.

.2 Exposed Insulation – Finish with Johns Manville Zeston 2000 PVC white 20 mil (0.5 mm) “Cut & Curled” factory-cut jacketing.

.3 Fittings and valves – All fittings, valves, tees, flanges, connections etc. to be insulated with factory pre-cut Johns Manville Hi-Low Temp insulation inserts of a thickness equal to that of the pipe insulation and covered with Johns Manville Zeston 2000 white PVC fitting covers.

.4 Insulation to be of thickness as follows:

Pipe Size	Insulation Thickness
All ϕ pipe	1” (25 mm)

.2 Domestic Hot Water, Domestic Hot Water Recirculation and Tempered Water Piping:

.1 Piping Insulation – Johns Manville Micro-Lok preformed rigid, glass fibre pipe insulation, complying to ASTM C547 with a white factory applied all service vapour barrier jacket of kraft paper reinforced with a glass fiber yarn and bonded to an aluminium foil, with self-sealing longitudinal closure laps and butt strips. Insulation conductivity shall be in the range of 0.22 - 0.28 BTU in/(h.ft^3.^{o}F) with mean temperature of 100^{o}F.

.2 Exposed Insulation – Finish with Johns Manville Zeston 2000 PVC white 20 mil (0.5 mm) “Cut & Curled” factory-cut jacketing.

.3 Fittings and valves – All fittings, valves, tees, flanges, connections etc. to be insulated with factory pre-cut Johns Manville Hi-Low Temp insulation inserts of a thickness equal to that of the pipe insulation and covered with Johns Manville Zeston 2000 white PVC fitting covers.

.4 Insulation to be of thickness as follows:

Pipe Size	Insulation Thickness
1/2" (13 mm) – 1 ¼” (32 mm) ϕ pipe	1” (25 mm)
1 ½” (38 mm) – 4” (100 mm) ϕ pipe	1½” (38 mm)

.3 Cold Condensate Piping:

.1 Piping Insulation – Johns Manville Micro-Lok preformed rigid, glass fibre pipe insulation, complying to ASTM C547 with a white factory applied all service vapour barrier jacket of kraft paper reinforced with a glass fiber yarn and bonded to an aluminium foil, with self-sealing longitudinal closure laps and butt strips. Insulation conductivity shall be in the range of 0.22 - 0.28 BTU in/(h.ft^3.^{o}F) with mean temperature of 100^{o}F.

.2 Exposed Insulation – Finish with Johns Manville Zeston 2000 PVC white 20 mil (0.5 mm) “Cut & Curled” factory-cut jacketing.

.3 Insulation to be of thickness as follows:

Pipe Size	Insulation Thickness
All ϕ pipe	1” (25 mm)

PART 3 : EXECUTION

3.01 GENERAL

.1 Do not apply insulating materials until piping to be insulated has been properly cleaned, dried and tested to the satisfaction of the Consultant.

.2 Apply all insulation, wrapping, vapour barrier, adhesives, coatings, and cement in strict accordance with manufacturer's recommendations.

.3 Do not apply any insulation or finishing when the ambient temperature in the space is less than 50^{o}F (10^{o}C).

3.02 INSTALLATION APPLICATION

.1 Apply all covering in a neat and workmanlike manner to present a clean appearance upon completion of the job.

.2 Apply all insulation in a manner to facilitate replacing and/or servicing of equipment.

.3 Make good and refinish cracks, undulations or any other deficiencies occurring in the insulation or vapour barrier.

.4 On all piping, terminate the insulation neatly around all openings and items requiring periodic access. Insulate separately with removable 16 gauge galvanized sheet steel panels lined with rigid slab insulating materials providing equivalent insulation to that on the adjoining surface.

.5 Provide the following insulation work:

.1 Domestic hot water, domestic hot water recirculation and cold water piping, including water meter, accessories, etc.

.2 All cold condensate, including pumps and accessories etc.

.3 Repair or replace any existing insulation damaged as a result of the work, where new connection to existing systems or where indicated to be re-insulated. Match existing for thickness and finish, unless exposed, then finish to match new.

.6 On all piping having vapour barrier jacket, the adjoining section of insulation is to be butted firmly together and the longitudinal seams of the vapour jacket to be sealed with vapour barrier adhesive. End joints are to be sealed with 4" (100 mm) factory furnished vapour barrier strips.

.7 Apply insulation over clean dry surfaces butting and adjoining sections firmly together and sealing or taping smoothly over joints.

.8 Where the pipe hanger is around the insulation, provide a 6" (152 mm) length at equal thickness of moulded thermo - 12 insulation, protected with a saddle, within the pipe support. Coordinate with Contractor installing hangers.

.9 Extend pipe insulation and covering through sleeves, walls, floors, ceilings, and structural beams, unless indicated otherwise on drawings, or other sections of this specification.

.10 **Note:** All piping exposed in public areas is to be covered with White PVC Jacket.

END OF SECTION

PART 1 : GENERAL

1.01 GENERAL PROVISIONS

.1 Conform to the General Provisions of Section 21 05 01.

1.02 RELATED WORK SPECIFIED ELSEWHERE

.1	Firestopping	Section 21 07 20
.2	Plumbing	Section 22 05 00
.3	Plumbing Insulation	Section 22 07 00
.4	Plumbing Fixtures and Trim	Section 22 40 00

1.03 QUALITY OF ASSURANCE

.1 Requirements of Regulatory Agencies:

.1 Conform to local and district by-laws, regulations and published engineering standards.

.2 Conform to the 2012 Ontario Building Code (OBC) Compendium containing the Building Code Act, and including all amendments.

.3 Conform to National Plumbing Code of Canada, Current Edition.

.4 Conform to Regulations for Construction Projects, Ontario Regulation 213 under the Occupational Health and Safety Act, Current Edition.

.5 Conform to regulations of Natural Gas Installation Code CAN1-B149.1, Current Edition.

.4 All plumbing supply fittings shall conform to latest edition of ASME A112.18/CAN/CSA-B125.1.

.5 All plumbing fittings shall conform to latest edition of CAN/CSA-B125.3.

PART 2 : PRODUCTS

2.01 PIPE AND PIPE FITTINGS

.1 Sanitary Drain and Vents:

.1 Soil and waste pipe 3" (75 mm) and over to be medium weight cast iron type MJ, unless indicated otherwise; 2 1/2" (65 mm) and under copper DWV pipe and fittings when above floor and Type L copper when buried.

.2 Vent pipe 3" (75 mm) and up is to be medium weight cast iron type MJ; 2 1/2" (65 mm) and under galvanized steel pipe with cast iron drainage fittings or copper type DWV.

.3 Below grade piping only:

.1 ABS piping in accordance with CAN/CSA-B181.1-02 for 4" (100 mm) pipe sizes and smaller.

.2 P.V.C. gravity sewer piping SDR28 for 6" (150 mm) pipe sizes and smaller to CAN/CSA-B182.1-02.

.3 P.V.C. gravity sewer piping SDR35 for 8" (200 mm) pipe sizes and above to CAN/CSA-B182.2-02.

.2 Domestic Water Piping and Cold Condensate Piping:

.1 Domestic water lines (cold, hot and re-circulating) above grade shall be type L. Copper to ASTM B88-03.

.2 Exposed piping in finished areas shall be chrome plated unless noted otherwise.

.3 Air conditioning condensate lines above grade to be Type M copper to ASTM B88

.3 Gas Piping:

.1 Pipe to be schedule 40 welded or seamless steel pipe.

.2 Valves to be C.G.A. certified, plug cock type or ball valves installed where shown or required with one for each appliance.

.3 Fitting to be black malleable iron screwed up to 2" (50mm) and steel welded over 2" (50mm).

2.02 HANGERS & SUPPORTS

.1 Hangers shall be carbon steel with copper or plastic coating for direct support of copper tubing, and shall be carbon steel with black corrosion resistant finish for all other piping.

.2 Use Grinnell FIG 65, 70, 97, CT-99, 101, 260, or 269 hangers for individual support of all horizontal piping.

.3 Provide Grinnell fig. 168 pipe covering protection saddles at each hanger where pipes are insulated.

.4 Provide Grinnell fig. 171 single pipe rollers complete with fig. 160 protection saddles on all heating mains where identified.

.5 Use 100 mm x 40 mm minimum steel channel for joint support of horizontal piping.

.6 Use welded beam attachments or beam clamps for support of horizontal pipe from steelwork.

.7 Perforated pipe hangers are not acceptable.

.8 Determine spacing between pipe rack supports using smallest pipe size.

.9 Provide Grinnell fig. 262 pipe saddles on each pipe where trapeze hangers are used.

.10 Hangers and supports shall be as manufactured by Grinnell, Myatt, Taylor, Aimco or Economec.

.11 Roof support blocks:

a. Roof top support blocks for gas piping, plumbing, HVAC, conduit, cable tray, and mechanical equipment shall be Roof Top Blox (RTB-01). The support blocks must be designed to eliminate roof penetrations, flashings or damage to roofing membrane.

b. Support body shall be made of recycled UV-resistant Polypropylene Copolymer. Base platform material shall be 1” thick, 25psi, type 4 closed cell structural foam to distribute and evenly cushion loads.

c. Support top surface shall have molded in pipe organizing saddles and strut mounting cradle. The top surface shall also have screw guide indents and engineered internal screw thread gripping feature.

d. Block must accept 3/8” and 1/2” threaded rod (ROD-03) using side entry nut slots to allow fast top side assembly and piping height adjustments. Aluminum rollers (ROL-05 or ROL-06) shall be installed on long piping runs. Securing brackets (SBC-07) and adhesive (ADH-12) recommended for permanently securing Blox into its final installed position, anchoring against wind, rain and snow loads.

2.03 VALVES AND ACCESSORIES

.1 Domestic Water:

.1 General

.1 Use the following valves for all piping systems provided by this Section, unless specified otherwise. Use rising stem where space permits. Use flanged, screwed or solder ends to suit pipe lines, and non-heating malleable iron handles.

.2 Use only industrial class valves meeting ANSI, ASTM, ASME and applicable MSS standards. Specification MSS-SP-80, MSS-SP-110, MSS-SP-70, 85, 71, MSS-SP-72, MSS-SP-67.

.2 Domestic Water Systems (Hot and Cold) Up to 1400 kPa (200 PSIG)

.1 Check Valves – Back Flow Prevention

1. For sizes 50 mm (2”) and under, use 860 kPa (125 psig) / 200 W.O.G. bronze body to ASTM C89530 (Lead Free Bronze), Screwed Cap C49300 (Lead Free Brass), Integral Seat, PTFE Disk.

Swing “Y” Pattern
Screwed Ends - Kitz 822T
Jomar T-511G
Solder Ends - Kitz 823T
Jomar S-511G

Spring Loaded
Screwed Ends – Mueller Steam Specialty Model 303HT
316 SS Body and 316 SS Trim

.2 For sizes 65 mm (2-1/2”) and over, use Class 150 Stainless Steel A351 CF8M Body, Trim #10, Bolted Cover, PTFE Gasket, Flanged.

Swing Check Flanged - Kitz 150 UOAM

Wafer Checks

Single Flapper – Moygro W15A-666
Stainless Steel A351 CF8M Body, Class 150, 316 SS Trim

Double Door – Mueller Steam Specialty Model 72HHHTH
Stainless Steel A351 CF8M Body, Class 150, 316 SS Trim
Silent Check – Spring Loaded
Stainless Steel A351 CF8M Body, Class 150, 316 SS Trim, Center Guided
Mueller 101MHT
Mueller 105MHT (Globe Style)

Note: Check valves minimum installation 8-10 pipe diameters downstream of pumps is recommended.

.2 Ball Valves - For Isolation and Balancing Service

.1 For sizes 50 mm (2”) and under, use 1034 kPa (150 psig) / 600 W.O.G., Brass Body to ASTM C49300 (Lead Free Brass), Full Port, PTFE Seats, Double “O” Ring or Teflon packing, TEA Plated Forged Brass C49300 Vented Solid Ball, Blowout Proof Stem, Lever Handle.

Screwed Ends - Kitz 858
Jomar T-100C
Solder Ends - Kitz 859

Jomar S-100C

.2 For sizes 65 mm (2-1/2") and over, Use Class 150 Stainless Steel A351 CF8M Body, SS Ball & Stem, PTFE packing, Hypatite or PTFE seats, locking lever operated (Use gear operated for 8" & 10")

Kitz 150UTBZM (Full Port)
Kitz 150UTAM (Reduced Port)
MAS F-150-SS-F-N (Full Port)
MAS F-150-SS-R-N (Reduced Port)

.3 Hose Bibbs/Drain Hose Connections c/w Cap & Chain

.1 For sizes 20 mm (3/4") and 13 mm (1/2") use 1034 kPa (150 psig) / 600 W.O.G. Brass Body to ASTM C49300 (Lead Free Brass), Full Port, PTFE Seats, Double "O" Ring or Teflon packing, TEA Plated Forged Brass C49300 Vented Solid Ball, Blowout Proof Stem, Lever Handle.

.2 Hose bibb Brass fitting to ASTM C49300 (Lead Free Brass) and Cap & Chain.

Screwed Ends - Kitz 858
Jomar T-100HFG
Solder Ends - Kitz 859
Jomar S-100HSG

.4 Lead Free Flow Balancing Valves (Complete with insulation covers):

.1 Armstrong
.2 Bell & Gosset
.3 Tour & Anderson
.4 Newman Hattersley
.5 Oventrop
.6 Victaulic

.4 Escutcheons:

.1 Supply and install chromium plated escutcheon plates on all piping passing through finished walls, floors and ceilings. Where sleeves project above the floor in potentially wet areas, provide chromium plated Grinnell Fig.400 escutcheon.

.2 Escutcheon plates shall be installed over the insulation and shall have set screws or clamping devices to keep the escutcheon plate in place.

PART 3 : EXECUTION

3.01 PIPING INSTALLATION

.1 Sanitary and Vent Piping:

.1 Install sanitary drains and connect to fixtures where shown. Connect up all drains to drain, open hub or other approved locations. Connect to drainage system all drains from equipment supplied under other Sections.

.2 Horizontal sanitary drains shall have the following minimum slopes:

.1	Fixture waste or drains	1/4" per ft. (2 cm per meter)
.2	Drains up to and including 3" (75 mm)	1/4" per ft. (2 cm per meter)
.3	Drains over 3" (75 mm)	1/8" per ft. (1 cm per meter)

.3 Connect storm drains to all roof hoppers, specialty gutter outlets, etc. Carry main drain to a point as shown on drawings.

.4 All fixtures are to be vented in accordance with Local and Provincial Regulations. Vents are to be run as directly as possible and to be properly graded so as to drain back to fixture connection. Vents are to be concealed in walls, and ceilings; vent stacks are to be built into pipe chases, concealed areas, and walls, with particular attention paid to building frame construction.

.5 Vent stacks are to be connected to the vent extensions provided by Division 7 and installed by the General Contractor. The only exposed vent pipe or vent stack allowed will be in the areas provided in pipe spaces, mechanical room, etc. Maintain a minimum of 10 ft. (3m) from outside air intakes to location of vent stack.

.2 Domestic Water Piping:

.1 Connect cold water to all fixtures, hose bibs, as required and as shown. This is to include all connections to equipment and units supplied under other Sections.

.2 All equipment is to have unions or flanged connection for equipment removal, and where possible piping is to run concealed in all walls and ceiling, but may run exposed in mechanical rooms and warehouse.

.3 Install shock absorbers ahead of all solenoid valves, flush valves or other quick closing valves and where shown. Vacuum breakers are to be installed on all fixtures where required by the Ontario Plumbing Code, or Local Plumbing Inspector.

.4 Connect condensate piping to all drain pans and run to nearest drain.

.3 Gas Piping:

.1 Complete installation to conform to the latest edition of the gas code including the colour coding of the pipe which is to be by the Contractor and to the satisfaction of the Consultant.

.2 Slope the piping towards low points or risers, low point drips to have tee, nipple and cap.

.3 Use soap solution and compressed air to test all joints and fittings for leakage. Repair as required.

.4 Chemical Resistant Drainage Piping:

.1 Connect drainage piping to plumbing fixtures and chemical neutralizing systems where noted on drawings.

.5 Equipment Connection:

.1 Install unions and/or flanges to connect piping to all pieces of equipment. All equipment is to have isolating valves for equipment removal.

.6 Flashing:

.1 All vent stacks and soil stacks are to connect to insulated stackvents. Stackvents are supplied and installed through the roof by Division 7. All holes through roof are to be properly flashed and made weatherproof by roofer as required under Division 7.

3.02 PIPING JOINTS

.1 Solder Joints:

.1 Pipe is to be cut at right angles, reamed, deburred and sized.

.2 End of pipe and inside of fittings to be cleaned with steel wool to a bright metallic finish.

.3 Flux to be applied to outside of pipe and inside of fittings; fitting to be revolved on pipe to ensure proper distribution of flux.

.4 Using solder wire, heat assembly with torch until solder has flowed completely around fittings. Wipe off excess solder. Solder used on potable water systems to consist of 0.2% maximum lead composition or alternatively use 90/5/5 tin/ silver/antimony. Larger size pipe joints are to be completely tinned before assembly.

.2 Cast Iron Joints:

.1 Mechanical joint cast iron piping and fittings will be assembled in accordance with manufacturer's recommendations.

.3 P.V.C., Polypropylene and A.B.S. Piping Joints:

.1 Install P.V.C., Polypropylene and A.B.S. joints as per manufacturer's recommendations, using approved joining methods, compounds and materials.

3.03 FLANGED JOINTS

.1 Flanges and other attachments shall be square with the indicated axis and shall not deviate from this position measured across any diameter by more than 3/64" per foot (4mm per m.) of diameter. Maximum allowable dishing of a flange facing shall be 1/64" (0.4mm).

.2 Bolt holes shall be aligned within a tolerance of ±1/16" (2mm) of the required position.

.3 Flanges shall be installed with the bolt holes straddling the vertical and horizontal centre lines or as required for proper valve position. Use box wrenches to pull up flanges.

.4 Unless otherwise specified, lengths of studs shall be 1/4" (6mm) longer than specified in ANSI B16.5.

3.04 HANGERS AND SUPPORTS

.1 Horizontal piping is to be supported as close as practical to the connected equipment and intermediate hangers are to be spaced as follows:

Pipe Size	Single Rod Dia.	Double Rod Dia.	Maximum Spacing Copper	Steel
Up to 3/4" (Up to 19 mm	3/8" 10 mm	3/8" 10 mm	5 ft. 1.5 m	6 ft. 1.8 m)
1" - 1 1/4" (25 mm to 32 mm	3/8" 10 mm	3/8" 10 mm	5 ft. 1.5 m	8 ft. 2.4 m)
1 1/2" - 2" (38 mm & 50 mm	3/8" 10 mm	3/8" 10 mm	10 ft. 3 m	10 ft. 3 m)
2 1/2" & 3" (65 mm & 75 mm	1/2" 13 mm	1/2" 13 mm	10 ft 3 m	12 ft. 3.7 m)
4" (100 mm	5/8" 16 mm	5/8" 16 mm	- -	15 ft. 4.6 m)
6" (150mm	3/4" 19mm	5/8" 16mm	- -	17 ft. 5.2m)

.2 Cast Iron Piping is to be supported at intervals not exceeding 5 ft. (1.5 m) with clevis hanger securely anchored to building.

.3 Cast Iron Fittings are to be supported at intervals not exceeding 3 ft. (900 mm).

.4 Cast iron pipes are to be supported at every floor.

.5 No support or hanger securing device is to penetrate waterproofing roof membrane above steel deck.

.6 Provide roller supports, floor stands, wall brackets, etc. for all lines running near the floor or near the walls, which can be properly supported by the floors or walls.

.7 All pipe support arrangements are to be adjustable for proper support and grading.

.8 Suspend piping using malleable iron or wrought steel hangers suspended from hanger rods threaded each end not more than 1 1/2" (38 mm). Continuous threaded hanger rod is to be used in concealed locations only.

.9 Hanger rods are to be attached to concrete inserts, beam clamps, welded brackets or similar device. Co-ordinate location and method of pipe support in building with Structural Engineer.

.10 Roof supports for gas piping to be provided by mechanical contractor as detailed on drawings. Mechanical contractor to be responsible for providing the proper number of gas piping support to meet the requirements of the (N**ote:** not all required support are necessarily indicated on the drawings)

.11 Provide hangers for cold water piping with the hanger around the insulation.

3.05 VALVES AND ACCESSORIES

.1 Use valves of line size unless noted otherwise or being used for balancing purposes.

.2 Provide isolating valves in each branch from the main line and where shown. On renovation and retrofit projects add isolations valves at all new tie-in locations where connecting new piping into existing mains and branch lines etc. **Note:** Valves are not necessarily shown on the drawings.

.3 Provide isolating valves for all fixtures, appliances etc. including the following:

.1 On each branch serving more than three fixtures.
.2 At the base of each main riser.
.3 **Note:** Valves are not necessarily shown on the drawings.

.4 Unless indicated otherwise provide radiation regulating valves at each terminal unit and in locations where valve is to be used for regulating purposes. Ball valves are not acceptable for balancing purposes.

.5 Provide 1/2" (13 mm) ball valve with cap and chain at any low point of the system not drainable through the main supply piping.

.6 All valves are to be tagged and a chart showing location and equipment controlled to be turned over to the Owner upon completion of the job.

.7 Escutcheon plates are to be installed at all walls and floors where pipes are exposed to view.

.8 Install auto air vents at all high points in system.

.9 Install drain cup at each backflow preventer vent and drain opening and pipe to nearest floor drain.

3.06 INSPECTION AND TESTING

.1 Make tests that are required, by any authority having jurisdiction, in the presence of the Authority's Authorized Inspector. Tests are to be certified by him.

.2 Test all piping at the completion of roughing-in before connecting to new systems, and prior to concealment, insulation or covering of piping.

.3 Notify the Consultant in writing at least forty-eight (48) hours prior to start of tests. Failure to do so may require test to be re-done.

.4 Final test all drain waste and vents to Part 7 of the Ontario Building Code.

.5 All new drainage and vent piping is to be tested using water test method before connection of fixtures and maintain the required water level for 24 hours. Pressure test science room and prep room piping in accordance with Manufacturer’s instructions.

.1 **Do not** pressure test with compressed air or gas.

.6 Perform tests before application of pipe covering. Test buried and concealed piping before backfilling or concealing in structure. Protect equipment and parts not capable of withstanding test pressure during tests.

.7 Any leaks found are to be properly repaired and test reapplied until results satisfactory to the Consultant are obtained.

3.07 PLACING IN OPERATION

.1 Upon completion of the work and before turning over the job, the Contractor is to make a complete test of the various systems.

.2 Flush and sterilize domestic water mains in accordance with the procedures established by AWWA Specification C601.

.3 Flush all other domestic water piping in accordance with Local and Provincial Codes.

3.09 ROOF FLASHINGS

.1 Turn over flashings to the roofer for installation, provide flashings for each roof penetration.

END OF SECTION

PART 1 : GENERAL

1.01 GENERAL PROVISIONS

.1 Conform to the General Provisions of Section 21 05 01.

.2 Provide work under this Section as shown or specified and in accordance with the requirements of the Contract documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

.1	Plumbing	Section 22 05 00
.3	Plumbing Insulation	Section 23 07 00
.2	Plumbing Piping	Section 22 10 00

1.03 QUALITY ASSURANCE

.1 Requirements of Regulatory Agencies:

.1 Comply with local bylaws and standards.

.2 Comply with regulations under the Ontario Electrical Safety Code (latest edition).

.3. Conform to the 2012 Ontario Building Code (OBC) Compendium containing the Building Code Act, and including all amendments.

.4 Conform to National Plumbing Code of Canada current edition.

.5 All plumbing supply fittings shall conform to latest edition of ASME A112.18/CAN/CSA-B125.1.

.6 All plumbing fittings shall conform to latest edition of CAN/CSA-B125.3.

1.04 SUBMITTALS

.1 Submit shop drawings in accordance with paragraph 1.04 Section 23 01 00 for the following equipment items:

.1 Plumbing Fixtures and Trim

.2 Submit inspection certificates obtained from local inspection authorities.

.3 Submit certificates indicating that all required testing has been completed.

1.05 APPROVAL

.1 Additional manufacturers wishing to bid products other than the product specified herein, are to submit to the Consultant prior to Tender close a list of three past installations of products similar to those listed. Complete catalogue data along with deviations from the product specified are to be noted in the submittals to the Consultant. The manufacturer guarantees the proposed substitute product to comply with the product specified and as detailed on the Drawings, unless the deviations are so noted in the submittals for approval.

PART 2 : PRODUCTS

2.01 PLUMBING FIXTURES

.1 Plumbing fixtures shall be as indicated and specified with all required supports, accessories, drainage, vent and water connections to make the fixture complete.

.2 The flow rates of fittings that supply water to a fixture shall not exceed the maximum flow rates listed in Part 7 of the O.B.C. under the water efficiency section.

.3 Fixtures shall be American Standard, Zurn, Kohler or Mansfield. Fixtures shall be white unless noted otherwise.

.4 Fittings and trim shall be Zurn, Sloan, Delta Commercial, Crane or American Standard equivalent to the trim specified. All exposed flush valves, fittings, escutcheons, etc. at each fixture shall be polished chrome plated brass unless specified otherwise.

.5 All tanks of water closets shall be internally lined with anti-sweat insulation.

.6 Carriers shall be furnished for all wall-hung water closets, urinals, and lavatories. Carriers shall be as specified in Section 22 42 01 Plumbing of the specifications.

.7 Fixture Reference **WF-1** – Semi-circular Wash fountain to serve 1 to 4 users at a time and shall include the following standard equipment:

- Bowl: 54” (1,372 mm) to be constructed of 304 stainless steel, 14-gauge polished to #4 finish.
- Pedestal: Bowl and support tube are an integrally welded assembly, with the support tube welded to an extruded flange from bowl. Sprayhead nozzles and infrared sensors are secured to unit from inside the sprayhead module. Solenoid valves are safely concealed inside the washfountain. Access panels are removable. All supply and waste connections are concealed within the pedestal..
- Valves & Fittings: In addition to the bowl and pedestal, the following valves and fittings are standard: Navigator® thermostatic mixing valve, flexible stainless steel supply hoses and stops. Stops are 1/2" compression female.

- Activation Controls: Infrared_ Each of the stream-formers is controlled by a separate slow-closing solenoid valve. Hands placed within the bowl are detected by an infrared sensor module, which activates a flow of tempered water from one spray nozzle at a rate of 0.50 gpm (1.9 Lpm). Shut-off is automatic after hands are removed from the detection area. The infrared sensor module uses two zone-focused infrared transmitting beams, having a detection area that does not exceed the bowl perimeter. The detection range projects 6–9 inches forward at a 30° angle to each side and reaches 15° below horizontal. The infrared sensor is not affected by varying color tones or darkness. Direct sunlight or bright washroom lights will not activate the system. Infrared models also include solenoid valves and a low voltage transform as standard equipment:
    - Solenoid – 12V DC, 3/8" tube fitting. Few moving parts, and resistant to most chemicals, minerals, and impurities often present in municipal water supplies.
    - Low-Voltage Plug-In Adapter – UL/CSA-Listed 120V AC/12V DC plug in adapter designed to plug into a standard GFCI protected electrical outlet. Location of plug-in adapter per local electrical code.

Acceptable Manufacturers: Bradley SN2004-H-STD-IRP-NSD-SH

.2 Fixture Reference **CS-1**: Sink, counter mounted,31 1/2” x 20 7/8” x 8” (800mm x 530mm x 203mm) deep stainless steel double sink with ledge back with right integral drainboard, 18 gauge, stainless steel, each compartment with 16”x14” (406mm x 356mm) bowls, 3 ½” (89mm) crumb cup strainer assembly with tailpiece, hold down clamps Trim Fitting: 8” (203mm) polished chrome plated brass, deck mount faucet with quarter turn ceramic disc cartridges, 8” (203mm) cast brass swing spout with 1.84 IGPM (8.35 l/m) vandal-resistant aerator, cast metal lever handles3/8” (10mm) diameter chrome plated heavy pattern short rigid brass horizontal supplies with escutcheons and angled ball stops, on supply piping, 1 ½” (38mm) ‘P’ trap with cleanout.

Acceptable Manufacturers:

Sink: Novanni JE2031D8
Franke

Trim Fitting: Zurn Z-871G3-2F
Delta 26C3133
Moen Commercial 8283
Chicago Faucet 1100-V-L9-XK

Supplies: Dahl – E13-2277

PART 3 : EXECUTION

3.01 PLUMBING FIXTURES

.1 For precise location and mounting heights of the fixtures and trim, Refer to the Architectural Drawings.

.2 Co-ordinate the work of this Division with that of other Divisions with regard to all openings in wall and floors for any fully or semi-recessed fixtures.

.3 Fixtures are to be carefully stored until ready for placing. After placing, they are to be protected by pasting on paper, or other methods, from danger. When job is ready for service all fixtures and fittings are to be properly cleaned. Any scraped, chipped or permanently stained fixtures are to be replaced by the Contractor.

.4 All fixtures are to be white unless otherwise noted.

.5 All manufacturers' labels are to be left on fixtures until after Final Inspection and then removed.

.6 Each fixture to have compression type shut-off valves at the fixture in addition to the faucets on each fixture. These valves are to be adjusted to prevent excessive flow.

.7 Where fixtures connections pass into walls, floors, ceilings or through millwork they are to be fitted with proper escutcheons.

.8 All visible parts of trim of the fixtures including faucets, escutcheons, wastes, strainers, traps, supplies stops, etc., are to be chrome plated.

.9 When installing chrome plated trim and accessories, proper care is to be taken. Any wrench or other tool marks on the plating is to be sufficient cause for rejection.

.10 All exposed pipe and fittings and fixtures are to be rigidly supported. All fastenings to walls and partitions are to be firmly made without damage to wall finish.

.11 Connect all services to plumbing fixtures.

.12 Install all plumbing fixtures supplied by other Divisions and connect all services to plumbing fixtures.

END OF SECTION

PART 1 : GENERAL

1.01 REQUIREMENTS INCLUDED

.1 Shop drawings and product data

.2 Working/Interference drawings

.3 As-built drawings

.4 Operating and maintenance manuals including extended warranties.

1.02 RELATED WORK SPECIFIED ELSEWHERE

.1	Firestopping	Section 21 07 20
.2	Wet Pipe Sprinkler System	Section 21 13 13
.3	Plumbing	Section 22 05 00
.4	Plumbing Fixtures and Trim	Section 22 40 00
.5	Direct Digital Control Systems	Section 23 09 23
.6	Air Distribution	Section 23 30 00
.7	Air Terminal Units	Section 23 36 00
.8	Packaged Outdoor Air Handling Units	Section 23 74 00
.9	Liquid Heat Transfer	Section 23 80 00
.10	Building Automation Systems	Section 25 05 00

1.03 ADMINISTRATIVE

.1 Submit to Consultant submittals listed for review. Submit with reasonable promptness and in an orderly sequence so as to not cause delay in the construction schedule. Failure to submit in ample time is not considered sufficient reason for an extension of the Construction Schedule and no claim for extension by reason of such default is allowed.

.2 Work affected by the submittal is not to proceed until the review is complete unless an approval is obtained from the Consultant.

.3 Review submittals prior to submission to the Consultant. This review represents that necessary requirements have been determined and verified, and that each submittal has been checked and co-ordinated with the requirements of the Contract Documents.

1.04 SHOP DRAWINGS

.1 Submit shop drawings in accordance with the General Requirements of Division 1 and as required in various sections of these specifications and on the drawings, see also Commissioning Plan Schedule.

.2 Shop drawings to be submitted with a cover sheet(s) on the Contractor's letterhead listing the following information:

.1 Project:
.2 Owner/Client:
.3 Mechanical/Electrical Consultant:
.4 Mechanical Contractor:
.5 Supplier
.6 Specification Section
.7 Materials or Equipment submitted

.3 Include space for review stamps by Consultant, General Contractor, and Mechanical Contactor.

.4 Prepare and submit for review, where specified, shown or considered necessary by the Consultant, shop drawings showing details of work as follows:

.1 Fabrication and erection dimension.

.2 Sections, arrangements and details which indicate complete construction as well as interconnections with other work.

.3 Location and type of anchors and fastenings.

.4 Materials including gauges, thickness, sizes and finishes.

.5 Descriptive names of equipment and mechanical and electrical characteristics when applicable.

.6 Data verifying that superimposed loads will not affect function, appearance, and safety of work shown on shop drawings as well as other work interconnected.

.7 Assumed design loadings, dimensions of elements and materials specification for load bearing members.

.8 Complete composite wiring diagrams as required by Division 16 of each mechanical system. Indicate all electrical requirements both internal and external for review and co-ordination of other trades.

.9 Indicate all accessories and clearances for operation and servicing.

.5 Submit shop drawings, unless otherwise specified in form of electronic Portable Document Files (pdf). Files are to be separated by the specification section to which they apply. The file name as per below.

.6 Manufacturer's printed data sheets for standard items are acceptable providing pertinent characteristics are identified and relate to specified items. Submit electronic Portable Document Files (PDF). Files are to be separated by the specification section to which they apply. The file name is to be as follows:

Project Number – Shop Drawing – Specification Section – Title – Submission Number.pdf

Ex.: *17-128 – Shop Drawing –23 30 00 – Air Distribution – Submission 1.pdf*

.7 Check shop drawings and data sheets, before submission as follows:

.1 Against contract documents and other applicable shop drawings, to ensure that work adjacent to and affecting other work is accurately detailed.

.2 To ensure that work shown on shop drawings conforms to requirements of Contract Documents.

.3 Enclose notice in writing of any variations from requirements of Contract Documents.

.8 Indicate on shop drawings that they have been checked by applying stamp "checked and certified correct for construction", including date and signature. Drawings and details submitted without such stamp or whenever it is evident that drawings have not been checked (despite approval stamp) are not to be reviewed and are to be returned to this Division.

.9 The Consultant's review of shop drawings and data sheets pertain to general design only. Errors in dimensions, quantities or interference are to be marked if noticed, but is not in any way to relieve the Contractor from the responsibility to complete the work as shown and specified.

.10 All shop drawings are to be submitted in Imperial dimensions.

.11 Shop drawings are to be returned electronically with "No Exception Taken", "Make Corrections Noted Resubmission Not Required", " Revise and Resubmit", or "Rejected, Submit Compliant Product/System".

.1 No Exception Taken - Drawings conform with the general design concept.

.2 Make Corrections Noted Resubmission Not Required - Drawings conform with the general design concept subject to the corrections noted. Drawings to be corrected and resubmitted for final review and incorporation into maintenance manuals. Such submission is not to hold up manufacture.

.3 Revise and Resubmit - Drawings are rejected and manufacture of this equipment is not to proceed. Drawings are to be resubmitted with required corrections on equipment.

.4 Rejected, Submit Compliant Product/System – Drawings are rejected and manufacture of this equipment is not to proceed. Drawings are to be resubmitted with required specified product and/or systems.

1.05 WORKING/INTERFERENCE DRAWINGS

.1 Before commencing any work, the Contractor is to prepare working/interference drawings, to ensure that all components, including any components of other divisions, are

to be properly accommodated within the spaces provided, ensuring all clearances required by jurisdictional authorities and for proper maintenance are indicated and maintained.

.2 Prepare drawings to indicate co-ordination and method of installation of a system with other systems where their relationship is critical. Ensure all details of equipment, apparatus and connections are co-ordinated.

.3 As an alternative to preparing interference drawings, regularly scheduled meetings on site with all associated trades are to be conducted as necessary but not less than one per week.

.4 Failure to co-ordinate with all other trades could result in reworking of installed equipment, piping or ducting at the discretion of the Consultant. Any reworking to accommodate the installation of other trades is to be performed at no extra cost.

1.06 AS-BUILT DRAWINGS

.1 As-built drawings are to be maintained in accordance with the general requirements of Division 1.

.2 The Consultant is to provide this Division with an extra set of white prints on which to show clearly in red ink, as the job progresses, all changes and deviations from the plans, including all changes as part of change orders, site instructions or site condition.

.3 Record location of concealed mechanical services and components. Dimension and reference all concealed and buried mechanical services from visible and accessible permanent features of structure.

.4 Maintain as-built drawings on site for periodic review by Consultant.

.5 In accordance with the Commissioning Schedule Plan, submit a complete set of record drawings, marked “as-built” and dated.

1.07 MAINTENANCE DATA AND OPERATING INSTRUCTIONS

.1 Submit on set of electronic (pdf) of Operation and Maintenance Manual for review by Consultant prior to final submission to owners. After review and approval by the Consultants, submit **three (3)** copies of Operation and Maintenance Manual individually bound in suitable sized hard backed three-ring binders.

.2 Front cover of each binder to be suitably lettered as follows:

OPERATION AND MAINTENANCE
MANUAL FOR
(Project Name)
(Owners Name)
(Date)

.3 Provide plastic tab indices for all sections of the manual. Provide separate sections for each major piece of equipment and for groups of smaller products.

.4 Provide master index at the beginning of each binder indicating all items included in each section.

.5 Provide list of names, addresses and telephone numbers of equipment suppliers, Installing Contractors, General Contractors, Architect and Consulting Engineer.

.6 Provide final review shop drawings of each manufactured item in addition to the operating and maintenance instructions.

.7 Operating instructions to include:

.1 General description of each mechanical unit and system.

.2 Step by step procedure to follow in commissioning each piece of equipment, including start up, break-in, and routine normal operating instructions and sequences. Include regulation control stopping, shutdown, and emergency instructions. Include summer, winter and any special operating instructions.

.3 Schematic control diagrams for each separate system. Each diagram to indicate locations of start-stop switches, insertion thermostats, thermometers, freezestats, firestats, pressure gauges, automatic valves, and accessories. Correct operating settings for each control device to be indicated on diagram.

.4 Drawings of each control panel identifying all components on the panels and their function and sequence of operation.

.5 All mechanical equipment wiring and control diagrams as installed.

.6 Provide original manufacturers illustrations, shop drawings, assembly drawings and diagram required for maintenance.

.8 Maintenance instructions are to include:

.1 Manufacturer's printed maintenance instructions for each item of mechanical equipment installed under this Division. Instructions are to include installation instructions, description of the unit or system and component parts numbers and lists, name of supplier and maintenance and lubrication instructions. Include complete nomenclature and commercial number of replacement parts.

.2 Summary list of each item of mechanical equipment requiring servicing and lubrication, indicating the name of the equipment item, location of all points of lubrication, type of lubricant recommended, and frequency of lubrication.

.3 Include routing procedures and guide troubleshooting, disassembly, repair and reassembly instructions, alignment, adjusting, balancing and checking instructions.

.4 Provide list of manufacturers spare parts, current prices and recommended quantities to be maintained in storage.

.5 Balancing and testing reports.

.9 Provide written warranty on this Division's letterhead addressed to the Owner, copied to the General Contractor.

.10 Furnish complete Operating and Maintenance Manuals to the Commissioning Authority and the Owners/Owner's Representative for review in accordance with the Commissioning Plan Schedule. Allow a minimum fourteen (14) days for review.

.11 Furnish Final reviewed Operating and Maintenance Manuals to the Commissioning Authority and the Owners/Owner's Representative fourteen (14) days prior to scheduled Functional Tests.

1.08 EXTENDED WARRANTIES

.1 This Division is to submit extended warranties for specific materials and/or work specified in their respective sections.

.2 Extended warranties are to be issued on the Manufacturers or respective Contractor's letterhead, under seal, and issued in the name of the owner.

END OF SECTION

PART 1 : GENERAL

1.01 GENERAL PROVISIONS

.1 Conform to the General Provisions of Section 21 05 01.

1.02 RELATED WORK SPECIFIED ELSEWHERE

.1	Firestopping	Section 21 07 20
.2	Air Distribution	Section 23 30 00
.3	Packaged Outdoor Air Handling Units	Section 23 74 00
.4	Liquid Heat Transfer	Section 23 80 00
.5	Building Automation Systems	Section 25 00 00
.14	Electrical	Division 26

1.03 QUALITY OF ASSURANCE

.1 Requirements of Regulatory Agencies:

.1 Conform to local and district by-laws, regulations and published engineering standards.

.2 Conform to the 2012 Ontario Building Code (OBC) Compendium containing the Building Code Act, and including all amendments.

.3 Conform to National Plumbing Code of Canada, Current Edition.

.4 Conform to Regulations for Construction Project, Ontario Regulation 213 under the Occupational Health and Safety Act, Current Edition.

.5 Conform to regulations of Natural Gas Installation Code CAN/CSA-B149.1, Current Edition.

1.04 SUBMITTALS

.1 Submit shop drawings in accordance with Section 23 01 00, paragraph 1.04 for all the following equipment items:

.1 Valves

PART 2 : PRODUCTS

2.01 PIPE AND PIPE FITTINGS

.1 Heating Piping:

.1 Steel pipe 2" (50 mm) and smaller - Schedule 40, electric weld or seamless A.S.T.M. specification A-53.

.2 Steel pipe 2 1/2" (65 mm) and larger - schedule 40, electric weld or seamless A.S.T.M. specification A-53 with butt welding ends.

.3 Copper pipe 3/4" (19 mm) and smaller - Type "L" hard drawn copper with wrought copper solder type fittings to ASTM B88-03.

.4 Dielectric unions to be used between copper and steel pipe.

.5 Steel pipe fittings up to and including 2" (50mm) are to be threaded joints malleable iron type.

.6 Steel pipe fittings 2 1/2" (65mm) and larger are to be forged steel butt welding type with all joints welded.

.7 Grooved end fittings are equally acceptable for chilled water and chilled glycol lines only, for sizes 4” (100 mm) and larger.

.1 Fittings shall be ductile iron to ASTM A536; wrought steel to ASTM A234; 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.

.1 Rigid: Coupling housings with offsetting, angle-pattern bolt pads shall be used to provide system rigidity and support and hanging in accordance with ANSI B31.1 and B31.9. Installation-Ready, for direct stab installation without field disassembly, with grade EHP gasket suitable for water temperatures to 250 ° F (120 ° C).

.2 AGS series two-segment couplings with lead-in chamfer on housing key and wide-width FlushSeal gasket.

.8 All elbows are to be long radius type.

.9 Copper pipe fittings to be cast copper alloy solder joint pressure fittings to ANSI B16.18-2001 or wrought copper and copper alloy solder joint pressure fittings to ANSI/ASME B16.22-2001.

2.02 HANGERS & SUPPORTS

.1 Hangers shall be carbon steel with copper or plastic coating for direct support of copper tubing, and shall be carbon steel with black corrosion resistant finish for all other piping.

.2 Use Grinnell FIG 65, 70, 97, CT-99, 101, 260, or 269 hangers for individual support of all horizontal piping.

.3 Provide Grinnell fig. 168 pipe covering protection saddles at each hanger where pipes are insulated.

.4 Provide Grinnell fig. 171 single pipe rollers complete with fig. 160 protection saddles on all heating mains where identified.

.5 Use 100 mm x 40 mm minimum steel channel for joint support of horizontal piping.

.6 Use welded beam attachments or beam clamps for support of horizontal pipe from steelwork.

.7 Perforated pipe hangers are not acceptable.

.8 Determine spacing between pipe rack supports using smallest pipe size.

.9 Provide Grinnell fig. 262 pipe saddles on each pipe where trapeze hangers are used.

.10 Hangers and supports shall be as manufactured by Grinnell, Myatt, Taylor, Aimco or Economec.

.11 Roof support blocks:

a. Roof top support blocks for gas piping, plumbing, conduit, cable tray, and mechanical equipment shall be Roof Top Blox (RTB-01). The support blocks must be designed to eliminate roof penetrations, flashings or damage to roofing membrane.

b. Support body shall be made of recycled UV-resistant Polypropylene Copolymer. Base platform material shall be 1” thick, 25psi, type 4 closed cell structural foam to distribute and evenly cushion loads.

c. Support top surface shall have molded in pipe organizing saddles and strut mounting cradle. The top surface shall also have screw guide indents and engineered internal screw thread gripping feature.

d. Block must accept 3/8” and 1/2” threaded rod (ROD-03) using side entry nut slots to allow fast top side assembly and piping height adjustments. Aluminum rollers (ROL-05 or ROL-06) shall be installed on long piping runs. Securing brackets (SBC-07) and adhesive (ADH-12) recommended for permanently securing Blox into its final installed position, anchoring against wind, rain and snow loads.

2.03 VALVES

.1 Heating:

.1 Gate Valves:

.1 Up to 2" (50 mm):

.1 Crane 428
.2 Jenkins 810J
.3 Newman Hattersley S/B608
.4 Milwaukee 149
.5 Nibco T-111
.6 Kitz 24
.7 Toyo 293
.8 Victaulic 771A/

.2 Globe Valves:

.1 Up to 2" (50 mm):

.1 Crane 7
.2 Milwaukee 590 T
.3 Newman Hattersley 13
.4 Jenkins 106BJ
.5 Nibco T-235-Y
.6 Kitz 09
.7 Toyo 221

.4 Check Valves:

.1 Up to 2" (50 mm):

.1 Crane 37
.2 Newman Hattersley 47
.3 Jenkins 4092J
.4 Milwaukee 509
.5 Nibco T-413
.6 Kitz 22
.7 Toyo 236

.5 Ball Valves:

.1 Up to 2" (50 mm):

.1 Crane F9202
.2 Newman Hattersley 1969-100
.3 Nibco/NCI T-FP-600
.4 Milwaukee BA-200

.5 Jenkins 201J
.6 Kitz 58
.7 Toyo 5044A
.8 MAS B-3
.9 Apollo 70-100
.10 Victaulic Series 722

.2 **Note:** provide stem extensions where valves are located in insulated pipes.

2.04 ACCESSORIES

.1 Heating:

.1 Flow Balancing Valves (Complete with insulation covers):

.1 Armstrong CBV
.2 Bell & Gosset CB
.3 Tour & Anderson STA
.4 Newman Hattersley 1700 series
.5 Oventrop
.6 Victaulic: Series 786H/787H Sweat/Thread (1/2” to 2”/13mm to 50mm)
Series 789 grooved (2 1/2” to 12”/65mm to 300mm)
Series 788 flanged (2 1/2” to 16”/65mm to 400mm)

.2 Radiation Valves:

.1 3/4" (19mm) Supply:

.1 DAHL 11041, 11042
.2 Oventrop

.2 3/4" (19mm) Return:

.1 DAHL 13000 Series with MV-2 (0.40-1.75USGPM) or MV-6 (1.75-6.0 USGPM) Venturion
.2 Oventrop

.3 Air Eliminators:

.1 Air eliminators on hydronic chilled water and heating mains to be Sarco AWN-150, Hoffman 792, Colton AUDT – #150, Bell & Gossett #107A.

.2 Air eliminators are to be connected to air collecting chambers with 1/2" (13 mm) I.P.S. nipple and isolating gate valve. Air collecting chambers shall consist of a full size tee.

.4 Expansion Joints:

.1 For steel pipe to be self equalizing type with two-ply stainless steel bellows, carbon steel shrouds and internal positive anti-torque device.

Flexonics Model H or H3, or Hydro-Flex.

.2 For copper pipe to be self equalizing type with two-ply bronze bellows, all bronze construction and internal positive anti-torque device.

Flexonics model HB or HB3 or Hydro-Flex.

.5 Escutcheons:

.1 Supply and install chromium plated escutcheon plates on all piping passing through finished walls, floors and ceilings. Where sleeves project above the floor in potentially wet areas, provide chromium plated Grinnell Fig.400 escutcheon.

.2 Escutcheon plates shall be installed over the insulation and shall have set screws or clamping devices to keep the escutcheon plate in place.

2.06 ROOF FLASHINGS

.2 Roof flashings for conduit serving roof top air handing equipment and ERE's shall be copper,18" high, pre-insulated with E.P.D.M. grommets for multiple penetrations, compatible with E.P.D.M. roof membrane, as manufactured by Thaler Metal Industries, Model No. MEF-AG2 or –MEF-AG3.

PART 3 : EXECUTION

3.01 PIPING INSTALLATION

.1 HW Heating Piping:

.1 Make all piping connections to boiler, chiller, pumps, radiation, coils, fan coil units, humidifiers, etc. Unions and valves to be located so that removal of units and equipment is possible without disconnecting more than a minimum of pipe work, and without shutting down any other pieces of equipment.

.2 Where branch pipes are welded into mains without the use of "T" connections, torch cut openings must be cut true, bevelled and filed smooth. Branch pipes must not be allowed to project inside of main pipe. Openings must not be cut large enough to permit entry of welding metal and slag within the pipe.

.3 Grade horizontal water distribution piping 1" per 30 ft. (2.78 mm per meter) rising in direction of flow, wherever possible. Provide ball valves with cap and chain for draining at all low points and vent valves at high points of systems.

.4 Provide adequate space around piping to facilitate application of insulation.

.5 All reductions in pipe size to be made with eccentric fittings. Minimum size of run out shall be 3/4" (19 mm).

.2 Equipment Connection:

.1 Install unions and/or flanges to connect piping to all pieces of equipment. All equipment is to have isolating valves for equipment removal.

.3 Flashing:

.1 All vent stacks and soil stacks are to connect to insulated stackvents. Stackvents are supplied and installed through the roof by Division 07. All holes through roof are to be properly flashed and made weatherproof by roofer as required under Division 07.

.4 Thermal Expansion and Contraction of Piping:

.1 The Contractor to be responsible for expansion and contraction of all pipework. Erect all pipe in such a manner that the strain and weight does not come upon pipe connections of apparatus. Provide bends, or swing joints except where corrugated bellows type expansion joints are shown or required.

.5 Air Elimination and Drainage:

.1 All low points to be installed with a ball valve with a screwed connection suitable for connecting a hose.

.2 Install air vents at all high points in system complete with isolation ¼ turn ball valve.

3.02 PIPING JOINTS

.1 Threaded Joints:

.1 Pipe is to be cut at right angles and reamed to full bore.

.2 Threads are to be carefully cut with sharp dies and proper cutting oil.

.3 All chips and other foreign matter are to be removed from the pipe before installation into system.

.4 Proper joint compound is to be used on male threads only. A good grade of hemp fibre is to be used on threads.

.5 Connections to be made with proper wrench to suit pipe size, additional leverage not to be allowed.

.6 If threaded joints leak after assembly by normal methods, they are to be disconnected and corrected if possible, or replaced. Over tightening or caulking is not considered a proper correction.

.2 Solder Joints:

.1 Pipe is to be cut at right angles, reamed, deburred and sized.

.2 End of pipe and inside of fittings to be cleaned with steel wool to a bright metallic finish.

.3 Flux to be applied to outside of pipe and inside of fittings; fitting to be revolved on pipe to ensure proper distribution of flux.

.4 Using solder wire, heat assembly with torch until solder has flowed completely around fittings. Wipe off excess solder. Solder used on potable water systems to consist of 0.2% maximum lead composition or alternatively use 90/5/5 tin/ silver/antimony. Larger size pipe joints are to be completely tinned before assembly.

.3 Grooved Joints:

.1 Install in accordance with the manufacturer's latest published installation instructions.

.2 Pipe ends shall be clean and free from indentations, projections and roll marks in the area from pipe end to (and including) groove.

.3 Gasket shall be manufactured by the coupling manufacturer and verified as suitable for the intended service.

.4 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.

3.03 WELDED JOINTS

.1 Where the location of butt welded piping joints is left to the discretion of this Division, such joints shall be minimum three feet (914mm) from other welded piping joints.

.2 Joint areas shall be thoroughly cleaned to remove all slag, oil, grease, rust, scale and moisture prior to commencement of welding. Slag and spatter shall be removed completely from each welding pass before the next pass is deposited.

3.04 BUTT WELDING

.1 Unless otherwise specified, all 2-1/2" (65mm) size and larger piping shall be prepared for butt welding. Unless otherwise specified, butt welding and preparation shall be in accordance with figure 1(a) of ANSI Standard B16.25, for piping with wall thickness of 3/16" to 3/4" (5mm to 19mm) inclusive. V-bevel end profiles for all alloy steel piping shall be made by machining only. This Division shall ensure that the end preparation is truly circular and concentric with the pipe axis and within the tolerances allowed by applicable standards.

.2 V-bevel end profiles for carbon steel piping shall be made by machining or flame cutting. This Division shall ensure that the end preparation is truly circular and concentric with the pipe axis and within the tolerances allowed by applicable standards.

.3 Where the flame cutting is employed on end preparation, the cut shall by thoroughly dressed afterwards to eliminate all scale, profile irregularities and to give clean, shiny surfaces.

3.05 WELDING OF PRESSURE PIPING

.1 General:

.1 Pressure welding shall conform to ANSI B.31.1, ASME Boiler and Pressure Vessel Code and the MCCR Boilers and Pressure Vessels Act.

.2 Welding Process:

.1 Welding shall be done using either shielded metal-arc welding process and/or inert gas tungsten-arc welding process.

.3 Welding Procedures:

.1 Welding procedures are to be submitted, registered and approved to requirements of MCCR Boiler and Pressure Vessels Act prior to submission to the Consultant for approval. The following limitations shall be observed in these procedures,

.2 Welders shall be tested and approved in accordance with Section IX of the ASME Boilers and Pressure Vessel Code and the requirements of the MCCR.

.3 No welding shall be performed when the ambient is less that 32°F (0°C). If the ambient is less that 32°F (0°C), a heated enclosure shall be required. When the base metal temperature is less than 50°F (10°C), the base metal shall be preheated to at lease 70°F (21°C) and maintained at this temperature during welding and thereafter as required.

.4 The use of backing rings and strips shall not be permitted unless received prior approval of the Consultant. If their use is approved they shall be made from materials of weldable quality compatible with the base metal and shall be removed after welding unless the Consultant specifically approves their remaining in the joint.

.5 Where covered electrodes are used they shall be of the low hydrogen type and shall be properly conditioned prior to their use. Storage and handling practices shall be in accordance with the electrode manufacturer's specifications. Details of storage and handling practices shall be submitted by this Division when submitting welding procedures. Unless otherwise incorporated in the welding procedure, peening shall not be permitted.

.4 Performance of Welders:

.1 No welding shall be undertaken prior to this Division supplying the Consultant valid certificates for this Division’s personnel and procedures.

.2 Welds suspected to be defective shall be radiographed at no expense to the Owner.

.3 Weld defects shall be removed by grinding until the base metal is reached. Repairs shall be done using the same welding procedure as required for the original welds. Repaired welds shall be proven by radiograph at no expense to the Owner.

.4 If any three welds performed by the same welder require repair, the welder shall be disqualified from further welding.

.5 Welds shall be stamped with the welder's identification number.

3.06 FLANGED JOINTS

.1 Flanges and other attachments shall be square with the indicated axis and shall not deviate from this position measured across any diameter by more than 3/64" per foot (4mm per m.) of diameter. Maximum allowable dishing of a flange facing shall be 1/64" (0.4mm).

.2 Bolt holes shall be aligned within a tolerance of ±1/16" (2mm) of the required position.

.3 Flanges shall be installed with the bolt holes straddling the vertical and horizontal centre lines or as required for proper valve position. Use box wrenches to pull up flanges.

.4 Unless otherwise specified, lengths of studs shall be 1/4" (6mm) longer than specified in ANSI B16.5.

3.07 HANGERS AND SUPPORTS

.1 Horizontal piping is to be supported as close as practical to the connected equipment and intermediate hangers are to be spaced as follows:

Pipe Size	Single Rod Dia.	Double Rod Dia.	Maximum Spacing Copper	Steel
Up to 3/4" (Up to 19 mm	3/8" 10 mm	3/8" 10 mm	5 ft. 1.5 m	6 ft. 1.8 m)
1" - 1 1/4" (25 mm to 32 mm	3/8" 10 mm	3/8" 10 mm	5 ft. 1.5 m	8 ft. 2.4 m)
1 1/2" - 2" (38 mm & 50 mm	3/8" 10 mm	3/8" 10 mm	10 ft. 3 m	10 ft. 3 m)
2 1/2" & 3" (65 mm & 75 mm	1/2" 13 mm	1/2" 13 mm	10 ft 3 m	12 ft. 3.7 m)
4" (100 mm	5/8" 16 mm	5/8" 16 mm	- -	15 ft. 4.6 m)
6" (150mm	3/4" 19mm	5/8" 16mm	- -	17 ft. 5.2m)

.2 No support or hanger securing device is to penetrate waterproofing roof membrane above steel deck.

.3 Provide roller supports, floor stands, wall brackets, etc. for all lines running near the floor or near the walls, which can be properly supported by the floors or walls.

.4 All pipe support arrangements are to be adjustable for proper support and grading.

.5 Suspend piping using malleable iron or wrought steel hangers suspended from hanger rods threaded each end not more than 1 1/2" (38 mm). Continuous threaded hanger rod is to be used in concealed locations only.

.6 Hanger rods are to be attached to concrete inserts, beam clamps, welded brackets or similar device. Co-ordinate location and method of pipe support in building with Structural Engineer.

3.08 VALVES AND ACCESSORIES

.1 Use valves of line size unless noted otherwise or being used for balancing purposes.

.2 Provide isolating valves in each branch from the main line and where shown. On renovation and retrofit projects add isolations valves at all new tie-n locations where connecting new piping into existing mains, branch lines etc. **Note:** Valves are not necessarily shown on the drawings

.3 Provide isolating valves for all appliances, heating terminal units etc.
.1 **Note:** Valves are not necessarily shown on the drawings.

.4 Unless indicated otherwise provide radiation regulating valves at each terminal unit and in locations where valve is to be used for regulating purposes. Ball valves are not acceptable for balancing purposes.

.5 Provide 1/2" (13 mm) ball valve with cap and chain at any low point of the system not drainable through the main supply piping.

.6 All valves are to be tagged and a chart showing location and equipment controlled to be turned over to the Owner upon completion of the job.

.7 Escutcheon plates are to be installed at all walls and floors where pipes are exposed to view.

.8 Install auto air vents at all high points in system.

.9 Install drain cup at each backflow preventer vent and drain opening and pipe to nearest floor drain.

.10 Control valves are to be supplied by the Control Contractor (Refer to Section 23 09 23 – Direct Digital Controls) and installed by this division.

3.09 INSPECTION AND TESTING

.1 Make tests that are required, by any authority having jurisdiction, in the presence of the Authority's Authorized Inspector. Tests are to be certified by him.

.2 Test all piping at the completion of roughing-in before connecting to new systems, and prior to concealment, insulation or covering of piping.

.3 Notify the Consultant in writing at least forty-eight (48) hours prior to start of tests. Failure to do so may require test to be re-done.

.4 Heating water piping to be tested by filling the system with water and applying a hydrostatic pressure of 125 psig (860 kPa) which is to be maintained for at least 24 hours. If a freezing hazard exists the Consultant may permit a compressed air test to be substituted.

.5 Perform tests before application of pipe covering. Test buried and concealed piping before backfilling or concealing in structure. Protect equipment and parts not capable of withstanding test pressure during tests.

.6 Any leaks found are to be properly repaired and test reapplied until results satisfactory to the Consultant are obtained.

3.10 PLACING IN OPERATION

.1 Upon completion of the work and before turning over the job, the Contractor is to make a complete test of the various systems.

3.11 HEATING WATER PIPING CLEANING & FLUSHING

.1 All equipment and new piping to be thoroughly cleaned of iron cuttings and other foreign matter as they are installed. Particular attention to be given to:

.1 Valve seats and glands.
.2 Flange or union faces or seats.
.3 Strainers, orifices, etc.

.2 Automatic flow control valves, and all similar devices in which foreign matter could become lodged, are not to be installed until cleaning and flushing is completed.

.3 Systems are to be filled at municipal water make-up connection, with all air vents open. After filling, vents are to be closed.

.4 The Contractor is to start main circulator with pressure reducing valve make-up set. Vents are to be checked in sequence to bleed off any trapped air in order to ensure circulation through all components of system.

.1 **Note:** Be sure pumps are properly aligned and bolted down before start-up to prevent damage to seals or couplings.

.5 Circulate loop water for 24-48 hours and then drain completely to flush out foreign matter.

.6 Check and clean all strainers. If indications are found of excessive dirt, repeat the above flushing, until results are acceptable to chemical supplier and Consultant.

.7 Automatic flow control valves may now be installed. All shut off valves are to be left wide open.

.8 Refill the system with corrosion prevention chemical in sufficient quantity as per manufacturers recommendations. Refer to Liquid Heat Transfer Section 23 80 00.

.9 Apply heat to the system slowly, with pumps operating to produce 122^{o}F (50^{o}C) system water temperature. Recheck all vent points during this heating and remove all air.

.10 The entire system to be thoroughly checked for leaks by pressure testing at 100 psig (690 kPa) for 24 hours with water. The contractor is not to add at any time, any leak-stop compound to the system.

.11 After the system has been completely cleaned and tested, as specified herein, it is to be tested by litmus paper or other dependable method and left with a ph of 8.0 to 10.0. If system is outside of these parameters, water conditioner is to be added as required.

.12 Consultant to be given 1 week notice of this cleaning operation and may be present to observe the cleaning operation, and if the Consultant or his representative deems it necessary, the cleaning operation is to be repeated.

.13 Two weeks after putting the various systems in operation the Contractor shall return to the building and clean out all strainers and scale pockets.

3.17 ROOF FLASHINGS

.1 Turn over flashings to the roofer for installation, provide flashings for each roof penetration.

.2 Ensure that the flashing grommets are not cut or otherwise damaged during installation. Cut or damaged grommets must be replaced, caulking of the flashings to repair leaks will not be accepted.

END OF SECTION

PART 1 : GENERAL

1.01 REQUIREMENTS INCLUDED

.1 The Mechanical Contractor is to be responsible for ensuring that all systems are operating prior to the balancing agency arriving on site and assisting the balancing agency providing any necessary information, repairing failed equipment, providing proper access to equipment etc. In addition, any additional drive changes, pulleys, etc. necessary to achieve the specified values is to be the responsibility of Division 23 and not of the balancing agency.

.2 Conform to the requirements of Section 21 05 01, "Mechanical General Provisions".

.3 The Balancing Agency is to be fully qualified and recognized firm having established a reputation with the Consultant for this type of work. Members of A.A.B.C. on NEBB or operating under the direction of a registered professional engineer will be considered.

.4 Perform this work in accordance with procedures and standards described in SMACNA "Balancing and Adjusting Manual".

1.02 SCOPE OF WORK

.1 This section includes testing, adjusting and balancing of HVAC systems achieve the water and air quantities shown on the drawing. This Section includes but is not limited to the following:

.1 Balancing Air Systems – Constant air volume and VVT systems.
.2 Balancing Hydronic Piping Systems –
.3 Measuring the electrical performance of all HVAC equipment
.4 Verification that automatic control devices are functioning properly
.5 Report results of the activities and procedures specified in this section.

1.02 DESCRIPTION OF SYSTEMS

.1 Air Systems

.1 There are three (3) new ASHP rooftop air handling units (HVAC-1 to HVAC-3). These units provide fresh air, heating, air conditioning, and ventilation requirements to the tech shop revitalized areas of the school.

.2 Units HVAC-2, and HVAC-3 have VVT dampers with bypass dampers.

.3 Air handling unit (HVAC-1), is a constant volume unit.

.4 All three units are be balanced for CO_2 demand control ventilation with minimum outdoor air damper positioned during occupied hours on CO_2 demand control ventilation to increase to maximum fresh air.

.2 Hydronic

.1 There is an existing hydronic heating plant that serves the building with a high temperature heating system. Section of the system are to be removed and new equipment (radiation) installed .
.2 There are new circulation balancing valves (CBV's) with every new section of radiation as indicated on the drawings.

PART 2 : PRODUCTS

2.01 GENERAL

.1 Furnish all test equipment. All equipment will remain the property of the testing and balancing company. Instruments required for the balancing are to have been calibrated within a period of six months prior to balancing. Types, serial numbers, and dates of calibration of all instruments are to be listed in the balancing reports hereinafter specified.

.2 The approved testing and balancing company for this project will be determined by the Consultant.

2.02 MATERIALS

.1 Use materials specified herein, or as defined in Section 21 05 01, "Mechanical General Provisions", Clause 2.1.

.2 Calibrated orifices and portable flow meters are to be used to balance water flow at all points indicated on drawings.

2.03 DUCT ACCESS HOLE PLUGS

.1 Use Duro-Dyne Type IP-4 duct access hole plugs.

PART 3 : EXECUTION

3.01 GENERAL

.1 Include all labour, engineering and test equipment required to adjust and balance all mechanical systems installed under this Division, and described herein.

.2 Prior to proceeding with the balancing the Balancing Agency is to provide the Consultant with a submission report with a working agenda on procedures employed for testing and balancing each system, including all test and balance report forms that are to appear in the final report with all design data already filled in. Testing is not to proceed until submission is reviewed by Consultant.

.3 Review drawings, specifications, addendums, change notices etc. and installed work to ensure that systems may be properly balanced in accordance with drawings. Advise this Division of any additional requirements for effective balancing.

.4 Ensure that all control devices and equipment interlocks are operating in the manner required for the correct performance of the systems.

.5 Ensure equipment is lubricated as per manufacturer's instructions and filters are clean.

3.02 JOB CONDITIONS

.1 Schedule this work in cooperation with other trades involved.

.2 Do not begin testing and balancing until the systems have been completely installed, tested and put in running order, with clean filters. Correct operation of equipment and system components and cleanliness of piping and ductwork is the responsibility of this Division.

3.03 SUBMITTALS

.1 Record all test data and submit four copies of completed reports to the Consultant.

.2 Use data sheets which have been approved by the Consultant to record measurements. Include schematic diagrams of all systems identifying branches, inlets, outlets and equipment.

.3 Submit report in hard cover 3-ring binder, complete with indexing tabs and cover identification at front and side.

3.04 AIR SYSTEMS

.1 Preliminary Check

.1 Check all grilles and diffuser outlets for installation and directional adjustment.

.2 Check all systems are free from obstructions.

.3 Check all manual damper locations and ensure they are locked in open position.

.4 Verify all motorized dampers, fire dampers are installed in open position.

.5 Ensure all access doors are installed and closed tight.

.6 Verify fan rotation, fan drive alignment, and proper belt tension, and advise appropriate trade if any corrections are necessitated.

.7 Check all motors and fan bearings are lubricated, motors are wired and proper heaters and fuses are installed.

.2 Test Procedure

.1 The Contractor is to be responsible for ensuring that all systems are operating prior to the balancing agency arriving on site and assisting the balancing agency providing any necessary information, repairing failed equipment, providing proper access to equipment etc. In addition, any additional drive changes, pulleys, etc. necessary to achieve the specified values is to be the responsibility of Division 23 and not of the balancing agency.

.2 Record all nameplate data on fans and motors.

.3 Start the system and tabulate the initial readings.

.4 Test and adjust fan speeds and dampers to deliver the required air quantities. For belt-driven fans, determine size of sheaves required to properly balance systems and operate systems at minimum static pressures. Changes to sheaves is the responsibility of Division 23.

.5 Make pitot tube traverse of main supply air ducts to verify design air quantities. Seal duct access holes with plugs. Do not use duct tape to seal access holes.

.6 Test and adjust each diffuser, grille and register to within ±10% of design requirements, and also adjust so as to minimize drafts in all areas.

.7 Once all outlets have been adjusted to design the fan capacity performance tests will be retaken.

.8 Make any necessary adjustments to variable speed pulleys or motor tappings to attain design requirements.

.9 Obtain fan performance tests for each possible condition the system may operate in.

.10 On applicable systems record results for units when providing minimum outside air and when providing maximum outside air.

.11 Identify location and method of determining results.

3.05 AIR BALANCING DATA

.1 Include the following information in the test report:

.1 Motors:
Manufacturer
Model and/or Serial number
Rated amperage and voltage
Rated hp (kW)
Rated rpm
Corrected full load amperage
Measured amperage and voltage
Calculated hp (kW)
Measured rpm
Sheave size, type and manufacturer

.2 Fans:
Manufacturer
Model and/or Serial number
Rated cfm (l/s)
Rated rpm
Rated static pressure
Measured cfm (l/s)
Measured rpm
Measured static pressure
Pulley size, type and manufacturer
Belt size and quantity

.3 Air Systems (including inlets and outlets):
Grille, register, diffuser or outlet reference number
Grille, register or diffuser location
Design air quantity
Effective area factor and size
Measured air quantity

.4 Heat Transfer Elements (Coils, etc.):
Manufacturer and type
Design inlet and outlet temperatures
Design pressure drop
Measured inlet and outlet temperatures
Measured pressure drop
Measured flow rate

.5 Testing and Balancing Instruments:
Types
Serial numbers
Dates of calibration

3.06 WATER SYSTEMS

.1 Preliminary Check

.1 All air must be purged from system after start up and before balancing.

.2 Expansion tanks to be checked to ensure they are not air bound and ensure that the system is full of water.

.3 Pump rotation to be checked. Advise appropriate trade if any corrections are needed and ensure corrections are made before starting any balancing.

.4 All strainers and filters shall be cleaned.

.2 Test Procedures

.1 Air balance must have been accomplished before water balance is begun.

.2 Water Pumps are to be set to proper gpm (lpm) delivery, as determined by pressure differential measurements.

.3 Water circuits are to be adjusted by balancing valves as specified.

.4 Flow of water through all equipment is to be adjusted to correct flow.

.5 All balancing valves to be permanently marked after balance is complete so that they may be restored to their correct position if disturbed.

.6 After making adjustments pump settings to be rechecked and readjusted if required.

3.07 WATER BALANCING DATA

.1 Include the following information in the test report:

.1 Motors:
Manufacturer
Model and/or Serial number
Rated amperage and voltage
Rated hp (kW)
Rated rpm
Corrected full load amperage
Measured amperage and voltage
Calculated hp (kW)

.2 Balancing Valves:
Valve reference No.
Valve location
Design flow
Size
Measured flow
Measured pressure differential
Valve setting

.3 Testing and Balancing Instruments:
Types
Serial numbers
Dates of calibration

3.08 FINAL INSPECTION AND ACCEPTANCE

.1 After submission of balancing report, arrange an inspection with the Consultant.

.2 At the inspection recheck points or areas selected by the Consultant.

.3 For each system, if more than 10% of the measurements at the selected recheck stations deviate by 10% or more from those in the Report, then the Report for that system is to be rejected as unacceptable.

.4 If Report is rejected, rebalance systems deemed to be unacceptable, submit new Reports, and make reinspection at no extra cost to the Owner.

.5 After acceptance of the Report by the Consultant, permanently mark settings of valves, splitters, dampers and other adjustment devices so that adjustment can be restored if disturbed. Type of marking and method of application to be approved by the Consultant.

END OF SECTION

PART 1 : GENERAL

1.01 GENERAL PROVISIONS

.1 Conform to General Conditions, Supplementary General Conditions and Sections of Division 01, as applicable.

.2 Conform to the General Provisions of Section 21 05 01.

.3 Provide work under this Section as shown or specified and in accordance with the requirements of the Contract documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

.1	Basic Materials & Methods	Section 23 05 01
.2	Air Distribution	Section 23 30 00
.3	Liquid Heat Transfer	Section 23 80 00

1.03 CLARIFICATION

.1 Insulation may extend through fire rated separations when used in conjunction with firestopping material specifically tested for this purpose.

PART 2 : PRODUCTS

2.01 GENERAL

.1 Insulating materials by Johns Manville. Manson Insulation, Knauf Insulation and Owens Corning are considered equal.

.2 For adhesives and mastics for applications noted equal products of the following manufacturers will be accepted: Foster; 3M and Ductmate.

.3 All insulation and covering materials are to be non-combustible, and asbestos free. Vapour barrier jacket, and adhesive to be fire retardant to approved standards of fire hazard classification for building materials. Flame spread rating not to exceed 25 and smoke rating not to exceed 50.

2.02 MATERIALS

.1 Heating Supply and Return Piping:

.1 Piping Insulation – Johns Manville Micro-Lok preformed rigid, glass fibre pipe insulation, complying to ASTM C547 with a white factory applied all service vapour barrier jacket of kraft paper reinforced with a glass fiber yarn and bonded to an aluminium foil, with self-sealing longitudinal closure laps and butt strips. Insulation conductivity shall be in the range of 0.25 - 0.29 BTU in/(h.ft^3.^{o}F) with mean temperature of 125^{o}F.

.2 Exposed Insulation – Finish with Johns Manville Zeston 2000 PVC white 20 mil (0.5 mm) “Cut & Curled” factory-cut jacketing.

.3 Fittings and valves – All fittings, valves, tees, flanges, connections etc. to be insulated with factory pre-cut Johns Manville Hi-Low Temp insulation inserts of a thickness equal to that of the pipe insulation and covered with Johns Manville Zeston 2000 white PVC fitting covers.

.4 Insulation of be of thickness as follows:

Pipe Size	Insulation Thickness
3/4" (19 mm) - 1¼" (32 mm) φ pipe	1½" (38 mm)
1½” (38 mm) – 8” (203 mm) φ pipe	2” (50 mm)

.5 Unions and piping between shutoff valve and coil not exceeding 4 ft. (1.2 m) do not have to be insulated.

.2 Ductwork:

.1 External (Rigid) – Johns Manville Spin-Glas 814 rigid fibreglass insulation board 3.0 PCF (48 kg/m^3) in exposed areas. Finish with 8 oz. (227 gm) canvas adhered with welding pins on 12" (305 mm) to 18" (457 mm) centres, secured with clips. Apply to outside of ductwork. (Min R - Value of 4.0/in.).

.2 External (Flexible) – Johns Manville Fibreglass all service faced flexible duct insulation 0.75 PCF (12 kg/m^3) with factory applied FSK reinforced foil facing. In exposed areas finish with 8 oz (227 gm) canvas, adhere with fire retardant adhesive, applied in strips 6" (150 mm) wide and 12" (305 mm) on centres. (Min R-Value of 2.5/in).

.3 Internal - Fibreglass duct liner of thickness as indicated, with neoprene coating. Adhere with minimum 50% covering of fire retardant adhesive, and supplement with welding pins. (Min R - Value of 4.0/in.).

PART 3 : EXECUTION

3.01 GENERAL

.1 Do not apply insulating materials until equipment to be insulated has been properly cleaned, dried and tested to the satisfaction of the Consultant.

.2 Apply all insulation, wrapping, vapour barrier, adhesives, coatings, and cement in strict accordance with manufacturer's recommendations.

.3 Do not apply any insulation or finishing when the ambient temperature in the space is less than 50°F (10°C).

3.02 INSTALLATION APPLICATION

.1 Apply all covering in a neat and workmanlike manner to present a clean appearance upon completion of the job.

.2 Apply all insulation in a manner to facilitate replacing and/or servicing of equipment.

.3 Make good and refinish cracks, undulations or any other deficiencies occurring in the insulation or vapour barrier.

.4 On all piping, equipment and ductwork, terminate the insulation neatly around all openings and items requiring periodic access. Insulate separately with removable 16 gauge galvanized sheet steel panels lined with rigid slab insulating materials providing equivalent insulation to that on the adjoining surface.

.5 Provide metal corners concealed within the canvas finish on all exposed rigid duct insulation.

.6 Do not use staples on vapour barriers.

.7 Provide the following insulation work:

.1 All supply air ductwork located in Mezzanine Mechanical Fan Room - 1" (25mm) external (flexible).

.2 Do not insulate exposed ductwork in shops and any open ceiling areas.

.3 Ductwork where indicated on the drawings with cross-hatching - 1" (25 mm) internal (by sheet metal contractor, refer to Section 23 30 00). Note, where return ductwork in Fan Mechanical Room in internally insulated it will not require external insulation.

.4 All heating supply and return piping.

.5 Repair or replace any existing insulation damaged as a result of the work, where new connection to existing systems or where indicated to be re-insulated. Match existing for thickness and finish, unless exposed, then finish to match new.

.8 On all piping having vapour barrier jacket, the adjoining section of insulation is to be butted firmly together and the longitudinal seams of the vapour jacket to be sealed with vapour barrier adhesive. End joints are to be sealed with 4" (100 mm) factory furnished vapour barrier strips.

.9 Apply insulation over clean dry surfaces butting and adjoining sections firmly together and sealing or taping smoothly over joints.

.10 Where the pipe hanger is around the insulation, provide a 6" (152 mm) length at equal thickness of moulded thermo - 12 insulation, protected with a saddle, within the pipe support. Coordinate with Contractor installing hangers referenced in Section 23 05 29.

.11 Extend pipe and duct insulation and covering through sleeves, walls, floors, ceilings, and structural beams, unless indicated otherwise on drawings, or other sections of this specification.

.12 Cover angles and standing seams which extend beyond face of applied insulation with 1/2" (13 mm) thick blanket of glass fibre insulation fitted with factory applied facing of fire resistant kraft paper. Provide 3" (75 mm) overlap on each side of angle or seam. Apply strips of 1" (25 mm) thick glass fibre insulation board over blanket type insulation, allowing extended portion of angle or seam to project through work.

.13 Seal holes, corners, and joints with 3" (75 mm) wide scrim foil tape immediately following application of insulating materials.

.14 On ducts insulated with flexible external insulation, provide pins to adhere the insulation to the duct on duct 24" wide and larger. Clip the insulation to the pins, trim the excess pin and tape over the clip.

.15 Prior to insulating any ducts, verify with the balancing agency where they will require holes for traverse reading and insulate around their fittings.

.16 On all exposed ducts specified to receive external insulation, install metal corners and cover the corners with canvass and lagging as specified.

.17 Refer to Section 23 30 00 Air Distribution for Installation of internal duct liner.

.18 Cover all exposed pipe insulation with PVC jackets

END OF SECTION

PART 1 : GENERAL

1.01 GENERAL PROVISIONS

.1 Conform to the General Provisions of Section 21 05 01.

.2 Provide work under this Section as shown or specified and in accordance with the requirements of the Contract documents.

1.02 QUALITY ASSURANCE

.1 Conform to local and district by-laws, regulations and published engineering standards.

.2 Conform to the 2012 Ontario Building Code (OBC) Compendium containing the Building Code Act, and including all amendments.

.3 Conform to SMACNA Standards.

.4 Conform to ASHRAE Recommendations (1988 Handbook).

.5 Conform to ASHRAE 90.1.

1.03 RELATED WORK SPECIFIED ELSEWHERE

.1	Basic Materials & Methods	Section 23 05 01
.2	Mechanical Insulation	Section 23 07 00
.3	Packaged Outdoor Air Handling Units	Section 23 74 00
.4	Building Automation Systems	Section 25 05 00
.5	Electrical	Division 26

1.04 SUBMITTALS

.1 Submit shop drawings in accordance with Section 23 01 00 paragraph 1.04 for the following equipment:

.1 Fire Dampers and Access Doors
.2 Grilles and Diffusers
.3 Manual Balancing Dampers

.2 Submit certificates indicating that all required testing has been successfully completed.

PART 2 : PRODUCTS

2.01 RECTANGULAR LOW PRESSURE DUCT MATERIALS

.1 For the purpose of this specification low pressure ductwork is to be ducted for systems below 1" (249 pa) static pressure. This includes all ductwork indicated on the drawings with the exception of that indicated in other parts of this section.

.2 Ductwork shall be constructed to withstand 1 1/2 times the working static pressure with a leakage rate of 5% maximum and designed to operate at 1 1/2" w.g. (373 pa) maximum pressure.

.3 Fabricate ducts from smooth finish prime grade, new, open hearth, soft steel sheet, galvanized, conforming to manufacturer's standard thickness as specified herein.

.4 All sides of ducts over 10" (254mm) in either dimension, to have all sides cross-broken or beaded at 12" (305mm) spacing, except area of the duct where outlets are to be installed.

.5 Thickness and Reinforcing of Sheet Metal Ductwork Material and Thickness

Largest Duct Dimension Up to	Steel Thickness Gauge (mm) Duct	Slip	Recommend Cons't. Transverse Joints
12" (305mm)	26 (0.551)	26 (0.551)	Flat drive cleat on side, flat S cleat on top and bottom. Joints on 96" (2438mm) centres max.
13" to 20" (330mm to 508mm)	26 (0.551)	26 (0.551)	Flat drive cleat on side, 1" (25mm) standing S cleat on top and bottom. Joints on 72" (1819mm) centres max.
21" to 30" (533mm to 762mm)	24 (0.701)	26 (0.551)	Flat drive cleat on sides up to 20" (508mm), and 1" (25mm) standing drive slip over 20" (508mm). Top and bottom 1" (25mm) standing S cleat. Joints on 48" (1219mm) centres maximum.
31" to 48" (787mm to 1219mm)	24 (0.701)	24 (0.701)	Flat drive cleat on sides up to 20" (508mm), and 1" (25mm) standing drive slip up to 30" (762mm), and 1" gasketted and bolted formed flange over 30". Top and bottom 1" (25mm) standing S cleat. Joints on 48" (1219mm) centres maximum. *(* Stays if required.)
49" to 60" (1245mm to 1529mm)	22 (0.853)	22 (0.853)	Flat drive cleat on sides up to 20" (508mm), and 1" (25mm) standing drive slip up to 30" (762mm), and 1" gasketted and bolted formed flange over 30". Top and bottom 1 1/2" (38mm) gasketted and bolted formed flange. Joints on 48" (1219mm) centres maximum.

.6 The Contractor at his own discretion may also use flange duct joints; Ductmate or Nexxus.

.7 Acoustical Liner:

.1 Ducts are to be increased in size by thickness of insulation added to maintain inside dimensions as per indicated duct sizes and to ensure no increase in duct design velocity.

2.02 CIRCULAR DUCT AND FITTINGS, SINGLEWALL

. 1 All circular spiral ductwork to be galvanized unless indicated otherwise on the drawings.

Circular Spiral Ductwork

.1 Material:

- Galvanized steel conforming to ASTM standard A653 and A924.
- Stainless steel type 304L conforming to ASTM standard A240
- Stainless Steel type 316L conforming to ASTM standard A240
- Aluminium T3003.

Surface Finish.

- Galvanized steel (galvanized in accordance with latest SMACNA Standards)
- Stainless steel type 304L – 2B Mill Finish
- Stainless steel type 316L = 2B Mill Finish

.2 Thickness

.1 Material thickness constructed from galvanized steel in accordance with latest SMACNA's HVAC Duct Construction Standard for +10" water gauge pressure.

.3 Construction:

.1 Duct is of spiral lock seam construction with a mechanically formed seam locking indentation evenly spaced along the spiral seam. All spiral duct 8" diameter and larger shall incorporate multiple corrugations between spiral seams.

.2 Fittings shall be manufactured using one or more of the following construction methods:

- Overlapped edges stitch welded along the entire length of fitting
- Standing seam gore locked and internally sealed
- Button punched and internally sealed
- Elbows 3" through 12" diameter will be die stamped and continuously stitch welded.

.4 Connections

.1 Fitting ends shall be sized to slip-fit into spiral duct of the same nominal size.

Fitting to fitting connections shall be made by use of duct size “MF” couplings. Duct to duct connections require fitting size “NP” couplings.

.5 Joint Sealing

.1 All joints must be sealed by the installer during the installation process. The type of sealant used as well as the method and level of application should be as directed by the specification and accordance with the sealant manufacturer’s published installation instructions.

.6 Acceptable manufacturers: Alpha Sheet Metal, Flexmaster, EHG Air Distribution Solutions.

2.03 FAN DUCT CONNECTIONS

.1 Regular Low Pressure Duct.

.1 Provide flexible duct connectors Duro-Dyne "Durolon" woven glass fibre 24 oz. per sq. yd. (814 gm per sq.m), tensile strength of not less than 450 x 400 lb., coated both sides with Du Pont Hypalon, with 3" (76mm) metal to 6" (152mm) Durolon to 6" (152mm) metal "Grip-Lok" duct connections.

.2 Stainless Steel Fume Exhaust Duct

.1 Provide flexible duct connectors Duro-Dyne “Neoprene” woven glass fibre 30 oz. per sq. yd. (1017 g per sq. m), tensile strength not less than 450x 350 lbs., coated both sides with Polychloroprene, secured to ducts and fans with 1” x 0.12” (25mm x 3mm) SS type 316L flat bars or bands using type 316L SS screws or bolts at 4” (100mm) intervals.

2.04 SPLITTERS AND BALANCING DAMPERS

.1 Splitters to be made of at least the same thickness metal as the duct (minimum thickness 20 ga. (1.006mm). They are to be securely hinged at the air leaving edge, and made of two thicknesses so the entering edge presents a rounded surface to air flow. Minimum length of splitter is 12" (305mm). Splitter length is 1 1/2 times the width of the smaller duct when duct width is from 8" to 24" (203mm to 610mm). Splitter length for duct widths greater than 24" (610mm) is 1 1/4 times the width of the smaller duct.

.2 Splitters to be anchored at the air entering edge by a SRP-40 Duro Dyne fitting and a 1/8" (3mm) adjustable rod that passes thru a Duro Dyne SRP-14 ball joint damper casting, on the outside of the duct.

.3 Balancing dampers for round duct shall be butterfly style, constructed of 22 U.S. gauge (1.613mm) thick steel, trimmed for a proper fit within the duct and securely mounted in the duct. Manufactured components such as Nailor 1890 series are considered equal.

.4 Balancing dampers for square duct shall be multi-blade opposed blade balancing dampers, Nailor 1810 series or equal; 16 gauges galvanized steel blades mounted on ½” Celcon bearings in a 16 gauge galvanized frame.

.5 All balancing dampers to be controlled manually and able to lock in place with damper quadrant or other suitable device. Damper rod end to be marked indicating blade position.

2.05 FIRE DAMPERS

.1 Fire dampers to be shall be manufactured, tested and labelled in accordance with CAN/ULC-S112, and to be ULC listed and labelled for 1 1/2 hour fire rating. Fire dampers are to meet all requirements of NFPA 90, NBC and OBC.

.2 Fire dampers to be galvanized steel channel frame curtain type galvanized steel interlocking blades, minimum 22 gauge (0.853mm) galvanized steel enclosure, and 165°F (70°C) fusible link standard. Fusible links for 135°F (57°C), 212°F (100°C), or 284°F (140°C) shall be provided if indicated on drawing as such.

.3 Fire dampers for horizontal installation in vertical ductwork to be operated by a stainless steel closure spring and latch.

.4 Fire damper configuration to be low resistance type B with blades located outside of the air stream (unless detailed otherwise) for rectangular ductwork, and type C for round or oval ductwork.

.5 All fire dampers are to be DYNAMIC rated.

.6 Approved manufacturers: Ruskin, Controlled Air, Nailor, Kerr Hunt and Ventex.

2.06 REMOVEABLE DUCT SECTIONS

.1 Fire and Smoke Damper Access: Ductwork serving dampers 12” x 12” and 12” diameter inside clear dimensions and smaller to be provided with a removable ductwork section for damper and smoke detector inspection and maintenance. Removable ductwork section to function without the use of tools and shall not be more than 4” away from the fire damper sleeve break away connection on the smoke detector side of the damper. Contractor to provide manufacturer with quantity, sizes and static pressure as indicated on drawings.

.2 Sure-Clamp Access Rectangular and Round: Access section shall be suitable for ductwork pressure class and manufactured to maintain 100 percent of ductwork free area with a clamping type draw latch. Allowable leakage: 1/2 CFM for 2” W.G.

.3 **Material:** Galvanized G-90 ASTM A527 **Access Section:** 26 gauge galvanized 12” long constructed with Pittsburgh lock seam. **Flange Connection:** 18 gauge galvanized. **Clamps:** 20 gauge galvanized with zinc coated draw latch. **Gasket:** Neoprene gasket 3/16” x 1-1/4”, gasket profile forms to the inside of the clamp and seals the outer edges of the access section 18 gauge flanges. Seal seams in accordance with SMACNA HVAC Duct Construction Standard – Metal and Flexible. Liner (if specified): ½” Armaflex internally lined.

.4 Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:

1. Langdon, Inc.
2. Approved Equal

2.07 ACCESS PANELS

.1 Ductwork to be fabricated from 20 gauge (1.006mm) galvanized steel, hinged to 20 gauge (1.006mm) galvanized mounting frame complete with fastening devices and felt gasket. Doors in insulated ducts to be double panel construction with 1/2" (13mm) rigid insulation between metal. Acceptable manufacturers: Nailor-Hart, Controlled Air,

.2 Finished walls and ceilings to be steel as manufactured by Le Hage, and to be as recommended by the manufacturer for each particular installation.

.3 Access panels in walls, shafts or ceilings having a fire rating or forming part of a fire rated assembly or fire separation to have ULC 1-1/2 hour B label equal to Le Hage L-1010 with cylinder lock and interior latch release.

.4 Acceptable manufacturers: Acudor Acorn Ltd, MiFab

2.08 TURNING VANES AND VANE RAILS

.1 Turning vanes in rectangular duct elbows to be double walled vanes equal to Duro-Dyne "Duro Vane Rail" or Hart & Cooley "Ducturn".

2.09 DIFFUSERS, GRILLES AND REGISTERS

.1 Provide all diffusers, grilles and registers complete with accessories as scheduled on the drawings and indicated in the details.

.2 For T-Bar lay-in ceilings the grilles, registers, and diffusers are to lay into T-Bar system and no flange to extend beyond flange of T-Bar.

.3 For manufacturer and model refer to schedule on drawings.

.4 Titus, Metal*Aire, Krueger, E.H. Price, Carnes, Tuttle & Bailey and Nailor Hart are equal products.

2.10 VIBRATION ISOLATION

.1 Fans to have spring vibration isolators to give a minimum efficiency of 95%.

2.11 MOTORIZED CONTROL DAMPERS

.1 Motorized Control Dampers shall be Tamco Series 9000.

.1 Damper frame construction shall be 4 deep, .080" thick extruded aluminium insulated with rigid Styrofoam on four sides and flanged for flange mount to duct.

.2 Blades shall be extruded aluminium (6063T5) insulated with expanded polyurethane foam and shall be thermally broken. Complete blade shall have an insulating factor of R-2.29.

.3 Blade gaskets shall be extruded EPDM. Frame seals shall be of extruded TPE.

.4 Blade bearings are to be composed of a celcon inner bearing fixed to a 7/16" aluminium hexagon blade pin, rotating within a polycarbonate outer bearing inserted in the frame.

.5 Linkage hardware shall be installed in the frame side and be constructed of aluminum and corrosion resistant, zinc plated steel, complete with cup-point trunion screws for slip-proof grip.

.6 Minimum leakage on a 48" x 48" damper at 4" W.G. shall be less then 4.12 CFM per sq. ft. Damper shall meet AMCA Standard 500 performance criteria.

.7 Pressure drop of a fully open 48" x 48" damper shall not exceed .03" w.g. AT 1000fpm.

.8 Dampers shall be available in opposed blade or parallel blade action.

.2 Dampers shall be parallel blade action for two position operation and opposed blade action for modulating face and bypass operation, and sized to suit opening they will be installed in without blanking off free area.

.3 Approved Alternate Manufacturers: Nailor, Ruskin and NCA meeting this specification.

.4 Actuators shall be provided under Section 23 09 23 – Direct Digital Control Systems.

2.12 ACOUSTIC DUCT LINER

.1 Duct liner shall be equal to Johns Mansville "Linacoustic R-300" rigid fibreglass Plenum Liner board with reinforced coating, with airstream surface treated with an antimicrobial permacote coating. Insulation to be 25 mm (1") think unless noted otherwise.

.2 Insulation shall be in compliance with ASTM C1071 – Type II, ASTM G21 and G22, SMACNA Application Standards for Duct Liners, NAIMA Fibrous Glass Liner Installation, ASTM E84 – FHC 25/50, NFPA 90A and 90B, Conforms to ASHRAE 62 and Canada CGSB 51,10 and CAN/ULC S102.

2.13 VVT DAMPERS

.1 VVT dampers are to be as follows:

.1 Round Dampers:

.1 Shall be equal to Nailor Model: 1090 or equal. ultra-low leakage steel butterfly control damper, shall be designed for all types of round ductwork applications. Suitable for use in low to medium pressure and velocity commercial HVAC systems.
.2 Shall be sturdy beaded casing for superior rigidity, a 14 ga. (2.0) equivalent laminated blade double bolted to the drive shaft for maximum strength, long life corrosion resistant synthetic bearings and blade seals for low leakage requirements.
.3 The damper shall be capable of two position or modulating control using electric actuators, complete with actuator side mounting plate.
.5 Blade: 2 x 20 ga. (1.0) corrosion-resistant steel laminated together, equivalent to 14 ga. (2.0). open and close end stops, 90º rotation, CCW to open with cross-linked polyethylene blade seal.
.4 ½” (13mm) diameter plated steel double bolted to blade axle extends approximately 6” (152 mm) beyond frame, with Celcon® bearings.

.2 Square and Rectangular Dampers:

.1 Shall be Nailor 1010/20 Series or equal low leakage dampers designed for low to medium velocity and pressure commercial HVAC systems.
.2 They meet the frequently specified leakage criteria of less than 10 cfm per sq. ft at 4" w.g. (0.5% at 2000 fpm). Shall have sturdy hat channel frame with die-formed corner gussets for reinforcement and structural strength equivalent to 13 gauge channel type frames, a vee groove blade design that maximizes strength and zero maintenance concealed linkage (out of the air stream) for reduced pressure drop and air turbulence.
.3 Frame: 5" x 7/8" x 16 ga. (127 x 22 x 1.6) galvanized steel hat channel with die-formed corner gussets. Low profile (flat top and bottom) on dampers 10" (254) high and under.
.4 Blades: 6" (152) wide on 5 1/2" (140) centers. 16 ga. (1.6) galv. steel vee groove design. Parallel or opposed action.
.5 Linkage: Concealed type totally enclosed within the frame and out of the airstream. Plated steel.
.6 Bearings: 1/2" (13) dia. Celcon®.
.7 Axles: 1/2" (13) dia. plated steel double bolted to blades.
.8 Drive Shaft: 6" (152) long x 1/2" (13) dia. lock-on drive shaft on all single section dampers. A 1/2" (13) or 1" (25) dia. factory installed jackshaft is standard on all multiple section dampers.
.9 Blade Seals: Dual durometer bulb type extruded PVC.
10. Jamb Seals: Compression type cambered metal.
.11 Damper sizes less than 8”x10” (203x254) shall be single blade, dampers 8”x10” (203x254) and larger shall have two blades in parallel.

.2 Actuators shall be provide and installed by Control Contactor, refer to Section 25 00 00 – Building Automation Systems

PART 3 : EXECUTION

3.01 DUCT INSTALLATION - GENERAL

.1 The Contractor to furnish all labour and incidental materials and perform all the operations for the installation as specified.

.2 All ducts to be located in co-operation with the other trades to clear lights, pipes, plumbing, etc. In cases where cross beams, pipes, etc., to pass through ducts, air foils to be installed.

.3 In general, all ducts to be constructed that they may be dismantled and cleaned. All visible internal portions of duct outlets behind grilles and registers to be painted dull black.

3.02 DUCTWORK CONSTRUCTION AND INSTALLATION - GENERAL

.1 Ducts up to 24" (610mm) in either dimension to have reinforcing ribs, spaced not more than 8 ft. (2440mm) apart.

.2 Ducts over 24" (610mm) in either dimension to have reinforcing ribs, spaced not more than 4 ft. (1220mm) apart. Ducts shall have supplemental stiffening as required to prevent drumming and provide a structurally sound assembly.

3.03 CHANGE IN SHAPE OR DIMENSION

.1 Slope requirements for transformations that either increase or decrease duct area to a minimum of 1:7.

.2 The angle of transformation at connections to heaters or other equipment is not to exceed 30 degrees from a line parallel to the airflow on the approaching side of the equipment, and 45 degrees on the leaving side of the equipment. The angle of approach may be increased to meet space conditions when the transformation section is provided with vanes.

3.04 CHANGES IN DIRECTION

.1 Changes in direction and shape shall be kept to the minimum, permitted by distribution requirements and building conditions. Turns to be made with these elbows as required in the following order of preference on all supply, return and exhaust ductwork.

.2 Unvaned elbow, throat radius 3/4 width of duct and full heel radius.

.3 Elbows with inside radius less than 3/4 width of duct but not less than 3" (75mm) and full heel radius and single thickness turning vanes

.4 Square elbow with double thickness turning vanes spaced at 1 1/2" (38mm) centres up to 24" (610mm) duct and 3" (75mm) centres over 24" (610mm).

3.05 BALANCING DAMPERS

.1 Splitter or opposed blade dampers for adjustment of air distribution to respective branches to be located as indicated on drawings, or as described in other parts of this specification.

3.06 SEAMS

.1 Sections to be assembled with Pittsburgh lock or grooved longitudinal seams, fully closed for tightness and appearance.

3.07 JOINTS AND REINFORCEMENT

.1 Duct sections to be jointed by flat "S" or Standing "S" cleats which conform to following general requirements:

.1 Ducts up to 18" (457mm) in width to have flat "S" cleats on top and bottom and drive cleats on sides.

.2 Ducts over 18" (457mm) width to have standing "S" cleat on top and bottom and drive cleat on sides.

.3 Where length of drive cleat exceeds 24" (610mm), a standing "S" or standing "T" cleat to be used and corners taped for tightness.

3.08 SUPPORTING OF DUCTS

.1 All ducts to be adequately supported. For ducts up to 18" (457mm) in width, hangers to be placed on not more than 8 ft. (1440mm) centres; ducts 19" (483mm) and above in width on not more than 48" (1220mm) centres. Hangers to be placed plumb and present a neat appearance.

.2 Hangers on ducts up to 36" (914mm) in width to be constructed from galvanized band iron 1” x 16 gauge (25mm x 1.6mm). On ducts 37" (940mm) and above in width, hangers to be constructed from galvanized iron angles not less than 1 1/2" x 1 1/2" x 1/8" (38mm x 38mm x 3mm). Hangers to extend down the sides of the ducts to bottom of duct with angle bent around bottom for support. Fasten to duct with sheet metal screws on sides and bottom. Hangers on ducts to be of same material as ductwork.

.3 Hangers bands to extend the full depth of duct with bottom of hanger being toed in under duct. Hangers to be attached to the duct using not less than three rivets or metal screws.

.4 On reinforced concrete, all hangers for ductwork to be fastened to the concrete by Ram-Set studs or expansion shields and lag bolts.

.5 Ducts cannot in any location, be supported from the furring, ceiling construction, piping, conduit or other ducts.

.6 The use of perforated band iron for supporting of ducts is not permitted.

.7 In Mechanical Rooms, at approved locations where ducts are supported from the floor, install galvanized angle irons with base plates anchored to floor slab. Supports to be placed so as not to interfere with access to or around equipment and be attached to the floor slab.

3.09 REINFORCING OF SHEET METAL - GENERAL

.1 All ductwork 12" (305mm) and over in either dimension to be cross broken except those to which internal rigid board insulation is applied. Where drive cleat is used, top and bottom corners to be caulked before cleat is turned over to make duct air tight.

.2 All other joints to be caulked at all corners before and after joint is made to make duct completely air tight.

.3 All standing "S" cleats referred to are to be machine made for purposes of extra reinforcing.

.4 All longitudinal seams are to be Pittsburgh lock seam hammered over and made air tight.

.5 Where a duct falls into certain maximum duct size classification the entire duct, sides top and bottom, is to be of the gauge specified.

.6 Sheet metal screws to be used on sides of ducts where standing "S" cleat is used or reinforcing angle on 12" (305mm) centres or minimum 2 screws per side.

3.10 SHEET METAL INSTALLATION

.1 During installation, the open ends of ducts shall be protected to prevent debris and dirt from entering. The Contractor to install this work in accordance with the overall approved progress schedule and in co-operation with all other Contractors so there is no delay to other trades.

.2 All necessary allowances and provisions to be made in the installation of the ducts for the structural conditions of the building and other trades, and ducts to be transformed or divided as may be required. Ductwork to be altered or modified so as to give an effective sectional area equal to that originally shown without exceeding an aspect ratio of 4:1. All of these changes, however, must be approved and installed as directed at the site, or as approved on shop or erection drawings, and at no additional cost.

.3 All exposed spiral ducting to be installed in a neat manner with each section overlapping the next and all exposed edges sealed.

.4 All exposed ducting to be supported from a single hanger rod with support plate on inside of duct.

3.11 SPECIAL BRACKET

.1 Where the method of support specified above is not applicable, vertical risers and other duct runs, in general, to be supported by substantial angle brackets designed to meet field conditions.

3.12 DUCTS AT MASONRY

.1 Where ducts are shown connecting to or terminating at masonry openings, and/or along the edges of all plenums at floors, walls, ceilings, etc. provide a continuous 1 1/2" x 1 1/2" x 1/8" (38mm x 38mm x 3mm) galvanized angle iron bolted to the construction and made air tight to same by applying approved caulking compound on the angle before they are drawn down tight. The sheet metal at these locations to be bolted to the continuous angle iron.

3.13 LOCATION OF OUTLETS

.1 The position of all outlets shown on the drawings are approximate only and this Contractor is to check the location of all outlets with the Consultant and make such adjustments in position as are necessary to conform with architectural features, acoustic tile pattern, etc. and the outlets required by other trades without extra charge. Ceiling outlets and their assemblies to be constructed so that they fit the spacing and manufacture of the removable acoustic ceiling.

3.14 OUTSIDE OPENINGS

.1 Unless specifically noted otherwise, openings in the outside walls, roof, etc. to be left for this Contractor, where shown and required for fresh air intakes and exhausts.

.2 Louvres birdscreens, etc. for these intakes and exhausts, to be supplied and installed by this Division. Supply and install all necessary ductwork and plenums for intakes and exhausts and patch around same to make a weather tight job. Co-operate with all other trades on exact location of these openings, ducts, and louvres, serving the air systems. Supply and install 14 ga. insulated louvre blank-offs where shown for blanking off unused portion of louvres.

3.15 DUCT ACCESS DOORS

.1 Install access doors to fire or other dampers, for service, inspection, any other normal maintenance requirements, and for cleanouts where required on specialty systems. Ensure that such access doors are of a size that equipment to be attended is accessible.

.2 Install an access door on the upstream side of each duct mounted heating coil.

3.16 TURNING VANES

.1 Install small arc air foil vanes in ducts at elbows where centre-line radius is less than 1 1/4 times turning dimension of duct, in all square supply air elbows and/or all square elbows under positive pressure and where indicated on drawings.

.2 Square elbows with turning vanes equal to Duro-Dyne double thickness vanes spaced at 1 1/2" (38mm) centres up to 24" (610mm) duct and 3" (75mm) centres over 24" (610mm). Rovane duct turning vanes are acceptable.

3.17 FIRE DAMPERS

.1 Fire dampers are to be installed in all locations shown or where required by the Fire Marshal and to be labelled by Underwriter's Laboratories, Canada.

.2 Generally where any duct or any outlet passes through any required fire wall, fire separation with a fire resistance rating, or fire rated ceiling the duct to be provided with the Fire Marshal's approved automatic fire dampers built into the wall. Dampers to be supported from the structure and not from the ducts or grilles, to allow duct drop off under fire conditions.

.3 In addition, install in all systems where ducts service two or more stories, at each floor level Fire Marshal approved dampers, leaf dampers, fitted with fusible links of a Fire Marshal approved temperature rating to close airtight on linkage failure. Provide access to dampers for linkage replacement.

.4 The complete fire damper installation to be in strict accordance with manufacturers recommendations, NFPA-90A and meet the approval of all authorities having jurisdiction. Install fire dampers supplied as accessories under other sections of specifications. Refer to Section 15850. All smoke and fire damper locations to be shown on "As Built Drawings".

3.19 FAN-DUCT CONNECTIONS

.1 Install (Duro Dyne Grip-Lock Durolon) duct connectors unless specified otherwise to suit system pressure between ductwork and all fan equipment on both sides to isolate where indicated and on all fan equipment.

3.20 CONNECTIONS TO EQUIPMENT INLETS AND OUTLETS

.1 Mechanical contractor to ordinate the specified duct sizes on the drawings and the inlet and/or outlet connections on air handling equipment, supply. exhaust and return fans, air terminal units etc. and provide the necessary transition from ductwork to inlet and outlet of equipment.

.2 On rooftop equipment provide the necessary transition from inlet and/or outlet of equipment transition to duct size and/or roof opening with-in the roof curb.

3.21 DIFFUSERS, GRILLES AND REGISTERS

.1 Install all diffusers, grilles and registers complete with accessories as detailed on the drawings and in strict compliance with manufacturer's recommendations.

.2 This Division is cautioned that before ordering of any units details should be checked for verification of size of unit and flanging arrangement required.

.3 Co-operation to be exercised so that registers and diffusers do not conflict with structural steel, lights, tile and grids, etc. It is the responsibility of this Division to bring it to the attention of the Consultant of any such confliction of equipment prior to the installation of any registers and diffusers.

3.22 WATERTIGHT DUCT

.1 Provide watertight ductwork for:

.1 Fresh air intakes.
.2 Exhaust air outlets.

.2 Form bottom of duct without longitudinal seams. Solder or weld joints of bottom sheets and sides. Solder or weld transverse joints and caulk.

.3 Slope duct back to exterior louvre outlet and provide weep holes for drainage.

3.23 CURBS

.1 All roof curbs are to be provide by manufacturer of equipment being supported unless otherwise indicated. All curbs to be minimum 24” (610 mm) high. All curbs flashed by Roofing Contractor. Refer to details on Drawings.

3.24 MOTORIZED DAMPERS

.1 Install all motorized dampers supplied by Section 25 00 00 – Building Automation Systems. in all locations indicated on the drawings and described in this specification, except those dampers supplied as part of a packaged unit.

3.25 SEALING OF DUCTS

.1 Seal all seams and joints in all duct systems for an air-tight installation. All connections shall be sealed, including but not limited to spin-ins, taps, other branch connections, access doors, access panels and duct connections to equipment. Spiral lock seams systems need not be sealed.

.2 Duct sealer shall be high pressure, high velocity water based duct sealer. Apply sealer with either brush or caulking tube.

.3 On exposed duct scheduled for painting, seal only with product from caulking tube taking care to maintain a neat finished appearance to the duct.

.4 Duct sealer shall be Duro Dyne DSW or equal.

3.26 ACOUSTIC DUCT LINER

.1 Install acoustic duct liner in all ducts shown cross-hatched, or otherwise specified with duct liner. **Contractor shall oversize the sheet metal of the ductwork so that the interior dimensions of the acoustic liner is equal to the duct sizes indicated on the drawings.**

.2 Apply adhesive to the interior of the duct and supplement the adhesive with welding pins and clips, the pins shall be spaced no further than 12" apart, no more than 4" in from a corner or edge of the duct. Duct 8" wide and smaller does not require adhesive supplement.

.3 Trim all pieces of liner such that all corners and joints fit tight, without bulges.

.4 Apply liner adhesive to all joints, seams, and exposed edges, including all traverse joints as the duct is assembled.

.5 At the upstream leading edge of exposed liner, provide a step collar or insulation stop to cover the entire edge of the exposed liner.

.6 Interrupt the duct liner installation at fire dampers.

.7 Where dampers (motorized or manual), turning vane, or other interior duct device is to be mounted, provide a metal hat section or other build out to secure the damper or device. Fire dampers may not be mounted to a hat section, oversize fire dampers to the outside duct dimensions or provide step collars on either side of the fire damper.

3.27 VVT DAMPERS

.1 Contractor to install VVT boxes in accordance with manufacturers recommended installation and operation instructions.

.2 Each VVTI unit be independently supported, Hanger straps may be used and screwed directly into the sides or bottom of the unit casing (refer to drawings). Alternately, a trapeze setup. Use the support method prescribed for the rectangular duct in the job specifications.

.3 Slip each inlet duct over the inlet collar of the terminal. Fasten and seal the connection as described in the job specification. The diameter of the inlet duct for round inlets must be equal to the listed size of the damper. The inlet collar of the damper is made 1/8" (3) smaller than listed size in order to fit inside the duct.

.4 Provide hard duct inlet connections to all dampers.

.5 Contractor to obtain detailed information about start-up and operating procedures for manufacturer's digital controls. Co-ordinate with control contractor.

END OF SECTION

PART 1 : GENERAL

1.01 GENERAL PROVISIONS

.1 Conform to the General Provisions of Section 21 05 01.

.2 Provide complete control system c/w all wiring, dampers, thermostats, sensors, etc as described herein.

1.02 QUALITY ASSURANCE

.1 Conform to local and district by-laws, regulations and published engineering standards.

.2 Conform to the 2006 Ontario Building Code Compendium containing the Building Code Act, and Ontario Regulation 350/06 including all amendments.

1.03 RELATED WORK UNDER OTHER SECTIONS

.1	Plumbing Piping	Section 22 10 00
.2	Air Distribution	Section 23 30 00
.3	Building Automation Systems	Section 25 05 00
.4	Electrical	Division 26

1.04 SUBMITTALS

.1 Submit Shop Drawings in accordance with Section 23 01 00, paragraph 1.04 for the following items:

.1 Outdoor Heating, Ventilation and Air Conditioning Units (HVAC)

.2 Submit unit performance data including: capacity, nominal and operating performance.

.3 Submit Mechanical Specifications for units and accessories describing construction, components and options.

.4 Submit drawings indicating overall dimensions as well as installation, operation and services clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.

.5 Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

.6 Drawings submitted for approval shall be accompanied by a copy of the purchase agreement between the Contractor and an authorized service representative of the manufacturer for check, test and start up and first year service.

1.05 ELECTRICAL EQUIPMENT

.1 Provide integral or remote controls where specified with all equipment.

.2 Provide all safeties as required by Code.

1.06 REFERENCES

AHRI has introduced Standard 920 “Performance Rating of DX Dedicated Outdoor Air System Units”. Testing for rating is next step in implementation of this rating standard.)

.1 ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration. (all)

.2 ANSI/ASHRAE/IESNA 90.1-2013 - Energy Standard for New Buildings Except Low-Rise Residential Buildings.

.3 ANSI Z21.47/UL1995 - Unitary Air Conditioning Standard for safety requirements.

.4 ANSI/NFPA 70-1995 - National Electric Code. (all)

.5 Conform to regulations of Natural Gas Installation Code CAN/CSA-B149.1, Current Edition.

.6 NFPA 90 A & B - Installation of Air Conditioning and Ventilation Systems and Installation of Warm Air Heating and Air Conditioning Systems. (all)

1.07 DELIVERY, STORAGE AND HANDLING

.1 Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

.2 Accept products on site and inspect for damage, once acceptable, protect units from physical damage while on site. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish. Leave factory shipping covers in place until installation.

.3 Units to be secured via base rail tie-down locations.

1.08 WARRANTY

.1 Provide parts warranty extending either 12-months from date of unit start-up or a maximum of 18-months from unit ship date.

.2 All parts and labour on all compressors for 5 years, non pro-rated.

.3 All parts and labour on all condenser fans for 10 years, non pro-rated

1.09 MAINTENANCE SERVICES

.1 Furnish complete parts and labor service and maintenance of packaged outdoor air units for one year from Date of Substantial Completion by Manufacturer's Star-up Technician and start-up report.

.2 Provide maintenance service with a two month interval as maximum time period between calls. Provide 24 hour emergency service on breakdowns and malfunctions.

.3 Include maintenance items as outlined in manufacturer's operating and maintenance data.

.4 Submit copy of service call work order or report and include description of work performed.

1.10 REGULATORY REQUIREMENTS

.1 Unit shall conform to the appropriate standards listed in Section 103 as well as be listed and labeled by a Nationally Recognized Testing Laboratory (NRTL) for compliance with the following applicable standards.

.2 Standard for Safety Heating and Cooling Equipment-Fourth Edition, UL 1995/CSA C22.2#236 Issue: 2011/10/14

.3 In the event the unit is not approved by an NRTL for compliance with the appropriate standards, the manufacturer shall, at manufacturer's expense, provide for a field certification and labeling of unit by an NRTL to the appropriate standards. Manufacturer shall, at manufacturer's cost, complete any and all modifications required by NRTL prior to certification and field labeling. Manufacturer shall include coverage of all modifications in unit warranty.

1.11 EXTRA MATERIALS

.1 Provide one set of spare filters for very filter bank in each air handler.

.2 Provide one set of extra belts for each enthalpy energy recovery wheel.

1.12 APPROVALS

.1 Additional manufacturers wishing to bid products other than the product specified herein, are to submit to the Consultant prior to Tender close a list of three past installations of products similar to those listed. Complete catalogue data along with deviations from the product specified are to be noted in the submittal to the Consultant. The Manufacturer guarantees the proposed substitute product to comply with the product specified and as detailed on the Drawings, unless the deviations are so noted in the submittal for approval.

PART 2 : PRODUCTS

2.01 OUTDOOR AIR HANDLING UNIT

.1 SUMMARY

.1 The contractor shall furnish and install packaged outdoor air handling unit(s) as shown and scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform at the specified conditions as scheduled.

.2 GENERAL DESCRIPTION

.1 Furnish as shown on plans, Daikin Applied Rebel Single Zone Heating and Cooling Unit(s) model DPS. Unit performance and electrical characteristics shall be per the job schedule.

.2 Configuration: Fabricate as detailed on prints and drawings:

.1 Return plenum / economizer section.
.2 Filter section
.3 Energy Recovery Section
.4 Cooling coil section
.5 Supply fan section
.6 Gas heating section
.7 Condensing unit section

.3 The complete unit shall be cETLus listed.

.4 The unit shall be ASHRAE 90.1-2016 compliant and labeled.

.5 Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet. Each unit shall be completely factory assembled and shipped in one piece. Packaged units shall be shipped fully charged with R-32 Refrigerant and oil.

.6 The unit shall undergo a complete factory run test prior to shipment. The factory test shall include a refrigeration circuit run test, a unit control system operations checkout, a unit refrigerant leak test and a final unit inspection.

.7 All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.

.8 Performance: All scheduled EER, IEER, capacities and face areas are minimum accepted values. All scheduled amps, kW, and HP are maximum accepted values that allow scheduled capacity to be met.

.9 Warranty: The manufacturer shall provide 12-month parts only warranty. Defective parts shall be repaired or replaced during the warranty period at no charge. The warranty period shall commence at startup or six months after shipment, whichever occurs first.

.10 Unit discharge airflow configuration shall be:

.1 Vertical discharge through unit base.

.3 CABINET, CASING & FRAME

.1 Panel construction shall be double-wall construction for all panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be a minimum of 1" thick with an R-value of 7.0 and shall be 2 part injected foam. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 5.0 inches w.g.

.2 Exterior surfaces shall be constructed of painted galvanized steel, for aesthetics and long-term durability. Paint finish will include a base primer with a high-quality polyester resin topcoat. Finished, unabraded panel surfaces shall be exposed to an ASTM B117 salt spray environment and exhibit no visible red rust at a minimum of 3,000 hours exposure. Finished, abraded surfaces shall be tested per ASTM D1654, having a mean scribe creepage not exceeding 1/16” at 1,000 hours minimum exposure to an ASTM B117 salt spray environment. Measurements of results shall be quantified using ASTM D1654 in conjunction with ASTM D610 and ASTM D714 to evaluate blister and rust ratings.

.3 Service doors shall be provided on the fan section, filter section, control panel section, and heating vestibule in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.

.4 The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal. Lifting brackets shall be provided on the unit base to accept cable or chain hooks for rigging the equipment.

.4 OUTDOOR/RETURN AIR SECTION

.1 Unit shall be provided with an outdoor air economizer section. The economizer section shall include outdoor, return, and exhaust air dampers. The economizer operation shall be fully integral to the mechanical cooling and allow up to 100% of mechanical cooling if needed to maintain the cooling discharge air temperature. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include moisture eliminator filters to drain water away from the entering air stream. The outside and return air dampers shall be sized to handle 100% of the supply air volume. The dampers shall be parallel blade design

Damper blades shall be gasketed with side seals to provide an air leakage rate of 1.5 cfm / square foot of damper area at 1” differential pressure in according with testing defined in AMCA 500. A barometric exhaust damper shall be provided to exhaust air out of the back of the unit. A bird screen shall be provided to prevent infiltration of rain and foreign materials. Exhaust damper blades shall be lined with vinyl gasketing on contact edges. Control of the dampers shall be by a factory installed direct coupled actuator. Damper actuator shall be of the modulating, spring return type. A comparative enthalpy control shall be provided to sense and compare enthalpy in both the outdoor and return air streams to determine if outdoor air is suitable for “free” cooling. If outdoor air is suitable for “free” cooling, the outdoor air dampers shall modulate in response to the unit’s temperature control system.

.2 Economizer assembly Fault Detection and Diagnostics (FDD) shall be 90.1, IECC, and California Title 24 compliant. MicroTech III controls shall display a warning, and write a warning to the BAS, if the economizer malfunctions in accordance with 90.1, IECC, and Title 24 specifications.

.5 ENERGY RECOVERY

.1 The rooftop unit shall be designed with a track so the entire energy recovery wheel cassette can slide out from the rooftop unit to facilitate cleaning

.2 The unit shall have 2” Merv 8 filters for the outdoor air before the wheel to help keep the wheel clean and reduce maintenance. Filter access shall be by a hinged access door with ¼ turn latches.

.3 The matrix design shall have channels to reduce cross contamination between the outdoor air and the exhaust air. The layers shall be effectively captured in aluminum and stainless-steel segment frames that provide a rigid and self-supporting matrix. All diameter and perimeter seals shall be provided as part of the cassette assembly and shall be factory set. Drive belt(s) of stretch urethane

shall be provided for wheel rim drive without the need for external tensioners or adjustment.

.4 The total energy recovery wheel shall be coated with silica gel desiccant permanently bonded without the use of binders or adhesives, which may degrade desiccant performance. The substrate shall be lightweight polymer and shall not degrade nor require additional coatings for application in marine or coastal environments. Coated segments shall be washable with detergent or alkaline coil cleaner and water. Desiccant shall not dissolve nor deliquesce in the presence of water or high humidity.

.5 Wheels shall be provided with removable energy transfer matrix. Wheel frame construction shall be a welded hub, spoke and rim assembly of stainless, plated and/or coated steel and shall be self-supporting without matrix segments in place. Segments shall be removable without the use of tools to facilitate maintenance and cleaning.

.6 Wheel bearings shall be selected to provide an L-10 life in excess of 400,000 hours. Rim shall be continuous rolled stainless steel. Wheels shall be connected to the shaft by means of taper lock hubs.

.7 The exhaust air fan shall be a direct drive SWSI plenum fan. The exhaust fan shall be sized for the airflow requirements per the construction schedule. The unit controller shall control the exhaust fan to maintain building pressure. A VFD shall be provided for the exhaust fan motor, or the exhaust fan motor shall be an ECM motor. The rooftop unit shall have single point electrical power connection and shall be ETL listed

.8 The control of the energy recovery wheel shall be an integral part of the rooftop unit’s DDC controller. The DDC controller shall have visibility of the outdoor air temperature, leaving wheel temperature, return air temperature, and exhaust air temperature. These temperatures shall be displayed at the rooftop units DDC controller LCD display. All of these temperatures shall be made available through the BACnet interface.

.9 The rooftop unit with the energy recovery wheel shall incorporate the economizer operation. The energy recovery wheel shall have a bypass damper. When the unit is in the economizer mode of operation the energy recovery wheel shall stop and the bypass dampers shall be opened. The outdoor air shall be drawn through the bypass dampers to reduce the pressure drop of the outdoor airstream.

.10 The rooftop unit (DDC controller shall provide frost control for the energy recovery wheel. When a frost condition is encountered the unit controller shall stop the wheel. When in the frost control mode the wheel shall be jogged periodically and not be allowed to stay in the stationary position.

.6 EXHAUST FAN

.1 Exhaust fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with aluminum fan blades that are continuously welded to the hub plate and end rim. The exhaust fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.

.2 The fan motor shall be a totally enclosed EC motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

.3 The unit DDC controller shall provide building static pressure control. The unit controller shall provide proportional control of the exhaust fans from 25% to 100% of the supply air fan designed airflow to maintain the adjustable building pressure setpoint. The field shall mount the required sensing tubing from the building to the factory mounted building static pressure sensor.

.7 AIR FILTERS

.1 Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2” prefilter and a 4” final filter. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2” MERV 8 and 4" MERV 14 filters.

.2 All units shall be provided with a through the wall minihelic filter gauge that displays filter loading on the exterior of the unit.

.3 Manufacture shall provide one set of spare filters for each air handling unit.

.8 COOLING COIL

.1 The indoor coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped drain pan.

.2 The direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows. All cooling coils shall have an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak-tested with high pressure air under water.

.3 The cooling coil shall have an electronic controlled expansion valve. The unit controller shall control the expansion valve to maintain liquid subcooling and the superheat of the refrigerant system.

.4 The refrigerant suction lines shall be fully insulated from the expansion valve to the compressors.

.5 The drain pan shall be stainless steel and positively sloped. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan shall have a threaded drain connection extending through the unit base.

.9 SUPPLY FAN

.1 Supply fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.

.2 Supply fan and motor assembly combinations larger than 8 hp or 22” diameter shall be internally isolated on 1” deflection, spring isolators and include removable shipping tie downs.

.3 The fan motor shall be a totally enclosed EC motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

4 The supply fan shall be capable of airflow modulation from 30% to 100% of the scheduled designed airflow. The fan shall not operate in a state of surge at any point within the modulation range.

.10 VARIABLE VOLUME CONTROL

.1 The unit controller shall proportional control the ECM motors on the supply fan based on space temperature. The unit controller shall increase/decrease the

speed of the supply fan in order to maintain the space temperature within its setpoint and dead band. The unit controller shall provide discharge air temperature control with the compressor modulation.

.2 The unit manufacturer shall install all power and control wiring.

.3 The supply air fan drive output shall be controlled by the factory installed main unit control system and drive status and operating speed shall be monitored and displayed at the main unit control panel.

.11 HEATING SECTION

.1 The rooftop unit shall include a natural gas heating section. The gas furnace design shall be one natural gas fired heating module factory installed downstream of the supply air fan in the heat section. The heating module shall be a tubular design with in-shot gas burners.

.2 The module shall be complete with furnace controller and control valve capable of 5:1, 10:1 or 12:1 modulating operation depending on heating output of unit. refer to Air Handing Unit Schedule of drawings for required modulation for each unit.

.3 The heat exchanger tubes shall be constructed of stainless steel.

.4 The module shall have an induced draft fan that will maintain a negative pressure in the heat exchanger tubes for the removal of the flue gases.

.5 Each burner module shall have two flame roll-out safety protection switches and a high temperature limit switch that will shut the gas valve off upon detection of improper burner manifold operation. The induced draft fan shall have an airflow safety switch that will prevent the heating module from turning on in the event of no airflow in the flue chamber.

.6 The factory installed DDC unit control system shall control the gas heat module. Field installed heating modules shall require a field ETL certification. The manufacturer’s rooftop unit ETL certification shall cover the complete unit including the gas heating modules.

.12 HEAT PUMP HEATING

.1 The evaporator coil, condenser coil, compressors and refrigerant circuit shall be designed for heat pump operation. The refrigerant circuit shall contain a 4-way reversing valve for the heat pump operation. The outdoor coil shall have an electronic expansion valve to control the refrigerant flow. The unit controller shall modulate the expansion valve to maintain compressor operation within the compressor operational envelope.

.2 The refrigerant system shall have a pump-down cycle.

.3 The unit shall have a natural gas furnace for hybrid heating. When the heat pump operation cannot maintain the discharge air temperature setpoint the natural gas furnace shall temper the airstream to the discharge air temperature setpoint.

.13 CONDENSING SECTION

.1 Outdoor coils shall have seamless copper tubes, mechanically bonded into aluminum plate-type fins. The fins shall have full drawn collars to completely cover the tubes. A sub-cooling coil shall be an integral part of the main outdoor air coil. Each outdoor air coil shall be factory leak tested with high-pressure air under water.

.2 Outdoor air coils shall be protected from incidental contact to coil fins by a coil guard. Coil guard shall be constructed of cross wire welded steel with PVC coating.

.3 Fan motors shall be an ECM type motor for proportional control. The unit controller shall proportionally control the speed of the condenser fan motors to maintain the head pressure of the refrigerant circuit from ambient condition of 125°F (51.66ºC). Mechanical cooling shall be provided to 0º F (-17.7ºC). Heat Pump Heating shall be provided to -10F (-23.3ºC). The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase.

.4 The condenser fan shall be low noise blade design. Fan blade design shall be a dynamic profile for low tip speed. Fan blade shall be of a composite material.

.5 The unit shall have scroll compressors. One of the compressors shall be an inverter compressor providing proportional control. The unit controller shall control the speed of the compressor to maintain the air discharge temperature. The inverter compressor shall have a separate oil pump and an oil separator for each compressor that routes oil back to the compressor instead of through the

discharge line.

.6 Pressure transducers shall be provided for the suction pressure and head pressure. A temperature sensor shall be provided for the suction temperature and the refrigerant discharge temperature of the compressors. All of the above devices shall be an input to the unit controller and the values be displayed at the unit controller.

.8 Refrigerant circuit shall have a bypass valve between the suction and discharge refrigerant lines for low head pressure compressor starting and increased compressor reliability. When there is a call for mechanical cooling the bypass valve shall open to equalizing the suction and discharge pressures. When pressures are equalized the bypass valve shall close and the compressor shall be allowed to start.

.9 Each circuit shall be dehydrated, and factory charged with R-32 Refrigerant and oil.

.14 ELECTRICAL

.1 Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.

.2 A single non-fused disconnect switch shall be provided for disconnecting electrical power at the unit. Disconnect switches shall be mounted internally to the control panel and operated by an externally mounted handle.

14. CONTROLS

.1 Provide a complete integrated microprocessor based Direct Digital Control (DDC) system to control all unit functions including temperature control, scheduling, monitoring, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface. All MCBs and sensors shall be factory mounted, wired and tested.

.2 The stand-alone DDC controllers shall not be dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate standalone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.

.3 The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.

.4 All digital inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip.

.5 The DDC controller shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to ensure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.

.6 The keypad interface shall allow convenient navigation and access to all control functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:

.1 Return air temperature.
.2 Discharge air temperature.
.3 Outdoor air temperature.
.4 Space air temperature.
.5 Outdoor enthalpy, high/low.
.6 Compressor suction temperature and pressure
.7 Compressor head pressure and temperature
.8 Expansion valve position
.9 Condenser fan speed
.10 Inverter compressor speed
.11 Dirty filter indication.
.12 Airflow verification.

.13 Cooling status.
.14 Control temperature (Changeover).
.15 Cooling status/capacity.
.16 Unit status.
.17 All time schedules.
.18 Active alarms with time and date.
.19 Previous alarms with time and date.
.20 Optimal start
.21 Supply fan and exhaust fan speed.
.22 System operating hours.
.a Fan
.b Exhaust fan
.c Cooling
.d Individual compressor
.e Heating
.f Economizer
.g Tenant override

.7 The user interaction with the keypad shall provide the following:
.1 Controls mode
.a Off manual
.b Auto
.c Heat/Cool
.d Cool only
.e Heat only
.f Fan only
.2 Occupancy mode
.a Auto
.b Occupied
.c Unoccupied
.d Tenant override
.3 Unit operation changeover control
.a Return air temperature
.b Space temperature
.c Network signal
.4 Cooling and heating change-over temperature with deadband
.5 Cooling discharge air temperature (DAT)
.6 Supply reset options
.a Return air temperature
.b Outdoor air temperature
.c Space temperature
.d Airflow (VAV)
.e Network signal
.f External (0-10 vdc)
.g External (0-20 mA)

.7 Temperature alarm limits
- .a High supply air temperature
- .b Low supply air temperature
- .c High return air temperature

.8 Lockout control for compressors.
.9 Compressor interstage timers
.10 Night setback and setup space temperature.
.11 Building static pressure.
.12 Economizer changeover
- .a Enthalpy
- .b Drybulb temperature

.13 Currently time and date
.14 Tenant override time
.15 Occupied/unoccupied time schedule
.16 One event schedule
.17 Holiday dates and duration
.18 Adjustable set points
.19 Service mode
- .a Timers normal (all time delays normal)
- .b Timers fast (all time delays 20 sec)

.8 If the unit is to be programmed with a night setback or setup function, an optional space sensor shall be provided. Space sensors shall be available to support field selectable features. Sensor options shall include:
- .1 Zone sensor with tenant override switch
- .2 Zone sensor with tenant override switch plus heating and cooling set point adjustment. (Space Comfort Control systems only)

.9 To increase the efficiency of the cooling system the DDC controller shall include a discharge air temperature reset program for part load operating conditions. The discharge air temperature shall be controlled between a minimum and a maximum discharge air temperature (DAT) based on one of the following inputs:
- .1 Airflow
- .2 Outside air temperature
- .3 Space temperature
- .4 Return air temperature
- .5 External signal of 1-5 vdc
- .6 External signal of 0-20 mA
- .7 Network signal

.15 ROOF CURB

.1 A prefabricated heavy gauge galvanized steel, mounting curb shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be a full perimeter type with complete perimeter support of the air handling

section and condensing section. The curb shall be a 24" (610 mm) high and include a nominal 2" x 4" (38mm x 89mm) wood nailing strip. Gasket shall be provided for field mounting between the unit base and roof curb.

.16 Approved Manufacturers: Daikin, York, Trane and AAON

PART 3 : EXECUTION

3.01 OUTDOOR AIR HANDLING UNIT (HVAC-1, 2 & 3)

.1 Install unit in accordance to manufacturers installation instructions.

.2 This Division shall make all condensate drainage piping connections.

.3 Division 26 to provide power to units. Contractor shall verify that there is proper power supply adequate to supply the unit.

.4 Contractor to verify that the roof is ready to receive the equipment and that openings dimensions are as required for ductwork through roof deck.

.5 Mount units on factory built roof mounting frame providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

.6 All duct connections shall be made utilizing canvas connections as specified under Section 23 30 00.

.7 Contractor shall make all heating piping connections to the equipment

.8 Refer to Building Automation Systems Section 25 00 00 for the work performed by that section.

.9 Upon completion of the installation the manufacturer to furnish the services of a technician to start up air handling units and perform tests over their full operating range, in conjunction with the requirements of the Commissioning Authority.

.10 The contractor shall furnish manufacturer complete submittal wiring diagrams of the package unit as applicable for field maintenance and service.

END OF SECTION

PART 1 : GENERAL

1.01 GENERAL REQUIREMENTS

.1 Conform to the General Provisions of Section 21 05 01.

.2 Provide work under this Section as shown or specified and in accordance with the requirements of the Contract documents.

1.02 QUALITY ASSURANCE

.1 Conform to the requirements of ASHRAE 90.1.

.2 Conform to local and district by-laws, regulations and published engineering standards.

.3 Conform to the 2006 Ontario Building Code (OBC) Compendium containing the Building code Act, and Ontario Regulation 350/06 including all amendments.

1.03 RELATED WORK SPECIFIED ELSEWHERE

.1	Basic Materials & Methods	Section 23 05 01
.2	Mechanical Insulation	Section 23 07 00
.3	Air Distribution	Section 23 30 00
.4	Building Automation Systems	Section 25 05 00
.7	Electrical Work	Division 26

1.04 SUBMITTALS

.1 Submit shop drawings in accordance with Section 23 01 00, paragraph 1.04 for the following items:

.1 Terminal Units
.2 Chemical Treatment

1.05 APPROVALS

.1 Additional manufacturers wishing to bid products other than the product specified herein, are to submit to the Consultant prior to tender close a list of three past installations of products similar to those listed. Complete catalogue data along with deviations from the product specified to be noted in the submittal to the Consultant. The manufacturer guarantees the proposed substitute product to comply with the product specified and as detailed on the drawings, unless the deviations are so noted in the submittal for approval.

PART 2 : PRODUCTS

2.01 TERMINAL UNITS

.1 General:

.1 All terminal units shall have element lengths and capacities as indicated on drawings. Capacities shall be based on 180°F (82.2°C) entering and 160°F (71.1°C) leaving water temperature, and 60°F (18.3°C) entering air temperature.

.2 All heating elements shall be aluminium fins mechanically bonded to seamless copper tubing.

.3 All terminal heat transfer units shall be treated to multi-step preparation before the addition of an electrostatically applied powder coat paint finish, colour chosen from manufacturer's standard colours.

.4 All finned tube radiation components shall be cleaned and phosphatized to prevent corrosion.

.5 Provide for noiseless expansion of all components.

.6 All terminal units are based on Sigma. Units of Engineered Air Ltd, Beacon Morris, Zehnder-Rittling and Trane meeting intent of drawings and specifications will be acceptable.

.2 Wall Fin Convection Radiation:

Type 1 – SWE-24S, slope top, 24" (610 mm) high, 2 row - 3/4" element.
Type 2 – SWE-24S, slope top, 24" (610 mm) high, 1 row 1 1/4" element

.1 Copper-Aluminium Element - Tubing shall be 1 1/4" (32mm) nominal I.D. (1 3/8" (35mm) O.D.) or 3/4" (19 mm) seamless copper as indicated on drawings and in schedule. Fins shall be aluminium 4" x 4" (102mm x 102mm), 0.016" (0.4mm) thick with a stamped pattern for strength and rigidity. They shall have integral collars to provide even spacing and maximum heat transfer. Fins shall be firmly bonded to the tube by mechanical expansion. All copper-aluminium elements shall have 44 fins/ft. (144 fins/m). Tube ends shall be suitable for connecting with sweat fittings.

.2 Enclosures - Enclosures shall be constructed of 18 gauge premium cold rolled steel. The enclosures shall be supported at the top by a 1/2" (13mm) joggle strip mounted on wall and at bottom by support brackets which shall be wall mounted on not more than 3'-0" (1.0 meter) centres. Enclosures shall have factory installed gusset plates to maintain enclosure shape during shipment and installation. Gusset plates shall be welded to enclosure.

.3 Element Brackets - Element brackets shall consist of a steel cradle mounted on a lexan slide plate which will allow free and quiet element expansion. Element brackets shall be securely fastened to wall brackets on not more than 4'-0" (1.2 metre) centres.

.4 Accessories - Provide all necessary filler pieces, end caps, etc. as required, refer to drawings.

2.02 CHEMICAL TREATMENT

.1 Scope of Work:

.1 This project shall be renovations to an existing heating system. Chemical Contractor shall provide water treatment for the systems specified herein to control scale, corrosion (algae), (suspended solids). The program shall be administered by the chemical supply company who will supply installation drawings and on-site supervision.

.2 It shall be the responsibility of the chemical supply company to instruct the operating personnel before acceptance of the installation by the Commissioning Authority and Consultant. Copies of written instructions of the treatment dosages, control charts and test procedures shall also be supplied.

.3 The water treatment supplier shall provide four (4) service calls (one every three months) for the first year's operation. Each call shall include tests of all pertinent systems, including humidification system water treatment. The specific amounts of chemicals and type of chemicals shall be supplied as specified.

.2 Pre-Operational Cleaning:

.1 This division shall be responsible for supply of chemicals and for cleaning and flushing of all water systems. Refer to Section 23 05 01, Basic Materials and Methods.

.2 All chemicals, test equipment and system administration shall be provided by the chemical supply company.

.3 Products and Materials - Chemicals and chemical feed equipment shall be as supplied by Aquarian.

.4 All flushing must be completed by Aquarian or a 3rd party that is authorized by Aquarian to act on their behalf.

.3 Chemicals - Provide sufficient water treatment chemicals for the initial start-up plus three months supply after turnover of system. Provide M.S.D.S. information on all chemicals with manufacturer’s name and address. Provide new system cleaner as prescribed by chemical supplier to remove oil, mill scale and iron oxide from the various closed loop systems by re-circulating and flushing under the chemical suppliers supervision.

.5 All biocides provided for control of algae, slime or other micro-biological growth, must be registered under the Pesticides Control Products Act, 1969. No non-registered biocides will be acceptable.

.6 Chemical Cleaning and Treatment for Renovated Systems:

.1 New piping shall be capable of being isolated from the rest of the system.

.1 Cleaning Solution: neutral pH cleaning solution which is capable of removing oil, grease, and rust from metal surfaces of system and passivating cleaned metal surfaces of system. Cleaning solution shall include:

.1 Low foaming non-ionic surfactant for penetrating oily and greasy deposit surfaces.
.2 Solvent for dissolving oil and grease.
.3 Dispersant for dissolving rust.
.4 Reducing agent for corrosion control.
.5 Ferrous and non-ferrous metal corrosion inhibitors.

.2 Deposit Removal Cleaning Solution: blended neutral pH cleaning solution which is capable of removing scale and iron deposits, destroying bacteria, and passivating the metal surfaces of system.

PART 3 : EXECUTION

3.01 TERMINAL UNITS

.1 Wallfin Radiation:

.1 Mounting heights of wall mounted units shall be as recommended by the manufacturer and shall be closely co-ordinated with all other trades to avoid interferences.

.2 Support terminal units from structural elements of wall, and not from wall finishes.

.3 Comply with manufacturer's installation instructions.

.4 Provide 12" (305mm) wide section of removable enclosure at each end for valve access.

3.06 CHEMICAL TREATMENT

.1 The Contractor shall supply the Consultant with certified documentation that all systems have been approved by the chemical supplier, and that sufficient corrosion inhibitor and glycol (where applicable) has been added to the chilled water and heating systems and the Owner's operating personnel have been instructed as to the operation of all treatment systems.

.2 Refer to Basic Materials and Methods Section 23 05 01 for cleaning and flushing closed loop systems.

END OF SECTION

PART 1: GENERAL

1.01 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

.1 Section 23 05 01 – Basic Materials & Methods

.1 Control Valves
.2 Flow Switches
.3 Temperature Sensor Wells and Sockets

1.02 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

.1 Section 23 75 00 – Packaged Outdoor HVAC Air Handling Units:

.1 Equipment manufacture will have to have all points of control wired factory assembled and terminated up to a contact terminal strip, to allow control contractor to add their controller for interface into the BAS. This includes but not limited to, all damper actuators, differential pressure sensors, float switches, humidity sensors, pressure sensors, proximity sensors, temperature sensors, CO_2 sensors.

1.03 GENERAL REQUIREMENTS

.1 The intent of this section is to define the Integration of the Automated Building Systems and Control Systems into the Integration Platform. This platform will allow for a consistent graphical display of all systems shown in the overall topology.

.2 Reference associated Divisions 21, 23, or others controlled with Integrated Automation.

.3 Refer to drawings for a diagrammatic representation of the System Architecture/Topology.

.4 This section describes the scope for the Building Automation System for the project.

.5 Coordinates the responsibilities of the Mechanical and Electrical and Control trade contractors pertaining to control products or systems, furnished by each trade, that will be integrated by this Division.

.6 All labor, material, equipment, and software not specifically referred to herein or on the plans, that is required to meet the functional intent of this specification, shall be provided without additional cost to the owner.

.7 It is the owner's goal to implement an Open System that will allow products from various suppliers to be integrated into a unified system in order to provide flexibility for expansion, maintenance, and service of the system. The owner shall be the named license holder of all software associated with any and all incremental work on the project(s).

.8 Confirm to the Requirements of Section 21 05 01 General Mechanical Provisions.

.9 BAS platform to be Niagara based.

.10 Contractor required to secure all required licenses as part of scope.

.11 Contractor to provide local workstations with adequate capacities to operate all required function of the BAS system.

.12 Contractor to provide all IP drop.

.13 Point to Point system commissioning after installation of new controllers and Graphics.

.14 Contractor to provide complete graphics package.

1.04 SCOPE OF WORK

.1 Provide a Building Automation System (BAS) to control and monitor the new equipment provided and installed under this project as specified in this section.

.2 Provide integration of all existing controllers and any standalone controls throughout the entire school to a new Niagara based platform. The system shall consist of a high-speed network of DDC controllers, a control system server.

.3 The control system server shall provide for overall supervision and configuration, graphical user interface, management report generation, and alarm annunciation.

.4 The system shall support Web browser access to the building data. A remote user using a standard Web browser shall be able to access the control system graphics and change adjustable setpoints with the proper password.

.5 Provide submittal data sheets, control schematics, electrical installation, programming, start-up and validation acceptance documentation, as-built documentation, maintenance manuals and system warranties.

.6 Design and provide wiring linking all elements of the system.

.7 Switches, and power wiring to motors, starters, thermal overload switches, and contactors, is specified in Division 26 This Section shall includes the furnishing and installation of controls and wiring for automatic controls, electric damper and valve operators, terminal control units, interlocks, starter circuits, and wiring to power consuming control devices.

.8 All labour, material, equipment and services not specifically referred to in this specification or on associated drawings that are required to fulfill the functional intent of this specification shall be provided at no additional cost to the Owner.

.9 Enclosures for all controllers to be supplied and installed by BAS Contractor. Enclosers to be adequately size to allow easy mounting and wiring of all controllers, relays etc. as required. Existing enclosures in mechanical rooms, electrical rooms etc. can be reused provided they are of adequate size. Electrical division to provide a power outlet feeding each transformer inside control enclosures.

1.05 APPROVED CONTROL SYSTEM PRIMARY MANUFACTURERS

.1 Use only controllers approved for use, listed in Appendix A. – List of Approved Controllers

1,06 QUALITY ASSURANCE

.1 Installer and Manufacturer Qualifications:

.1 The Installer shall have an established working relationship with Control System Manufacturer of not less than three years.

.2 Installer shall have successfully completed Control System Manufacturer's control system training. Upon request, Installer shall present the certification of completed training for all installation staff including hours of instruction and course outlines.

1,07 CODES AND STANDARDS

.1 Work, materials, and equipment shall comply with the most restrictive of local, provincial, and federal authorities' codes and ordinances or these plans and specifications. As a minimum, the installation shall comply with current editions in effect 30 days prior to receipt of bids of the following codes:

.1 Ontario Electrical Safety Code (OESC)

.2 Conform to the 2006 Ontario Building Code (OBC) Compendium containing the Building code Act, and Ontario Regulation 350/06 including all amendments.

.3 ANSI/ASHRAE Standard 135-2004, BACnet – A Data Communication Protocol for Building Automation and Control Networks

1,08 SUBMITTALS

.1 Product Submittal Requirements. Meet requirements of Section 23 01 00 on Shop Drawings, Product Data, and Samples, and requirements included here-in. Provide **an electronic** of shop drawings and other submittals on hardware, software, and equipment to be installed or furnished. Begin no work until submittals have been reviewed for conformity with design intent. Provide drawings as either AutoCAD 2016 (or newer) or Microsoft Visio compatible files (file format: .dwg, .dxf, .vsd, or comparable). When manufacturer's cutsheets apply to a product series rather than a specific product, clearly indicate applicable data by highlighting or other means. Clearly reference covered specification and drawing on each submittal. General catalogs shall not be accepted as cutsheets to fulfill submittal requirements. Select and show submittal quantities appropriate to scope of work. Provide submittals within 6 weeks of contract award. The submittal shall be broken down into the following sections:

.1 Sequences of Operation

.1 Complete description of control system operation including sequences of operation.
.2 Each system shall be described in detail.
.3 Identify logging of points, including number of entries and time interval (minimum 288 entries at 15 minute intervals)
.4 Identify points that are to be alarmed, alarm enrolment and alarm notification (that follows the WRDSB + WCDSB Alarming Standard)

.2 Drawings and Schematics

.1 Riser diagrams showing control network layout, communication protocol, and wire types.
.2 Schematic diagram of each type of controlled system. Label control points with point names. Graphically show locations of control elements. Similar systems, such as VAV systems or Unit Heaters, can be shown as 1 type of system.

.3 Schematic wiring diagram of each controlled system. Label control elements and terminals. Where a control element is also shown on control system schematic, use the same name.

.4 Schematic wiring diagram for all systems with safety interlocks. Wiring diagram shall be provided whenever low limit controls (freezestats), high limit controls (fire stats), damper end-switches for fans, etc., are used.

.5 Instrumentation list for each controlled system. List each control system element in a table. Show element name, type of device, manufacturer, model number, and product data sheet number.

.6 Mounting, wiring, and routing plan-view drawing in 1/4 in. scale. Take into account HVAC, electrical, and other system's design and evaluation requirements. Show locations of concrete pads and bases and special wall bracing for panels to accommodate this work.

.3 Controller Points List

.1 Point list for each system controller including inputs and outputs (I/O), point numbers, controlled device associated with each I/O point, and location of I/O device. Indicate alarmed and trended points.

.1 Each controller points list shall include:
.1 120 VAC power source
.2 Transformer for 24 VAC
.3 Location
.4 Enclosure
.5 Controller Name and Alias
.6 Infinet ID (BACnet MAC Address)
.7 BACnet Device Node ID
.8 Serial Number

.9 Controller Model Number

.2 Each controller points list shall be organized into columns under the following headings:
- .1 I/O with channel (i.e. I-02, O-04)
- .2 Point Name/Alias (that follows the WRDSB + WCDSB Naming Standard)
- .3 Character Count (number of characters of point name)
- .4 Location
- .5 Cable #
- .6 Wiring Detail #
- .7 Device Model Number
- .8 Point Descriptor
- .9 Character Count (number of characters of descriptor)
- .10 Cable Type

.2 Cable # Description
- .1 Cable numbers shall be comprised of the following, separated by dashes:
  - .1 Controller ID (matches the Infinet ID)
  - .2 I or O, for Input or Output
  - .3 Channel Number
- .2 Cable numbers shall be printed on wire markers, minimum ¾" wide, black writing on white labels

.3 VAV Box Information (if required)
- .1 Include all relevant VAV box information for each controller
- .2 VAV box information shall include
  - .1 Minimum Air Flow
  - .2 Maximum Air Flow
  - .3 Minimum Heating Air Flow
  - .4 VAV Box Size
  - .5 Kfactor

.4 Control Valve Schedule

.1 Control Valve Schedule shall include the following information:
- .1 Valve Designation (specific numbering for all valves)
- .2 Heating Valve Service (Room, equipment, etc.)
- .3 Point Designation (to match the cable number in the points list)
- .4 Heat Value (MBH or KW)
- .5 Flow Rate (GPM or L/S)
- .6 Pipe Size where valve is being installed
- .7 Design Delta-P (in psi)
- .8 Calculated CV at the flow rate and design Delta-P
- .9 Selected CV of the control valve
- .10 Actual pressure drop of the selected control valve (in psi)
- .11 Valve size, model number and actuator
- .12 Type of valve body (2-way or 3-way)
- .13 Fail safe position
- .14 Rated close-off pressure of the control valve

.2 Manufacturer's description and technical data such as performance curves, product specification sheets, wiring details, physical dimensions, and installation and maintenance instructions for all control valves and actuators being provided.

.5 Damper Schedule

.3 Damper Schedule shall include the following information:

.1 Damper Location
.2 Damper Service (Room, equipment, etc.)
.3 Model number of the damper
.4 Damper Size
.5 Type (Flanged or slip-in)
.6 Action – Parallel or Opposed Blade
.7 Actuator
.8 Fail position of the actuator
.9 Number of actuators
.10 Notes

.4 Manufacturer's description and technical data such as performance curves, product specification sheets, wiring details, physical dimensions, and installation and maintenance instructions for all dampers and actuators being provided.

.5 Direct Digital Control System Hardware

.1 Complete bill of materials indicating quantity, manufacturer, model number, and relevant technical data of equipment to be used.

.2 Manufacturer's description and technical data such as performance curves, product specification sheets, wiring details, physical dimensions, and installation and maintenance instructions for items listed below for all equipment required for a complete installation:

.1 Direct digital controllers (controller panels)
.2 Transducers and transmitters
.3 Sensors (including accuracy data)
.4 Relays and switches
.5 Control panels
.6 Power supplies
.7 Batteries
.8 Operator interface equipment
.9 Wiring
.10 Pressure Sensors
.11 Any components furnished by this section but installed by other sections

.6 Computer System Hardware and Software:

.7 Commissioning Check List

.1 Provide blank copies of all commissioning check lists

.2 Check lists shall be a mirror copy of the submitted points list and include columns to verify and date point-to-point commissioning and functional performance testing.

.2 Schedules:

.1 Schedule of work provided within one month of contract award indicating:

.1 Intended sequence of work items
.2 Start date of each work item
.3 Duration of each work item
.4 Planned delivery dates for ordered material and equipment and expected lead time
.5 Milestones indicating possible restraints on work by other trades or situations

.2 Monthly written status reports indicating work completed and revisions to expected delivery dates. Include updated project schedule of work.

.3 Project Record Documents. Submit **one (1) hard copy** and one (1) electronic copy of record (as-built) documents upon completion of installation for approval prior to the final completion. Submittal shall consist of:

.1 Project Record Drawings. As-built versions of the submittal shop drawings provided as AutoCAD 2016 (or newer) or Visio compatible files on optical media and as 11” x 17” prints.Testing and Commissioning Reports and Checklists. Completed versions of reports, checklists, and trend logs used to meet requirements of Part 3: “Control System Demonstration and Acceptance.”

.2 Operation and Maintenance (O&M) Manual. As-built versions of submittal product data.

.1 Names, addresses, and 24-hour telephone numbers of installing contractors and service representatives for equipment and control systems.

.2 All information submitted in the shop drawing submittal. Include all updated information including, but not limited to, controller locations, 120 VAC power sources (including panels and circuit numbers), serial numbers, VAV air flow numbers, including minimum and maximum air flows, kFactors and duct sizes.

.3 Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware including computer equipment and sensors.

.4 Original, editable Electronic copies of all documentation in original formats (Word, Excel, Visio, AutoCad, etc.).

.5 Licences, guarantees, and warranty documents for equipment and systems. Include and highlight any manufacturer's warranties that extend beyond the project warranty.

.4 Training Materials. Provide course outline and manuals for each class at least six weeks before first class. Consultant will modify course outlines and manuals if necessary to meet Board's needs. Consultant will review and approve course outlines and manuals at least three weeks before first class.

1.09 WARRANTY

.1 Warrant work as follows:

.1 Warrant labour and materials for specified control system free from defects for a period of 18 months after final acceptance of the control system. Control system failures during warranty period shall be adjusted, repaired, or replaced with new equipment (reused equipment is not acceptable without the Board's written consent) at no additional cost or reduction in service to Board. Respond during normal business hours within 24 hours of the Owner's warranty service request.

.2 Work of this section shall have a single warranty date, even if the Board receives beneficial use due to early system start-up. If specified work is split into multiple contracts or a multi-phase contract, each contract or phase shall have a separate warranty start date and period.

.3 If the Consultant and the Board determine that equipment and systems operate satisfactorily at the end of final start-up, testing, and commissioning phase, Consultant will certify that the control system operation has been tested and accepted in accordance with the terms of this specification. Date of acceptance shall begin warranty period.

.4 Provide updates to operator workstation software, project-specific software, graphic software, database software, and firmware that resolve Contractor identified software deficiencies at no charge during warranty period. If available, Owner can purchase in-warranty service agreement to receive upgrades for functional enhancements associated with above-mentioned items. Do not install updates or upgrades without Owner's written authorization.

.5 Exception: Contractor shall not be required to warrant reused devices except those that have been rebuilt or repaired. Installation labour and materials shall be warranted. Demonstrate operable condition of reused devices at time of Consultant's acceptance.

1.10 OWNERSHIP OF PROPRIETARY MATERIAL

.1 Project-specific software and documentation shall become Owner's property. This includes, but is not limited to:

.1 Graphics

.2 Record drawings

.3 Database

.4 Application programming code

.5 Documentation

.6 Electronic copies of all shop drawing documentation in original, editable formats (Word, Excel, Visio, AutoCad, etc.)

1.11 DEFINITIONS

.1 ***BACnet Interoperability Building Blocks (BIBB):*** A BIBB defines a small portion of BACnet functionality that is needed to perform a particular task. BIBBs are combined to build the BACnet functional requirements for a device in a specification.

.2 ***BACnet/BACnet Standard:*** BACnet communication requirements as defined by the latest version of ANSI/ASHRAE Standard 135 and approved addenda.

.3 ***Control Systems Server:*** A computer(s) that maintain(s) the systems configuration and programming database.

.4 ***Controller:*** Intelligent stand-alone control device. Controller is a generic reference to building controllers, custom application specific controllers, and application specific controllers.

.5 ***Direct Digital Control (DDC):*** Microprocessor-based control, including Analog/Digital conversion and program logic.

.6 ***Gateway:*** Bi-directional protocol translator connecting control systems that use different communication protocols.

.7 ***Local Area Network (LAN):*** Computer or control system communications network limited to local building or campus.

.8 ***Master-Slave/Token:*** Data link protocol as defined in the BACnet standard.

.9 ***Point-to-Point:*** Serial communication as defined in the BACnet standard.

.10 ***Primary Controlling LAN:*** High speed, peer-to-peer controller LAN connecting BCs and optionally AACs and ASCs. Refer to System Architecture below.

.11 ***Protocol Implementation Conformance Statement:*** A written document that identifies the particular options specified by BACnet that are implemented in a device.

.12 ***Router:*** A device that connects two or more networks at the network layer.

.13 ***Wiring:*** Raceways, fittings, wire, boxes and related items.

1.12 ACCEPTANCE PRODEDURES

.1 Upon completion of work, the control Contractor to coordinate with the Testing and Balancing Contractor, Commissioning Agent and the Owner's forces for final commissioning. A complete operational system as specified must be delivered to the Owner for final acceptance. Also confirm to the requirements of Section 21 05 00 – General Mechanical Provisions.

.2 Instruct the Owner's operating personal as to the intended operation of all control equipment and proper maintenance procedures as part of Section 21 05 00 – General Mechanical Provisions.

1.13 TRAINING

.1 Provide training to the Owner's designated representatives. At completion of training, provide written notification to Consultant.

PART 2 - PRODUCTS

2.01 MATERIALS

.1 Use new products that the Manufacturer is currently manufacturing and that have been installed in a minimum of 25 installations. Do not use this installation as a product test site unless explicitly approved in writing by the Board. Spare parts shall be available for at least **five (5) years** after completion of this contract.

2.02 COMMUNICATION

.1 Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a BACnet internetwork. Controller and operator interface communication shall conform to ***ANSI/ASHRAE Standard 135-2004, BACnet*** and be certified, tested and compliant to that standard.

.2 Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a ***BACnet*** protocol BAS. Controller and operator interface communication shall conform to ***BACnet*** and be certified, tested and compliant to that standard. Each controller shall have a communication port for connection to an operator interface.

.3 Internetwork operator interface and value passing shall be transparent to internetwork architecture.

.1 An operator interface connected to a controller shall allow the operator to interface with each internetwork controller as if directly connected. Controller information such as data, reports, system software, and custom programs shall be viewable and editable from each internetwork controller.

.2 Inputs, outputs, and control variables used to integrate control strategies across multiple controllers shall be readable by each controller on the internetwork. Program and test all cross-controller links required to execute specified control system operation. An authorized operator shall be able to manage, maintain and access the BAS network of controllers.

.4 System shall be expandable to at least twice the required input and output objects with additional controllers, associated devices, and wiring. Expansion shall not require operator interface hardware additions, software updates, node and/or point count upgrades or software revisions.

.5 Workstations, Building Control Panels and Controllers with real-time clocks shall use the installed BAS Protocol synchronization service. The system shall automatically synchronize system clocks daily from an operator-designed device via the internetwork. The system shall automatically adjust for daylight savings and standard time as applicable.

2.03 OPERATOR INTERFACE

.1 Operator interface is existing to the Board for functional use at project acceptance.

.2 Contractor may provide an additional operator interface for programming of work required, if required.

.3

2.04 CONTROLLER SOFTWARE

.1 Operator software and database are existing.

.2 New points and programming shall be programmed onto the existing server.

2.05 BUILDING CONTROLLERS

.1 General. Provide an adequate number of building controllers to achieve the performance specified in Section 1.04. Each of these panels shall meet the following requirements:

.1 The Building Automation System shall be composed of one or more independent, stand alone, microprocessor-based building controllers to manage the global strategies described in the System Software Section.

.2 The building controller shall have sufficient memory to support its operating system, database, and programming requirements and allow for 20% spare capacity once all programs and points have been commissioned.

.3 Data shall be shared between networked building controllers.

.4 The operating system of the building controller shall manage the input and output communication signals to allow distributed controllers to share real and virtual object information and allow for central monitoring and alarms.

.5 Controllers that perform scheduling shall have a real-time clock.

.6 The building controller shall continually check the status of its processor and memory circuits. If an abnormal operation is detected, the controller shall:

.1 Assume a predetermined failure mode,

.2 Generate an alarm notification.

.7 The Building Controller shall communicate with other BACnet devices on the internetwork using the Read (Initiate) and Write (Execute) Property Services as defined in clauses 15.5 and 15.8, respectively, of ASHRAE Standard 135-1995.

.3 Communication:

.2 Each building controller shall reside on a BACnet network using the ISO 8802-3 (Ethernet Data Link/Physical layer protocol. Each building controller also shall perform BACnet routing if connected to a network of custom application specific controllers.

.3 The controller shall provide a service communication port using BACnet Data Link/Physical layer protocol for connection to a portable operator's terminal.

.4 Network routers/repeaters/bridges shall be used to extend communications, change media type, or extend the network in order to ensure proper communication for the entire BAS. Repeaters shall be used whenever the communication cable length approaches 4000' and/or has more than 32 controllers.

.4 Environment. Controller hardware shall be suitable for the anticipated ambient conditions.

.2 Controllers used in outdoors and/or in wet ambient conditions shall be mounted within water-proof enclosures and shall be rated for operation at -40°C to 65°C (-40°F to 150°F).

.3 Controllers used in conditioned space shall be mounted in dust-proof enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).

.5 Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.

.6 Memory. The building controller shall maintain all BIOS and programming information in the event of a power loss for at least 72 hours.

.7 Immunity to Power and Noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m (3 ft).

2.06 CUSTOM APPLICATION CONTROLLERS

.1 General. Provide an adequate number of custom application controllers to achieve the performance specified in Section 1.04. Each of these panels shall meet the following requirements:

.1 The custom application controller shall have sufficient memory to support its operating system, database, and programming requirements.

.2 Data shall be shared between networked custom application controllers.

.3 The operating system of the controller shall manage the input and output communication signals to allow distributed controllers to share real and virtual object information and allow central monitoring and alarms.

.4 Controllers that perform scheduling shall have a real-time clock.

.5 The custom application controller shall continually check the status of its processor and memory circuits. If an abnormal operation is detected, the controller shall:

.1 Assume a predetermined failure mode

.2 Generate an alarm notification.

.6 The custom application controller shall communicate with other BACnet devices on the internetwork using the Read (Initiate) and Write (Execute) Property Services as defined in Clauses 15.5 and 15.8, respectively, of ASHRAE Standard 135-1995.

.2 Communication:

.1 Each custom application controller shall reside on a BACnet network using the MS/TP Data Link/ Physical layer protocol.

.2 The controller shall provide a service communication port using Data Link/ Physical layer protocol for connection to a portable operator’s terminal.

.3 Environment. Controller hardware shall be suitable for the anticipated ambient conditions.

.1 Controllers used outdoors and/or in wet ambient conditions shall be mounted within water-proof enclosures and shall be rated for operation at –40°C to 65°C (-40°F to 150°F).

.2 Controllers used in conditioned space shall be mounted in dust-proof enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).

.4 Serviceability. Provide diagnostic LEDs for power, communication, and processor. All writing connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.

.5 Memory. The custom application controller shall maintain all BIOS and programming information in the event of a power loss for at least 72 hours.

.6 Immunity to power and noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1m (3 ft).

2.07 APPLICATION SPECIFIC CONTROLLERS

.1 General. Application specific controllers (ASCs) are microprocessor-based DDC controllers, which through software or firmware design are dedicated to control a specific piece of equipment. They are not fully user-programmable but are customized for operation within the confines of the equipment they are designed to serve. Application specific controllers shall communicate with other BACnet devices on the internetwork using the Read (Execute) Property Service as defined in Clause 15.5 of ASHRAE Standard 135-1995.

.1 Each ASC shall be capable of stand-alone operation and shall continue to provide control functions without being connected to the network.

.2 Each ASC will contain sufficient I/O capacity to control the target system.

.3 Each ASC shall be certified and listed for compliance to the BACnet standards.

.2 Communication:

.1 The controller shall reside on a BACnet network using the MS/TP Data Link/Physical layer protocol. Each network of controllers shall be connected to one building controller.

.2 Each controller shall have a BACnet Data Link/Physical layer compatible connection for a laptop computer or a portable operator's tool. The connection shall be extended to a space temperature sensor port where shown.

.3 Environment. The hardware shall be suitable for the anticipated ambient conditions.

.1 Controllers used outdoors and/or in wet ambient conditions shall be mounted within water-proof enclosures and shall be rated for operation at –40°C to 65°C (-40°F to 150°F).

.2 Controllers used in conditioned space shall be mounted in dust-proof enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).

.4 Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.

.5 Memory. The application specific controller shall use non-volatile memory and maintain all BIOS and programming information in the event of a power loss.

.6 Immunity to power and noise. Controllers shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80%. Operation shall be protected against electrical noise of 5-120 Hz and from keyed radios up to 5 W at 1 m (3 ft).

.7 Transformer. Power supply for the ASC must be rated at a minimum of 125% ASC power consumption and shall be of the fused or current limiting type.

2.08 INPUT/OUTPUT INTERFACE

.1 Hardwired inputs and outputs may tie into the system through building, custom application, or application specific controllers.

.2 All input and output points shall be protected such that shorting of the point to itself, to another point, or to the ground will cause no damage to the controller. All input and output points shall be protected from voltage up to 24V of any duration, such that contact with this voltage will cause no damage to the controller.

.3 Binary inputs shall allow the monitoring of On/Off signals from remote devices. The binary inputs shall provide a wetting current of at least 12 mA to be compatible with commonly available control devices and shall be protected against the effects of contact bounce and noise. Binary inputs shall sense “dry contact” closure without external power (other than that provided by the controller) being applied.

.4 Pulse accumulation input objects. This type of object shall conform to all the requirements of binary input objects and also accept up to 10 pulses per second for pulse accumulation.

.5 Analog inputs shall allow the monitoring of low-voltage (0 to 10 VDC), current (4 to 20 mA), or resistance signals (thermistor, RTD). Analog inputs shall be compatible with – and field configurable to – commonly available sensing devices.

.6 Binary outputs shall provide for On/Off operation or a pulsed low-voltage signal for pulse width modulation control. Binary outputs on building and custom application controllers shall have three-position (On/Off/Auto) override switches and status lights. Outputs shall be selectable for either normally open or normally closed operation.

.7 Analog outputs shall provide a modulating signal for the control of end devices. Outputs shall provide either a 0 to 10 VDC or a 0 to 20 mA signal as required to provide proper control of the output device. Analog outputs on building or custom application controllers shall have status lights and a two-position (AUTO/MANUAL) switch and manually adjustable potentiometer for manual override. Analog outputs shall not exhibit a drift of greater than 0.4% of range per year.

.8 Tri-State Outputs. Provide tri-state outputs (two co-ordinated binary outputs) for control of three-point floating type electronic actuators without feedback. Use of three point floating devices shall be limited to zone control and terminal unit control applications (VAV terminal units, duct-mounted heating coils, zone-dampers, radiation, etc.). Control algorithms shall run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.

.9 Input/Output points shall be the universal type, i.e., controller input or output may be designated (in software) as either a binary or analog type point with appropriate properties. Application specific controllers are exempted from this requirement.

.10 System Object Capacity. The system size shall be expandable to at least twice the number of input/ output objects required for this project. Additional controllers (along with associated devices and wiring) shall be all that is necessary to achieve this capacity requirement. The operator interfaces installed for this project shall not require any hardware additions or software revisions in order to expand the system.

2.09 POWER SUPPLIES AND LINE FILTERING

.1 Control Transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish over-current protection in both primary and secondary circuits for Class 2 service in accordance with OESC requirements. Limit connected loads to 80% of rated capacity.

.1 DC Power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load changes. Unit shall have built-in over-voltage and over-current protection and shall be able to withstand a 150% current overload for at least three seconds without trip-out or failure.

.1 Unit shall operate between 0°C and 50°C (32°F to 120°F). EM/RF shall meet FCC Class B and VDE 0871 for Class B and MIL-STD 810C for shock and vibration.

.2 Line voltage units shall be UL recognized and CSA approved.

.2 Power Line Filtering:

.1 Provide transient voltage and surge suppression for all workstations and building controllers either internally or as an external component. Surge protection shall have the following at a minimum:

.1 Dielectric strength of 1000 volts minimum

.2 Response time of 10 nanoseconds or less

.3 Transverse mode noise attenuation of 65 dB or greater

.4 Common mode noise attenuation of 150 dB or better at 40 Hz to 100 Hz

2.10 AUXILIARY CONTROL DEVICES

.1 Motorized control dampers, unless otherwise specified elsewhere, shall be as follows:

.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 50L/s·m2 (10 cfm per ft2) at 1000 Pa (4 in. w.g.) differential pressure. Provide air foil blades suitable for a wide-open face velocity of 7.5 m/s (1500 fpm).

.6 Individual damper sessions shall not be larger than 125 cm x 50 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.

.9 Dampers shall be either Tamco 1000 for interior applications or Tamco 9000 for outdoor air/exhaust air applications.

.2 Electric damper/valve actuators:

.1 The actuator shall have mechanical or electronic stall protection to prevent damage to the actuator through the rotation of the actuator.

.2 Where shown, for power-failure/safety applications, an internal mechanical, spring-return mechanism shall be built into the actuator housing. Alternatively, an uninterruptible power supply (UPS) may be provided.

.3 Proportional actuators shall accept a 0 to 10 VDC or 0 to 20 mA control signal and provide a 2 to 10 VDC or 4 to 20 mA operating range.

.4 All 24 VAC/VDC actuators shall operate on Class 2 wiring.

.5 All non-spring-return actuators shall have an external manual gear release to allow manual positioning of the damper/valve when the actuator is not powered. Spring-return actuators with more than 7·m (60 in.-lb) torque capacity shall have a manual crank for this purpose.

.6 All actuators shall be Belimo.

.3 Control Valves:

.1 Control valves shall be two-way or three-way type for modulating service or two-position service as required.

.2 Control valves assemblies shall be provided and delivered from a single manufacturer as a complete assembly. The manufacturer shall warrant all components for a period of 5 years, except where noted, from the date of production with the first two years unconditional.

.3 All two-way and three-way control valves (1/2” to 6”) shall meet or exceed the following:

.1 Two-way Ball Valves (1/2” to 2”) with Characterized Disk:
- .1 Pressure Rating for 1” and smaller: 600 psi
- .2 Pressure Rating for 1-1/4” through 2”: 400 psi
- .3 Pressure Rating for 2-1/2” through 6”: 175 psi
- .4 Close-off Pressure for 6” and smaller: 200 psig
- .5 Close-off Pressure for 2-1/2” through 6”: 100 psig
- .6 Media Temperature Range for 6” and smaller: Zero to 250 deg F
- .7 Control Port Leakage: 0%
- .8 Body and Tail Piece for 2” and smaller: Forged brass with nickel plating.
- .9 Body and Tail Piece for 2-1/2” through 6”: Cast iron GG25.
- .10 End Connections for 2” and smaller: NPT Female ends.
- .11 End Connections for 2-1/2” through 6”: ANSI 125 type flange
- .12 Ball for 3/4” and smaller: Stainless steel
- .13 Ball for 1” through 6”: Stainless steel
- .14 Stem and Stem Extension:
  - .1 Material: stainless steel or brass to match ball.
  - .2 Blowout-proof design.
- .15 Ball Seats: Teflon PTFE.
- .16 Stem Seal: Dual EPDM O-rings (lubricated)
- .17 Characterizing Disc for 2” and smaller: TEFZEL.
- .18 Characterizing Disc for 2-1/2” through 6”: Stainless steel
- .19 Flow Characteristic: Equal percentage.
- .20 Label each valve with following:
  - .1 Manufacturer's name and model number.
  - .2 Body size.
  - .3 Flow directional arrow.
  - .4 Valve Designation Tag that matches the provided Control Valve Schedule

.2 Three-way Ball Valves (1/2” to 2”) with Characterized Disk:
- .1 Pressure Rating for 1” and smaller: 600 psi

.2 Pressure Rating for 1-1/4" through 2": 400 psi
.3 Close-off Pressure: 200 psig
.4 Process Temperature Range: Zero to 250 deg F
.5 Control Port Leakage: 0%
.6 Body and Tail Piece: Forged brass with nickel plating.
.7 End Connections: NPT female ends.
.8 Ball for 3/4" and smaller: Stainless steel
.9 Ball for 1" through 2": Stainless steel
.10 Stem and Stem Extension:
.1 Material: stainless steel or brass to match ball.
.2 Blowout-proof design.
.11 Ball Seats: Teflon PTFE.
.12 Stem Seal: Dual EPDM O-rings (lubricated)
.13 Characterizing Disc for 1" and smaller: TEFZEL.
.14 Characterizing Disc for 1-1/4" through 2": TEFZEL or stainless steel
.15 Flow Characteristics for A-Port: Equal percentage.
.16 Flow Characteristics for B-Port: Modified for constant common port flow.
.17 Label each valve with following:
.1 Manufacturer's name and model number.
.2 Body size.
.3 Flow directional arrow
.4 Valve Designation Tag that matches the provided Control Valve Schedule

.3 High Temperature Ball Valves with Single Port and Characterized Disk:
.1 Subparagraphs below are based on Belimo's "B2 HTCCV series."
.2 Pressure Rating for 1" and smaller: 600 psi
.3 Close-off Pressure for 1" and smaller: 200 psig
.4 Water Media Temperature Range for 1" and smaller: 60 to 266 deg F
.5 Steam Media Temperature Range for 1" and smaller: Zero to 212 degF at 15 psi inlet pressure.
.6 Body and Tail Piece for 1" and smaller: Forged brass with nickel plating.
.7 End Connections for 1" and smaller: NPT female ends.
.8 Ball for 1" and smaller: Stainless steel.
.9 Stem and Stem Extension:
.1 Material: stainless steel.
.2 Blowout-proof design.
.10 Ball Seats: ETFE.
.11 Stem Seal: Dual EPDM O-rings (lubricated)
.12 Characterizing Disc: TEFZEL.
.13 Flow Characteristic: Equal percentage.
.14 Label each valve with following:
.1 Manufacturer's name and model number.
.2 Body size.
.3 Flow directional arrow.
.4 Valve Designation Tag that matches the provided Control Valve Schedule

.4 Control Valve Sizing Criteria:

.1 Two-position service: Line size with no characterizing disk.

.2 Two-way modulating service: Pressure drop shall be equal to the pressure drop through heat exchanger (load) or 4 psi, whichever is greater.

.3 Three-way modulation service: Pressure drop equal to the pressure drop through the coil exchanger (load) or 4 psi, whichever is greater.

.4 Steam Valves:

.1 Body and trim materials shall be in accordance with manufacturer's recommendations for design conditions and service with linear ports for modulating service.

.2 Sizing Criteria:

.1 Two-position service: pressure drop 10% to 20% of inlet psig.
.2 Modulating service: 100 kPa (15 psig) or less; pressure drop 80% of inlet psig.
.3 Modulating service: 101 to 350 kPa (16 to 50 psig); pressure drop 50% of inlet psig.
.4 Modulating service: over 350 kPa (50 psig); pressure drop as scheduled on plans.

.5 Electric and Electronic Control Valve Actuators

.1 Manufactured, brand labeled or distributed by Belimo.
.2 The valve assembly (control valve and actuator) shall be provided and delivered from a single manufacturer.
.3 Agency Listings: ISO 9001, cULus, CE, CSA, and UL 2043The manufacturer shall warrant all components for a period of 5 years from the date of production with the first two years unconditional.
.4 Actuators for Hydronic Control Valves: Capable of closing valve against system pump shutoff head.
.5 Actuators for Steam Control Valves: Shutoff against 1.5 times steam design pressure.
.6 Position indicator and graduated scale on each actuator.
.7 Type: Motor operated, with gears, electric and electronic. Overload protected electronically throughout rotation.
.8 Voltage: 24-VAC
.9 Deliver torque required for continuous uniform movement of controlled device from limit to limit when operated at rated voltage at the valve close-off pressure for system design.
.10 Function properly within a range of 80 to 120 percent of nameplate voltage.
.11 Two-Position Actuators: Single direction, fail safe or reversing type.
.12 Modulating Actuators:

.1 Operation: Capable of stopping at all points across full range, and starting in either direction from any point in range.
.2 Control Input Signal:
.1 Retain subparagraphs below that remain after revising "Control Valve Applications" Article. See "Control Signal Options" discussion in Evaluations.
.2 Three Point, Tristate, or Floating Point: Clockwise and counter-clockwise inputs. One input drives actuator to open position and other input drives actuator to close position. No signal of either input remains in last position.
.3 Proportional: Actuator drives proportional to input signal and modulates throughout its angle of rotation. Suitable for 2- to 10- Vdc signals.
.4 Pulse Width Modulation (PWM): Actuator drives to a specified position according to pulse duration (length) of signal from a dry contact closure, triac sink, or source controller.
.5 Retaining "Programmable Multi-Function" Subparagraph below limits manufacturer choices. Belimo is most well-known manufacturer offering product.
.6 Programmable Multi-Function:
.1 Control Input, Position Feedback, Mechanical Travel, and Running Time: Factory or field software programmable without the use of actuator mounted switches.
.2 Adaptation: Upon adjustment of operating parameters. Adaptation shall be initiated to adapt the input, feedback and run time, to the actual mechanical angle of rotation or travel.
.3 Diagnostic: Feedback of hunting or oscillation, mechanical overload, mechanical travel, and mechanical load limit.
.4 Service Data: Include, at a minimum, number of hours powered and number of hours in motion.

.13 All actuators shall meet the requirements of the sequence of operation for either modulating or two-position control.
.14 Water valves shall fail normally open or closed, as scheduled on plans, or as follows:
.1 Water heating valves (radiation) – normally open when valves are primary source of heat.
.2 Heating coils – normally open.
.3 Chilled water control valves – normally closed.
.4 Other applications – as scheduled or as required by the sequences of operation.

.15 Manufacturer: All valves and actuators shall be Belimo.

.2 Binary Temperature Devices (Freezestats or High Limits):

.1 Low-voltage space thermostat shall be 24V, bimetal-operated, mercury switch-type, with either adjustable or fixed anticipation heater, concealed set point adjustment, 13°C to 30°C (55°F to 85°F) set point range, 1°C (2°F) maximum differential, and vented ABS plastic cover.

.2 Line-voltage space thermostat shall be bimetal-actuated, open contact type, or bellows-actuated, enclosed, snap-switch type or equivalent solid-state type, with heat anticipator, UL listed for electrical rating, concealed set point adjustment, 13°C to 30°C (55°F to 85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.

.3 Low-limit thermostats. Low-limit airstream thermostats shall be UL listed, vapour pressure type, with an element of 6 m. (20 ft) minimum length. Element shall respond to the lowest temperature sensed by any 30 cm (1 ft) section. The low-limit thermostat shall be manual reset only. Bulb-type low-limit thermostats are also acceptable with the Engineer's prior approval, and only in cases where the 6 m. (20 ft) capillary type can not be installed.

.3 Temperature Sensors:

.1 Temperature Sensor shall be 10K Ohm Type 7 (Type III) NTC thermistor.

.2 Duct sensors shall be single point or averaging as required. Averaging sensors shall be a minimum of 1.5m (5 ft.) in length as per $1m^2$ ($10 ft^2$) of duct cross section.

.3 Immersion sensors shall be provided with a separable 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.

.4 Space sensors shall be plastic in office and classroom areas.

.5 Space sensors shall be stainless steel flat plat sensors in corridors, gymnasiums and washrooms.

.6 Provide matched temperature sensors for differential temperature measurement.

.4 Humidity Sensors:

.1 Duct and room sensors shall have a minimum sensing range of 20% to 80%.

.2 Duct sensors shall be provided with a sampling chamber.

.3 Outdoor air humidity sensors shall have a sensing range of 20% to 95% RH. They shall be suitable for ambient conditions of -40°C to 75°C (-40°F to 170°F).

.4 Humidity sensor's drift shall not exceed 1% of full scale per year.

.5 Provide humidity sensors with integral temperature sensors where temperature and humidity are measured at the same point (duct, room, outdoor air, etc.).

.5 Flow switches:

.1 Flow-proving switches shall be differential pressure type.

.2 Paddle-type flow switches are not acceptable.

.3 Differential pressure type switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum), NEMA 1 enclosure, with scale range and differential suitable for intended application or as specified.

.6 Differential pressure transducers (Wet media):

.1 Transducer shall have linear output signal. Zero and span shall be field adjustable.

.2 Transducer sensing elements shall withstand continuous operating conditions of positive or negative pressure 50% greater than calibrated span without damage.

.3 Water pressure transducer shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Transducer shall be complete with either a 4 to 20 mA output or 0-5/10 VDC output, required mounting brackets, and block and bleed valves.

.4 Water differential pressure transducer shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Over-range limit (differential pressure) and maximum static pressure shall be 300 psi. Transducer shall be complete with 4 to 20 mA output or 0-5/10 VDC, required mounting brackets, and five valve manifold.

.5 Transducer shall be in a NEMA 4 Enclosure.
.6 Transducer shall be powered by 24 VAC.

.7 Differential pressure transducers (Dry media):

.1 Transducer shall have linear output signal. Zero and span shall be field adjustable.

.2 Transducer sensing elements shall withstand continuous operating conditions of positive or negative pressure 50% greater than calibrated span without damage.

.3 Air pressure transducer shall have ¼” barb fittings for air pressure connections.

.4 Transducer shall be selected for proper air pressure readings for application. Duct and filter transducers shall be rated up to 10 PSI. Space to outdoor differential pressure sensors shall be rated up to 1” PSI. Full scale of sensor shall reflect best range for the application (typically up to 2.5” for duct and filter pressures, +/-0.1” for space differential pressure).

.5 Transducer shall be in a NEMA 1 Enclosure.

.8 Gauge pressure transducers

.1 Transducer shall have linear output signal.

.2 Transducer sensing elements shall withstand continuous operating conditions of positive or negative pressure 50% greater than calibrated span without damage.

.3 Water pressure transducer shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Transducer shall be complete with 4 to 20 mA or 0-5/10 VDC output.

.4 Water gauge pressure transducer shall have stainless steel diaphragm construction, proof pressure of twice the system measured pressure.

.5 Transducer shall be rated IP66 or NEMA 4.

.9 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.

.3 Control relays shall be equal to Omron MK2PNSAC-24 relays. All relay bases shall be 8-pin with octagonal base.

Override timers:

.4 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.

.10 Current Transducers:

.1 AC current transducers shall be the self-powered, either solid-core type or split-core type, have a built-in rectifier and either 4-20ma, 0-5 VDC or 0-10 VDC output. Unit ranges shall be a 10A, 25A or 50A full scale, be accurate to ±2% full-scale accuracy and be isolated to 600 VAC RMS.

.2 Transmitter shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA Recognized.

.3 Unit can be split-core type only for clamp-on installation on existing wiring.

.4 AC current transducer shall be specifically made for monitoring Variable Frequency Drive (VFD) loads when installed to monitor VFD loads.

.11 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 Transformers shall be used in conjunction with Current Transducers whenever the measured load is greater than 50 A.

.12 Motor Control

.1 All non-fractional horsepower motors will have starters with HAND/OFF/AUTO position supplied by Mechanical or Electrical trades. If an existing starter is not equipped with such, this functionally shall be implemented externally or by installing a retrofit kit to the existing starter. All starters and manual override switches shall be within eyesight of the motor being controlled. Supply and return fans will be assigned separate control outputs and ill not be interlocked via hard wiring.

.2 Fractional horsepower motors are to be controlled through a suitable sized horsepower rated relay or contractor.

.13 Current switches:

.1 Current switches are not acceptable.

.14 Local control panels:

.1 All indoor control cabinets shall be fully enclosed NEMA 1 construction with (hinged door) key-lock latch and removable subpanels. A single key shall be common to all field panels and subpanels.

.2 Interconnections between internal and face mounted devices shall be pre-wired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL listed for 600 volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings.

.3 Provide ON/OFF power switch with overcurrent protection for control power sources to each local panel.

.4 Provide all required duct track, labelling, fusing and power supplies for a neat, complete control panel installation.

2.11 WIRING AND RACEWAYS

.1 All of the installation requirements be they temporary or permanent, to comply with the Ontario Electrical Safety Code and all local and provincial codes.

.2 General: Provide copper wiring, plenum cable, and raceways as specified in the applicable sections of Division 26.

.3 All insulated wire to be copper conductors, UL labelled for 90°C minimum service.

.4 All wiring installed in panels shall be electrically rated for the maximum voltage present in that panel. All high voltage wiring, 50 volts or more, shall be a minimum of #12-gauge copper stranded T90, run in conduit. All low voltage wiring, less than 50 volts, to be minimum of #22-gauge copper stranded. All wiring shall be shielded.

.5 RS485 (MS TP) Communication Wiring: for the local field panels, wiring to be 2 conductor, #20 low capacitance shielded twisted pairs, with ground drain wire. All drain wires shall be grounded at the panel end. The other end shall be protected from grounding with dielectric material/electrical tape. All wiring to be shielded.

.6 Whenever existing conduit and/or wiring is used, the Contractor to take full responsibility for its integrity and functionality. Furthermore, all wiring runs to be direct from control equipment. The Contractor shall “Clean up” all wiring, eliminating any and all non-functional relays, contacts and switches in between,

.7 For future expansion purposes, the Contractor to ensure that wires are available in all conduits to accommodate the addition of possible future points to maximum capacity of panel.

.8 The Contractor to supply, install and connect all wiring between the different components related to the Control Systems. The electrical contractor will provide line voltage wiring to equipment/controllers. Only the school board pre-qualified electrical contractors are allowed to do the required electrical works for the BAS Contractor.

.9 Coordinate electrical requirements with Electrical trade. Arrange and pay for any modifications necessary to complete the work of this section.

.10 Control Contractor to provide all transformers including the transformers for room controls.

.11 If wiring picks up unwanted noise, correct problem by replacing or rerouting wire at no additional expense to Owner.

.12 Wiremold and/or raceway may not be used unless specifically approved by the Consultant.

.13 FT6 wiring to be acceptable in all room except Mechanical Rooms, Electrical Rooms and exposed areas (refer to reflective ceiling plans). All wiring within mechanical and electrical rooms and exposed areas o be installed in conduit. Wiring to be installed parallel to building lines or approved by the Consult and tie wrapped a minimum 3.3 M (4N).

.14 Conduit to ne thin wall Electrical Metal tubing (EMT) conduit, complete with watertight steel connectors at all entrances to enclosures. Steel set screw connectors and couplings will be used in all other parts of the installation. Maximum of 60% conduit fill will be allowed.

.15 Flexible conduit to be used only inn areas where vibrations and/or expansion joints are present. The length of any run of flexible conduit shall not exceed 1.5 M (5'-0").

.16 All conduit to be supported at least every 1.525 M (5'-0") and as per Ontario Electrical Safety Code. Support shall also be located at all connections along the length of the conduit run.

.17 In damp or weather exposed areas, use rigid conduit with liquid tight connectors.

.18 All conductors to be continuous from device to panel.

.19 High and low voltage wire to not be run in the same conduit.

.20 Sensor, power and control wiring to be run in separate conduits.

.21 Where wiring penetrates fire separations, use fire stop sealant to maintain fire separation ratings.

.22 New DDC panels to be mounted adjacent to existing control cabinets, where applicable.

2.12 WIRING IDENTIFICATION

.1 The two extremities of all wiring to be identified using the same code and cross referenced to the Record Drawings.

.2 The terminal strips to be numbered. All drawings to show wire identification codes and terminal numbers. Flex type terminal blocks are acceptable.

.3 The identification to be di=one using ideal or Brady paper with adhesive backing labels.

.4 The following colour code shall apply to all wiring.

Power

White	Neutral
Red, Yellow, Blue	Phase leads
Black	Switch travellers, for single pole switched circuits, the phase colour shall be carried through the switch to the outlet.

All ground wiring to be green.

2.13 NAMEPLATES

.1 Identify I/O devices and panel with nameplate identifying the point descriptor using the approved naming convention approved by the Owner.

.2 In addition to identification as described above, show “BAS” identification label for each piece of equipment wit nameplates.

.3 Index terminal strips and tag wires. Label exposed junction boxes including function and nature of service. Tag all wires within the junction boxes including purpose and nature of service.

.4 Use self-adhesive strip or clip on style plastic markers for wire tags. Secure tags to each individual wire at both ends.

2.14 PULL BOX AND JUNCTION BOX

.1 All boxes to comply with the Ontario Electrical Safety Code in reference to size, capacity, etc.

.2 All boxes to be fabricated of galvanized metal, unless otherwise warranted.

.3 All pull boxes to be located every 30 meters (100’). The Contractor is responsible for the location and for obtaining any required approvals form the Consultant,

.4 In suspended ceilings, all boxes to be installed on the structure.

.5 All boxes to be clearly marked with “BAS” as part of the energy management system.

PART 3 - EXECUTION

3.01 EXAMINATION

.1 The project plans shall be thoroughly examined for control device and equipment locations. Any discrepancies, conflicts, or omissions shall be reported to the Consultant for resolution before rough-in work is started.

.2 The Contractor shall inspect the site to verify that equipment may be installed as shown. Any discrepancies, conflicts, or omissions shall be reported to the Consultant for resolution before rough-in work is started.

The Contractor shall examine the drawings and specifications for other parts of the work. If head room or space conditions appear inadequate – or if any discrepancies occur between the plans and the Contractor's work and the plans and the work of others – the Contractor shall report these discrepancies to the Consultant and shall obtain written instructions for any changes necessary to accommodate the Contractor's work with the work of others. Any changes in the work covered by this specification made necessary by the failure or neglect of the Contractor to report such discrepancies shall be made by – and at the expense of – this Contractor.

3.02 PROTECTION

.1 The Contractor shall protect all work and material from damage by his/her work or employees and shall be liable for all damage thus caused.

.2 The Contractor shall be responsible for his/her work and equipment until finally inspected, tested, and accepted. The Contractor shall protect any material that is not immediately installed. The Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3,03 COORDINATION

.1 Site:

.1 Where the mechanical work will be installed in close proximity to, or will interfere with, work of other trades, the Contractor shall assist in working out space conditions to make a satisfactory adjustment. If the Contractor installs his/her work before coordinating with other trades, so as to cause any interference with work of other trades, the Contractor shall make the necessary changes in his/her work to correct the condition without extra charge.

.2 Coordinate and schedule work with all other work in the same area, or with work that is dependent upon other work, to facilitate mutual progress.

.2 Submittals. Refer to the "Submittals" Section in Part 1 of this specification for requirements.

.3 Test and Balance:

.1 The Contractor shall provide a qualified technician to assist in the test and balance process, until all terminals and equipment are balanced.

.4 Life Safety:

.1 Duct smoke detectors required for air handler shutdown are supplied under Division 26 in the specification. The Contractor shall provide a terminal block location to interlock smoke detectors to air handlers for shut down if required. Wiring from the duct smoke detectors is provided under Division 26.

.2 Smoke dampers and actuators required for duct smoke isolation are provided under **a section of Division 23**. The Contractor shall interlock these dampers to the air handlers as described in Part 3 “Sequences of Operation”.

.3 Fire/smoke dampers and actuators required for fire rated walls are provided under **another section of Division 23**. Control of these dampers shall be by Division 26.

.5 Coordination with controls specified in other sections or divisions. Other sections and/or divisions of this specification include controls and control devices that are to be part of or interfaced to the control system specified in this section. These controls shall be integrated into the system and coordinated by the contractor as follows:

.1 All communication media and equipment shall be provided as specified in Part 2 “Communication” of this specification.

.2 Each supplier of a controls product is responsible for the configuration, programming, start-up, and testing of that product to meet the sequences of operation described in this section.

.3 The Contractor shall coordinate and resolve any incompatibility issues that arise between the control products provided under this section and those provided under other sections or divisions of this specification.

.4 The Contractor is responsible for providing all controls described in the contract documents regardless of where within the contract documents these controls are described.

.5 The Contractor is responsible for the interface of control products provided by multiple suppliers regardless of where this interface is described within the contract documents.

3.04 GENERAL WORKMANSHIP

.1 Install equipment, piping, and wiring/raceway parallel to building lines (i.e., horizontal, vertical, and parallel to walls) wherever possible.

.2 Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.

.3 Install all equipment in readily accessible locations as defined by **Chapter 1, Article 100, Part A of the National Electrical Code (NEC).**

.4 Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.

.5 All equipment, installation, and wiring shall comply with acceptable industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

3.05 FIELD QUALITY CONTROL

.1 All work, materials, and equipment shall comply with the rules and regulations of applicable local, provincial, and federal codes and ordinances as identified in Part 1 of this specification.

.2 Contractor shall continually monitor the field installation for code compliance and quality of workmanship.

.3 Contractor shall have work inspected by local and/or provincial authorities having jurisdiction over the work.

3.06 EXISTING EQUIPMENT

.1 Wiring: The Contractor may reuse any abandoned wires. The integrity of the wire and its proper application to the installation are the responsibility of the Contractor. The wire shall be properly identified and tested in accordance with this specification. Unused or redundant wiring must be properly identified as such.

.2 Local Control Panels: The Contractor may reuse any existing local control panel/cabinets to locate new equipment. All redundant equipment within these panels must be removed. Panel face cover must be patched to fill all holes caused by removal of unused equipment or replaced with new.

.3 Unless otherwise directed, the Contractor is not responsible for the repairs or replacement of existing energy equipment and systems, valves, dampers, or actuators. Should the Contractor find existing equipment that requires maintenance, the Consultant is to be notified immediately.

.4 Temperature Sensor Wells: The Contractor may reuse any existing wells in piping for temperature sensors. These wells shall be modified as required for proper fit of new sensors.

.5 Room Thermostats: Deliver to Owner.

.6 Electronic Sensors and Transmitters: Unless specifically noted otherwise, remove and deliver to the Owner.

.7 Controllers and Auxiliary Electronic Devices: Deliver to the Owner.

.8 Pneumatic Controllers, Relays and Gauges: Deliver to the Owner.

.9 Damper Actuators, Linkages, and Appurtenances: Deliver to the Owner.

.10 Control Valves: Deliver to the Owner.

.11 The scheduling of fans through existing or temporary time clocks or control system shall be maintained throughout the DDC system installation.

.12 Install control panels where shown.

.13 Modify existing starter control circuits, if necessary to provide hand/off/auto control of each starter controlled. If new starters or starter control packages are required, these shall be included as part of this contract.

.14 Patch holes and finish to match existing walls.

3.07 WIRING

.1 All control and interlock wiring shall comply with national and local electrical codes and Division 26 of this specification. Where the requirements of this section differ from those in Division 26, the requirements of this section shall take precedence.

.2 All NEC Class 1 (line voltage) wiring shall be UL Listed in approved raceway according to OESC and Division 26 requirements.

.3 All low-voltage wiring shall meet OESC Class 2 requirements. (Low-voltage power circuits shall be sub-fused when required to meet Class 2 current limit.)

.4 Where OESC Class 2 (current-limited) wires are in concealed and accessible locations, including ceiling return air plenums, approved cables not in raceway may be used provided that cables are UL Listed for the intended application. For example, cables used in ceiling plenums shall be UL Listed specifically for that purpose.

.5 All wiring in mechanical, electrical, chiller, boiler or service rooms – or where subject to mechanical damage – shall be installed in conduit.

.6 All wiring for device connections in mechanical, electrical, chiller, boiler or service rooms shall be done in flexible metallic liquid tight. Length shall be limited to no more than 1 meter (3’).

.7 Do not install Class 2 wiring in raceway containing Class 1 wiring. Boxes and panels containing high-voltage wiring and equipment may not be used for low-voltage wiring except for the purpose of interfacing the two (e.g., relays and transformers).

.8 Do not install wiring in raceway containing tubing.

.9 Where Class 2 wiring is run exposed, wiring is to be run parallel along a surface or perpendicular to it and neatly tied at 3 m (10 ft) intervals.

.10 Where plenum cables are used without raceway, they shall be supported from or anchored to structural members. Cables shall not be supported by or anchored to ductwork, electrical raceways, piping, or ceiling suspension systems.

.11 All wire-to-device connections shall be made at a terminal block or terminal strip. All wire-to-wire connections shall be at a terminal block.

.12 All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.

.13 Maximum allowable voltage for control wiring shall be 120 V. If only higher voltages are available, the Contractor shall provide step-down transformers.

.14 All wiring shall be installed as continuous lengths, with no splices permitted between the controller and termination point. Exception – when wiring must transition between plenum rated FT6 cabling and 600V FT4 cabling, which must be identified in the shop drawing submittal and approved by the consultant and the Board.

.15 Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations.

.16 Size of raceway and size and type of wire shall be the responsibility of the Contractor, in keeping with the Manufacturer's recommendations and OESC requirements, except as noted elsewhere.

.17 Include one pull string in each raceway 2.5 cm (1 in.) or larger.

.18 Use coded conductors throughout with conductors of different colours.

.19 Control and status relays are to be located in designated enclosures only. These enclosures include packaged equipment control panel enclosures unless they also contain Class 1 starters.

.20 Conceal all raceways, except within mechanical, electrical, or service rooms. Install raceway to maintain a minimum clearance of 15 cm (6 in.) from high-temperature equipment (e.g., steam pipes or flues).

.21 Secure raceways with raceway clamps fastened to the structure and spaced according to code requirements. Raceways and pull boxes may not be hung in flexible duct strap or tie rods. Raceways may not be run on or attached to ductwork.

.22 Adhere to Division 26 requirements where raceway crosses building expansion joints.

.23 Install insulated brushings on all raceway ends and openings to enclosures. Seal top end of all vertical raceways.

.24 The Contractor shall terminate all control and/or interlock wiring and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site.

.25 Flexible metallic liquid-tight, flexible metal raceways shall not exceed 1 m (3 ft.) in length and shall be supported at each end. Flexible metal raceway less than 1/2 in. electrical trade size shall not be used. In mechanical, electrical, chiller, boiler or service rooms, flexible metallic liquid-tight raceways shall be used for connection to field mounted devices no connected with raceways.

.26 Raceway must be rigidly installed, adequately supported, properly reamed at both ends, and left clean and free of obstructions. Raceway sections shall be joined with couplings (according to code). Terminations must be made with fittings at boxes and ends not terminating in boxes shall have bushings installed.

3.08 COMMUNICATION WIRING

.1 The Contractor shall adhere to the items listed in the “Wiring” Article in Part 3 of the specification.

.2 All cabling shall be installed in a neat and workmanlike manner. Follow the Manufacturer’s installation recommendations for all communication cabling.

.3 Do not install communication wiring in raceway and enclosures containing Class 1 or Class 2 wiring.

.4 Maximum pulling, tension, and bend radius for cable installation, as specified by the cable manufacturer, shall not be exceeded during installation.

.5 Contractor shall verify the integrity of the entire network following the cable installation. Use appropriate test measures for each particular cable.

.6 When a cable enters or exits a building, a lightning arrestor must be installed between the lines and ground. The lighting arrestor shall be installed according to the Manufacturer’s instructions.

.7 All runs of communication wiring shall be unspliced length when that length is commercially available.

.8 All communication wiring shall be labelled to indicate organization and destination data.

.9 All communication wiring shall match the requirements of the manufacturers controllers (for Schneider Electric Andover product – communication wiring shall be orange and lo-capacitance type).

309 INSTALLATION OF SENSORS

.1 Install sensors in accordance with the Manufacturer’s recommendations.

.2 Mount sensors rigidly and adequately for the environment within which the sensor operates.

.3 Room temperature sensors shall be installed on concealed junction boxes properly supported by the wall framing. Room temperature sensors shall be plastic sensors (similar to Schneider Electric ETR-500) in classrooms and offices. Room temperature sensors shall be stainless steel flat plate sensors (similar to Schneider Electric EPT-500) in washrooms, corridors and gymnasiums.

.4 All wires attached to sensors shall be air sealed in their raceways or in the wall to stop air transmitted from other areas affecting sensor readings.

.5 Sensors used in mixing plenums and hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner vertically across the duct. Each bend shall be supported with a capillary clip.

.6 Low-limit sensors used in mixing plenums shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip. Provide 3 m of sensing element for each 1 m^2 (1 ft of sensing element for each 1 ft^2) of coil area.

.7 All pipe-mounted temperature sensors shall be installed in wells. Install all liquid temperature sensors with heat-conducting fluid in thermal wells.

.8 Install outdoor air temperature sensors on North wall, complete with sun shield at designated location.

.9 Differential air static pressure:

.1 Supply Duct Static Pressure: Pipe the high pressure tap to the duct using a pitot tube. Pipe the low-pressure port to a tee in the in the high pressure tap tubing of the corresponding building static pressure sensor (if applicable) or to the location of the duct high-pressure tap and leave open to the plenum.

.2 Return Duct Static Pressure: Pipe the high-pressure tap to the duct using a pitot tube. Pipe the low pressure port to a tee in the low-pressure tap tubing of the corresponding building static pressure sensor.

.3 Building Static Pressure: Pipe the low-pressure port of the pressure sensor to the static pressure port located on the outside of the building through a high-volume accumulator. Pipe the high-pressure port to a location behind a thermostat cover.

.4 The piping to the pressure ports in all pressure transducers shall contain a capped test port located adjacent to the transducer.

.5 All pressure transducers, other than those controlling VAV boxes, shall be located in field device panels, not on the equipment monitored or on ductwork. Mount transducers in a location accessible for service without use of ladders or special equipment.

.6 All air and water differential pressure sensors shall have gauge tees mounted adjacent to the taps. Water gauges shall also have shutoff valve installed before the tee.

3,10 FLOW SWITCH INSTALLATION

.1 Ensure that isolation valves are provided with the differential pressure flow switch.

.2 Adjust flow switch in accordance with Manufacturer’s instructions.

3,11 ACTUATORS

.1 Mount and link control damper actuators according to Manufacturer’s instructions.

.1 To compress seals when spring-return-actuators are used on normally closed dampers, power actuator to approximately 5° open position, manually close the damper, and then tighten the leakage.

.2 Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.

.3 Provide all mounting hardware and linkages for actuator installation.

.2 Electric/ Electronic:

.1 Dampers: Actuators shall be direct-mounted on damper shaft or jackshaft unless shown as a linkage installation. For low-leakage dampers with seals, the actuator shall be mounted with a minimum 5° available for tightening the damper seals. Actuators shall be mounted following Manufacturer's recommendations.

.2 Damper Actuators shall be configured as follows:

.1 Return Air Dampers – 100% Return Air at 2 VDC
.2 Outdoor Air Dampers – 100% Outdoor Air at 10 VDC
.3 Exhaust Air Dampers – 100% Exhaust Air at 10 VDC
.4 Face/Bypass Dampers – 100% Coil (Face) at 2 VDC
.5 Isolation Dampers – 100% Open at 2 VDC
.6 VAV Damper Actuators - +On shall be open

.3 Valves: Actuators shall be connected to valves with adaptors approved by the actuator manufacturer. Actuators and dampers shall be mounted following the actuator Manufacturer's recommendations.

.4 Valve actuators shall be configured as follows:

.1 Heating Valves – 100% Heating at 2 VDC
.2 Cooling Valves – 100% Cooling at 10 VDC
.3 Isolation Valves – 100% Open at 2 VDC

3,12 WARNING LABELS

.1 Permanent warning labels shall be affixed to all equipment that can be automatically started by the DDC system.

.1 Labels shall use white lettering (12-point type or larger) on a red background.

.2 Warning labels shall read as follows:

C A U T I O N
This equipment is operating under automatic control and may start or stop at any time without warning. Switch disconnect to 'Off" position before servicing.

.2 Permanent warning labels shall be affixed to all motor starters and all control panels that are connected to multiple power sources utilizing separate disconnects.

.1 Labels shall use white lettering (12-point type or larger) on a red background.

.2 Warning labels shall be read as follows:

C A U T I O N
This equipment is fed from more than one power source with separate disconnects.
Disconnect all power sources before servicing.

3,13 IDENTIFICATION OF HARDWARE AND WIRING

.1 All wiring and cabling, including that within factory-fabricated panels, shall be labelled at each end within 5 cm (2 in.) of termination with the DDC address or cable number (as specified in Section 1 under shop drawing submittal).

.2 Permanently label or code each point of field terminal strips to show the instrument or item served.

.3 Identify all control panels with minimum 1 cm (1/2 in.) letters on laminated plastic nameplates (lamacoids).

.4 Identify all other control components with permanent labels. All plug-in components shall be labelled such that the removal of the component does not remove the label.

.5 Manufacturer's nameplates and UL or CSA labels are to be visible and legible after equipment is installed.

.6 Identifiers shall match record documents.

.7 All electrical devices such as transformers and power supplies shall be labelled with supply voltage and power circuit number.

.8 Terminal blocks shall be labelled to match the connected device.

.9 Panel-mounted devices shall be labelled to match as-built drawings.

.10

3.14 CONTROLLERS

.1 Provide a separate controller for each AHU or other HVAC system. A DDC controller may control more than one system provided that all points associated with the system are assigned to the same DDC controller. Points used for the control loop reset, such as outside air or space temperature, are exempt from this requirement.

3.15 PROGRAMMING

.1 Provide sufficient internal memory for the specified sequences of operation and trend logging. There shall be a minimum of 25% of available memory free for future use.

.2 Point Naming: System point names shall match the naming structure provided by the Board.

.3 Point Logging: All points required to monitor performance of the system shall be logged. These points shall be identified in the shop drawing submittal. Point logging shall be at a minimum 288 entries every 15 minutes.

.4 System Trending: Each room and system shall have the system trend logs configured. Each trend log shall include the description of the trend log, which is displayed in the graphical trend log. Trend logs shall be configured to accurately display all relevant information for reviewing operation of the room and/or system over a period of time, with the upper and lower ranges configured to properly display the values shown in the graph.

.5 Point Alarming: All alarming shall be programmed to match the Board Alarming Standard.

3.16 CONTROL SYSTEM CHECKOUT AND TESTING

.1 Start-up Testing: All testing listed in this article shall be performed by the Contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed and documented before the Board's representative is notified of the system demonstration. The documented testing shall follow Section 8 of the shop drawing submittal and shall be provided to the Consultant and the Board's representative prior to system demonstration, and included in the O&M manuals.

.1 The Contractor shall furnish all labour and test apparatus required to calibrate and prepare for service of all instruments, controls, and accessory equipment furnished under this specification.

.2 Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that all terminations are tight.

.3 Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures according to Manufacturer's recommendations.

.4 Verify that all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starters, etc.) operate properly and that the normal positions are correct.

.5 Verify that all analog output levels (I/P's, actuators, etc.) are functional, that start and span are correct, and that span and normal positions are correct. The Contractor shall check all control valves and automatic dampers to ensure proper action and closure. The Contractor shall make any necessary adjustments to valve stem and damper blade travel.

.6 Verify that the system operation adheres to the sequences of operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops and optimum start/stop routines.

.7 Alarms and Interlocks:

.1 Check each alarm separately by including an appropriate signal at a value that will trip the alarm.

.2 Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.

.3 Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action.

3.17 CONTROL SYSTEM DEMONSTRATION AND ACCEPTANCE

.1 Demonstration:

.1 Prior to acceptance, the control system shall undergo a series of performance tests to verify operation and compliance with this specification. These tests shall occur after the Contractor has completed the installation, started up the system, and performed his/her own tests.

.2 The tests described in this section are to be performed in addition to the tests that the Contractor performs as a necessary part of the installation, start-up, and debugging process and as specified in the “Control System Checkout and Testing” article in Part 3 of this specification. The Consultant will be present to observe and review these tests. The Consultant shall be notified at least 10 days in advance of the start of the testing procedures.

.3 The demonstration process shall follow that approved in Part 1, “Submittals”. The approved checklist and forms shall be completed for all systems as part of the demonstration.

.4 The Contractor shall demonstrate actual field operation of each control and sensing point for all modes of operation including day, night, occupied, unoccupied, fire/smoke alarm, seasonal changeover, and power failure modes. The purpose is to demonstrate the calibration, response, and action of every point and system. Any test equipment required to prove proper operation shall be provided by and operated by the Contractor. This can be demonstrated with either:

.1 At least two persons equipped with two-way communication, one on site and one at a workstation or

.2 One person with a workstation on-site with wireless connection to a workstation.

.5 As each control input and output is checked, a log shall be completed showing the date technician’s initials, and any corrective action taken or needed.

.6 Demonstrate compliance with sequences of operation through all modes of operation.

.7 Demonstrate complete operation of operator interface.

.8 Additionally, the following items shall be demonstrated:

.1 DDC loop response. The Contractor shall supply trend data output in a graphical form showing the step response of each DDC loop. The test shall show the loop's response to a change in set point, which represents a change of actuator position of at least 25% of its full range. The sampling rate of the trend shall be from 10 seconds to 3 minutes, depending on the speed of the loop. The trend data shall show for each sample the set point, actuator position, and controlled variable values. Any loop that yields unreasonably under-damped or over-damped control shall require further tuning by the Contractor.

.2 Demand limiting. The Contractor shall supply a trend data output showing the action of the demand limiting algorithm. The data shall document the action on a minute-by-minute basis over at least a 30 minute period. Included in the trend shall be building kW, demand limiting set point, and the status of sheddable equipment outputs.

.3 Operational logs for each system that indicate all set points, operating points, valve positions, mode, and equipment status shall be submitted to the Consultant. These logs shall cover three 72 hour periods and have a sample frequency of not more than 15 minutes. The logs shall be provided in both printed and disk formats.

.9 Any tests that fail to demonstrate the operation of the system shall be repeated at a later date. The Contractor shall be responsible for any necessary repairs or revisions to the hardware or software to successfully complete all tests.

.2 Acceptance:

.1 All tests described in this specification shall have been performed to the satisfaction of both the Consultant and the Owner prior to the acceptance of the control system as meeting the requirements of completion. Any tests that cannot be performed due to circumstances beyond the control of the Contractor may be exempt from the completion requirements if stated as such in writing by the Consultant. Such tests shall then be performed as part of the warranty.

.2 The system shall not be accepted until all forms and checklists completed as part of the demonstration are submitted and approved as required in Part 1, "Submittals."

3.18 CLEANING

.1 The Contractor shall clean up all debris resulting from his/her activities daily. The Contractor shall remove all cartons, containers, crates, etc., under his/her control as soon as their contents have been removed. Waste shall be collected and placed in a designated location.

.2 At the completion of work in any area, the Contractor shall clean all work, equipment, etc., keeping it free from dust, dirt, and debris, etc.

.3 At the completion of work, all equipment furnished under this section shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.19 TRAINING

.1 Provide a general walkthrough and the following locations shall be confirmed with the O&M manual:

.1 Location of all controllers

.2 Location of all remotely mounted devices, including:
- .1 AHU duct static pressure sensor
- .2 System wet DP sensors
- .3 Remote on/off relays

3.20 SEQUENCE OF OPERATIONS FOR ALL SITES

Cooling System Enable
Equipment Start/Stop Programming
Room Control Start/Stop Programming
Sunrise/Sunset Programming
Sweater Day Control
Operating Schedules

.1 Cooling System Enable
- .1 Provide a master program “CalcClgEnable” which sets the global “System_Cooling” flag, which allows all cooling equipment to operate.
- .2 The master cooling program will compare the outdoor air temp “OA_Temp” to the outdoor air cooling lockout “OA_ClgLockout”. Whenever the outdoor air temperature is greater than the outdoor air cooling lockout for a time period of 30 minutes, the cooling system flag will be on. Whenever the outdoor air temperature is lower than the outdoor air cooling lockout for a time period of 30 minutes, the cooling system flag will be off.
- .3 The cooling system flag can only be enabled when the operator controlled numeric “Master_ClgEnable” is set to on.

.2 Equipment Start/Stop Programming
- .1 Equipment shall be started and stopped using either the imported school occupied flag “Flag_Occupied” or a local area flag “Flag_Area”. Use of either the school occupied flag or the area flag will start the equipment after the programmed time delay.
- .2 The school occupied flag is imported from a master schedule controlled point in the main network controller.
- .3 The area flag can be imported from a master schedule controlled point in the main network controller.
- .4 The various equipment time delays shall be staggered to prevent multiple pieces of equipment starting simultaneously. Time delays between pieces of equipment shall be at least 10 seconds, and shall be confirmed with the Board.

.5 Equipment shall also be capable of being started using the override flag "Flag_Override". Use of this point will bypass the programmed time delay.
.6 All equipment shall, due to a power failure, turn the output off and, after a minimum 10 minute time delay, shall reset the control program and start-up will be controlled, while the occupied flag or area flag are on, follow the above noted time delay.

.3 Room Control Start/Stop Programming
.1 Room controlled equipment shall be started and stopped using either the imported school occupied flag "Flag_Occupied" or a local area flag "Flag_Area". Use of either the school occupied flag or the area flag will start the equipment after the programmed time delay.
.2 The school occupied flag is imported from a master schedule controlled point in the main network controller.
.3 The area flag can be imported from a master schedule controlled point in the main network controller.
.4 The various equipment time delays shall be staggered to prevent multiple pieces of equipment starting simultaneously. Time delays between pieces of equipment shall be at least 10 seconds, and shall be confirmed with the Board.
.5 Equipment shall also be capable of being started using the override flag "Flag_Override". Use of this point will bypass the programmed time delay.
.6 All equipment shall, due to a power failure, turn the output off and, after a minimum 10 minute time delay, shall reset the control program and start-up will be controlled, while the occupied flag or area flag are on, follow the above noted time delay.

.4 Outdoor Lighting and Sunrise/Sunset Programming
.1 The main controller shall have a sunrise/sunset schedule, which will have sunrise and sunset times set per week within the controller.
.2 The sunrise and sunset times shall be adjusted automatically based on daylights savings time.
.3 There shall be an outdoor lighting schedule, which will be the times when the outdoor lights are allowed to operate.
.4 When the time of day is between the sunset and sunrise times and the outdoor lighting schedule is on, the outdoor lights shall be energized.

.5 Sweater Day Control
.1 The main controller shall have a program to adjust all the heating setpoints throughout all the controllers of the building.
.2 The program shall initiate the reduced setpoints based either on a schedule or from an external management system (eg. Ebase).
.3 There shall be local setpoints within the main controller for the standard heating setpoint, the sweater day setpoint and the current setpoint.
.4 There shall be a schedule to allow the sweater day scheduled point to be configured at any time.

.6 Operating Schedules
.1 Operating Schedules and associated control points shall be created
.1 Occupied Schedule
.2 Office Schedule
.3 Gym Schedule

.4 Outdoor Lighting Schedule
.5 Sweater Day Schedule
.6 Summer Learning Schedule
.7 Day Care Schedule

.2 All schedules shall exist in the main (CX) controller.

.3 All necessary schedule points and bindings shall be programmed.

END OF SECTION

PART 1: GENERAL

1.01 RELATED SECTIONS

.1 Division 01 – General Requirements

.2 Division 23 – Heating, Ventilating, and Air-Conditioning

.3 Section 25 05 01 – Integrated Automation

.4 Division 26 – Electrical

1.02 GENERAL NOTES

.1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2008, Supplementary Conditions of all sections of Division 1 are part of and apply to every division of this specification.

.2 In this specification the "Contractor" refers to the General/Prime Contractor responsible for the total project. The "Trade" refers to the particular Integrated Automation Trades.

.3 The terms “Integrated Automation Trades” and “Controls Trades” include all Trades that perform work specified within this Division.

1.03 SCOPE OF WORK

.1 It is the intent of these specifications to furnish and install complete integrated automation system as more thoroughly defined in each section of this specification. All materials and equipment as hereinafter specified and/or shown on the drawings will be furnished and installed in such a manner as to leave each of the systems of the Controls Trades complete and in satisfactory operating condition.

.2 These specifications are to be considered an integral part of the plans which accompany them. Neither the plans nor the specifications shall be used alone. Any item or subject omitted from one but which is mentioned or reasonably implied in the other shall not relieve this Trade of responsibility.

1.04 INSPECTION OF PREMISES AND SITE

.1 Extra charges for premium time labour shall be included in the Bid Price allowing for after hours, weekend and holiday labour requirements.

1.05 COMPLIANCE AND CO-OPERATION

.1 The drawings upon which this contract is based show the arrangement, general design and extent of the systems. These systems are suitably outlined on the drawings with regard to sizes, locations, general arrangement and installation details. The mains and connections thereto are shown more or less in diagrammatic form except where in certain cases the drawings may include details giving the exact location and arrangements required.

.2 Where any parts of the system and/or pieces of equipment are located by dimensions on the drawings, said dimensions shall be checked and verified in the field. Each Trade shall make, without additional charge or expense to the Owner, any necessary changes or additions to accommodate structural conditions or other equipment. The Consultant shall be notified immediately and his authority secured in writing for such revisions before proceeding with the work.

.3 This Trade must exercise the utmost care and diligence in order that all work shall be done in strict compliance with the full intent and meaning of the drawings and these specifications.

.4 This Trade shall be expected and required to confer and co-operate with the other trades in order to eliminate any unnecessary delays to any work being done in the building. This Trade will also be required to store up his materials neatly and out-of-the-way and to clean up all refuse caused by his work daily.

.5 This Trade shall carefully study all drawings, specifications, and other instructions and shall at once report to the Consultant any errors, inconsistencies, or omissions he may discover. In no case shall he proceed in uncertainty.

.6 As the work progresses and before installing fixtures, other fittings and equipment which may interfere with the work of other Trades, each Trade shall consult with the Consultant and obtain detail drawings or instructions for the exact location of such equipment.

1.06 SUBMITTALS AND SHOP DRAWINGS

.1 Submit for review, a complete set of shop drawings and data sheets covering all items or equipment to be installed under the Contract. Shop drawings shall show all relevant performance and installation information. The drawings and data required shall generally be as outlined under each Section of the Specification, but shall not be restricted to the items listed. Submit copies of reviewed shop drawings to other trades as required for completion of their related work.

.2 Shop drawings may be submitted electronically in Adobe Portable Document Format (.pdf). Electronically submitted shop drawings shall comply with all requirements for shop drawings noted herein including bearing the review mark of the submitting Trade. Electronically submitted shop drawings shall be returned electronically.

.3 Clearly indicate any discrepancies between the specified and supplied equipment, particularly those that affect the performance of the equipment.

.4 Equipment will not be accepted on site until approval of shop drawings. Shop drawings designated as "Reviewed as Modified" are conditionally approved such that this Trade shall ensure equipment satisfies all Contract requirements. Delivery of equipment may proceed but final, corrected shop drawings must be submitted prior to completion of Contract.

.5 Within ten working days of the award of the Contract, submit a list of all equipment for which delivery dates exceed six weeks.

.6 Shop Drawings: No work may begin on any segment of this project until submittals have been successfully reviewed for conformity with the design intent. When manufacturer’s cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Submittals shall include:

.1 A complete bill of materials of equipment to be used indicating quantity, manufacturer, model number, and other relevant technical data. Quantities of items submitted shall be reviewed but are the responsibility of the Trade

.2 Wiring diagrams and layouts for each control panel. Show all termination numbers.

.3 Schematic diagrams for controlled systems.

.4 Riser diagrams of network wiring between all control panels.

.5 A description of the proposed sequence of operations for each system.

.6 Project Record Documents: Refer to 01 78 39 *Project Record Documents*. Upon completion of installation, submit record (as-built) documents. The documents shall be submitted for approval prior to final completion and shall include:

.1 Project Record Drawings. As-built versions of the submittal shop drawings.

.2 Operation and Maintenance (O & M) Manual.

.3 As-built versions of submittal product data.

.4 Graphic files, programs, and database on Owner's Vista server.

.5 List of recommended spare parts with part numbers and suppliers.

.6 Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware including computer equipment and sensors.

.7 Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.

1.07 LIABILITY INSURANCE

.1 This Trade must maintain such insurance as will fully protect both the Owner and himself from any and all claims under the Workplace Safety and Insurance Act.

1.08 CODES, FEES AND CERTIFICATES

.1 All work shall be executed and all materials shall conform to and be inspected in strict accordance with all the laws, rules, and regulations of the local and provincial codes and all other authorities having jurisdiction.

.2 This Trade shall obtain all necessary permits and all notices, pay all fees in order that the work hereinafter specified may be carried out and he shall furnish any certificates necessary as evidence that the work installed conforms with the laws and regulations of all authorities having jurisdiction before final certificates are issued.

.3 All changes and alterations required by an authorized inspector of any authority having jurisdiction shall be carried out without charge or expense to the Owner.

.4 All equipment supplied must have approval of NFPA, CSA, ULC, FM, Owner's Underwriter and any other authority having jurisdiction.

1.09 QUALITY OF WORK

.1 Each respective trade must supply to this project, Certified Mechanics and Apprentices in accordance with current Department of Labour Regulations. Each trade shall provide installations and workmanship of a professional level of quality.

.2 The work shall be performed by skilled technicians under the direction of an experienced project manager, all of whom shall be properly trained and qualified for this work.

1.10 ELECTRICAL WIRING

.1 Each Controls Trade must review the Wiring for Mechanical Equipment Schedule on the electrical drawings as well as individual sections of the mechanical specification in order to determine the electrical requirements and responsibilities for their respective Trade.

1.11 EXTRAS AND CREDITS

.1 In the event of additional work of any nature being required, this Trade must state in writing the costs of such extras at the time they are required to do the work, and unless any such extras are approved, they will not be allowed. In the event of omissions, a fair and reasonable adjustment will be made to the contract price by negotiation with the Consultant. Such an adjustment to the contract shall not in any sense be construed to render the contract invalid. Any extras or credits submitted for approval shall be priced individually, and be accompanied by an itemized list of materials and corresponding price breakdown.

.2 All quotations shall be based on the submitted hourly rates and the latest issue of MCAA pricing manual.

1.12 FIRE OR SMOKE SEPARATION PENETRATIONS

.1 Patch all openings around installations of this Division that pierce fire or smoke separations with an approved watertight smoke and fire stop sealant.

1.13 TEMPORARY AND TRIAL USAGE

.1 It is especially understood and agreed that the temporary and trial usage by the Owner of any mechanical device, machinery, apparatus, equipment or any other work or materials, supplied under this contract, before Date of Substantial Completion and written acceptance by the Consultant, is not to be construed as evidence of the acceptance of same by the Owner. It is further understood and agreed that the Owner shall have the privilege of such temporary and trial usage as soon as this Trade shall claim that the said work is completed and in accordance with the drawings and specifications for such reasonable length of time and as the Consultant shall deem to be sufficient for making a complete and thorough test of the same.

1.14 ADJUSTING AND START-UP

.1 This Trade shall provide acceptance tests to demonstrate that the equipment and systems actually meet the specified requirements. Tests may be conducted as soon as conditions permit. Make all changes, adjustments or replacements required as the preliminary tests may indicate prior to final tests.

.2 In testing, vary loads to illustrate start-up, sequence, normal shut down, and simulate emergency conditions for safety shut down with automatic and manual reset.

1.15 DEFICIENCIES

.1 All deficiencies as identified in Field Review Reports or Commissioning Reports shall be corrected by the applicable Trade in a timely manner after being made aware of said deficiencies. The Controls Trade shall subsequently inform the Consultant that deficiencies have been corrected in writing.

1.16 COMPLETION

.1 Each Trade shall keep the premises in a clean and orderly condition during construction. All waste and unusable materials shall be promptly removed from the site.

.2 Upon completion of his work, each Trade shall go over the entire installation; remove all surplus materials and rubbish of every description, incident to this work, leaving the installation neat and orderly and in completely satisfactory working conditions subject to the approval of the Consultant.

1.17 OWNER'S INSTRUCTIONS

.1 This Trade shall supply to the Consultant (who will turn over to the Owner after his review) three (3) sets of operating and maintenance instructions through the mechanical trade.

.2 Each operating and maintenance manual shall contain parts list drawings for each mechanical component.

.3 This Trade is to supply the services of a knowledgeable technician to thoroughly explain the integrated control system operation and its maintenance to the full satisfaction of the Consultant and Owner's representative.

1.18 WARRANTY

.1 Equipment, material and software shall be unconditionally guaranteed for a period of two years form the date of substantial completion.

1.19 CONTROL WIRING

.1 Wire components of the integrated automation system in accordance with the requirements of Divisions 26 and 27.

.2 Use recommended orange jacket cable for all network wiring,

.3 Run all control wiring in dedicated EMT conduit where exposed.

.4 Control relays and transformers necessary for BAS operation shall be provided by the Control Trade, but all contactors and their power supplies handling power wiring to the equipment shall be by the electrical Trade;

1.20 IDENTIFICATION FOR INTEGRATED AUTOMATION

.1 All automation equipment, including but not limited to: stand-alone control units, instruments, and relays, shall be tagged at location of installation on the job and keyed to a control schematic on which all instruments are to be tagged for the entire job. A standard logical, rigorous, and comprehensive naming and identification system will be employed. Provide a rational relationship between the naming and identification system and its related equipment numbering system.

1.21 TRAINING

.1 Training shall be provided to the Owner's designated representative. Training will cover the complete operation of the Building Automation System.

1.22 ACCEPTANCE PROCEDURES

.1 The procedure shall consist of:

.1 A list of all points connected to the system detailed in the input/output summary shall be printed.

.2 Each commandable point shall be commanded and the results documented.

.3 Each program sub-routine shall be demonstrated as functioning.

.4 Each DDC loop shall be demonstrated as functioning and stable.

.5 A report including the results of these tests shall be submitted.

.6 Should this procedure and associated documentation prove satisfactory then the system will be accepted by the Owner.

PART 2: PRODUCTS

2.01 DENTIFICATION FOR INTEGRATED AUTOMATION

.1 Refer to Part 1 and Part 3 of this Section for identification requirements associated with these products.

.2 Provide orange cable jacket colour for identification of integrated automation network wire throughout the facility.

.3 Provide equipment nameplates.

PART 3: EXECUTION

3.01 CONTROL WIRING

.1 Provide all necessary conduit, fittings and wire to provide a complete control system described in this Specification. Control wiring shall be coded and identified to the standard of Division 27 and run parallel or at right angles to structure.

.2 Safety control loops such as freeze and fire stats shall be hard wired into the associated system magnetic starter. The primary function shall not be performed by software in this case.

.3 Provide all transformers and power supplies for the required controls. The electrical contractor shall provide separate labelled circuit breakers not to be used for any other purposes and 120 VAC wiring to a junction box on each floor or to designated areas.

.4 In existing block walls this trade shall provide surface mounted thermostats with conduit and junction boxes.

.5 All controls shall be powered from circuits dedicated to the control circuit. Application specific controllers may be powered from the same circuit as the equipment they are controlling, as long as that equipment is powered from a dedicated power source.

.6 Class 2 wiring and power wiring shall not share the same conduit.

.7 Verify integrity and provide complete testing of all wiring to ensure continuity and freedom from shorts and grounds. All equipment, installation, and wiring shall comply with acceptable industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

.8 Penetrations through and mounting holes in the building exteriors shall be made watertight. Holes in concrete, brick, steel and wood walls shall be drilled or core drilled with proper equipment; conduits installed through openings shall be sealed with materials which are compatible with existing materials. Openings in fire/smoke partitions shall be sealed with materials which meet the requirements of NFPA 70, Firestopping.

.9 The installation shall provide clearance for control-system maintenance by maintaining access space between coils, access space to mixed-air plenums, and other access space required to calibrate, remove, repair, or replace control-system devices. The control-system installation shall not interfere with the clearance requirements for mechanical and electrical system maintenance.

.10 All controllers and control power supplies shall be located in plant rooms and in dedicated control cabinets, except for those serving terminal boxes and ceiling mounted equipment which shall be located in a manner which facilitates service and maintenance.

.11 All panel enclosures shall contain a drawing showing the panel layout and connected points list.

3,02 IDENTIFICATION FOR INTEGRATED AUTOMATION

.1 All wiring and cabling, including that within factory-fabricated panels, shall be labelled at each end within 50 mm (2 in.) of termination with the DDC address or termination number.

.2 All pneumatic tubing shall be labelled at each end within 50 mm (2 in.) of termination with a descriptive identifier.

.3 Permanently label or code each point of field terminal strips to show the instrument or item served.

.4 Identify control panels with minimum 10 mm (½ in.) letters on laminated plastic nameplates.

.5 Identify all other control components with permanent labels. All plug-in components shall be labelled such that removal of the component does not remove the label.

.6 Identify room sensors relating to terminal box or valves with nameplates.

.7 Manufacturers' nameplates and UL or CSA labels are to be visible and legible after equipment is installed.

.8 Identifiers shall match record documents.

3.03 TRAINING

.1 Provide on-site or classroom training sessions, throughout the contract period for personnel designated by the owner.

.2 Train the designated staff of owner's representative and owner to enable them to do the following:

.1 Day-to-day Operators:

(1) Proficiently operate the system
(2) Understand control system architecture and configuration
(3) Understand DDC system components
(4) Log on and off the system
(5) Access graphics, point reports, and logs
(6) Adjust and change system set points, time schedules, and holiday schedules
(7) Recognize malfunctions of the system by observation of alarms
(8) Understand system drawings and Operation and Maintenance manual
(9) Understand the job layout and location of control components
(10) Access data from DDC controllers and ASCs
(11) Operate portable operator's terminals

.2 Advanced Operators:

.1 Create, delete, and modify point trend logs and graph or print these both on an ad-hoc basis and at user-definable time intervals
.2 Create, delete, and modify reports

.3 The instructor(s) shall be factory-trained instructors experienced in presenting this material.

.4 Classroom training shall be done using a network of working controllers representative of the installed hardware.

.5 During each training session formal minutes shall be taken documenting instructors, attendees and subjects discussed. No informal discussions or trouble shooting will be counted against training time.

3.04 INTEGRATION AND TESTING

.1 The controls Trade shall connect, test and commission all the products, software and network bindings to verify they are working to meet the controls sequence as specified for this project.

.2 This trade shall co-ordinate with and assist the testing adjusting and balancing trade to provide accurate balancing.

3.05 CONTROL SYSTEM CHECKOUT AND TESTING

.1 Start-up Testing: All testing listed in this article shall be performed by the Trade and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the owner's representative is notified of the system demonstration.

.2 The Trade shall furnish all labour and test apparatus required to calibrate and prepare for service of all instruments, controls, and accessory equipment furnished under this specification

Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.

.3 Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures according to manufacturers' recommendations.

.4 Verify that all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starters, etc.) operate properly and that the normal positions are correct.

.5 Verify that all analog output devices are functional, that start and span are correct, and that direction and normal positions are correct. The Trade shall check all control valves and automatic dampers to ensure proper action and closure. The Trade shall make any necessary adjustments to valve stem and damper blade travel.

.6 Verify that the system operation adheres to the sequences of operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops and optimum start/stop routines.

.7 Alarms and Interlocks:

.1 Check each alarm separately by including an appropriate signal at a value that will trip the alarm.
.2 Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.
.3 Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action.

END OF SECTION

PART 1: GENERAL

1.01 GENERAL REQUIREMENTS

.1 Conform to General Conditions for Mechanical Trades

.2 Related Work Specified Elsewhere

.1 General Conditions for Mechanical Trades
.2 Heating, Ventilation & Air Conditioning
.3 Heating, Ventilation & Air Conditioning Equipment
.4 Electrical

1.02 DESCRIPTION OF SYSTEM

.1 Furnish and install all components, devices and control wiring to revise and extend the existing for Energy Management and Environmental Control System incorporating Direct Digital Control (DDC) to provide a fully integrated system and equipment monitoring. The system shall control/monitor HVAC and plumbing equipment and systems as specified in this section. The work shall include but is not limited to the following:

.1 All necessary hardware, software, control panels, web access modules, control wiring, field devices, installation, documentation and owner training as specified.
.2 The installed system shall incorporate electronic and digital control devices to perform the control sequences and monitoring outlined herein. Specific control sequence requirements are as detailed elsewhere in this Section of the specification.
.3 Testing, debugging, calibrating, adjustment, programming and confirmation of total system operation.

1.03 MANUFACTURER AND INSTALLING CONTRACTOR

.1 The temperature control manufacturer shall be Distech Controls – local rep 519-893-2638.

.2 Any new building must be a seamless extension of the current Energy Management and Building Control System.

.1 The existing TAC Vista software shall be upgraded to Distech Niagara Integration.and shall continue to be, the only head-end BAS server for the entire School Board.
.2 The head-end server contains the secure Energy Management Settings (i.e. Master Setpoints & Schedules) that are sent to all schools in real-time. The control system must be an extension of the head-end server and be able to be managed exclusively through the Vista head-end server.
.3 Monitoring of all school board control systems are done in real-time and must be presented at the exclusive Vista head-end server as first-priority data.
.4 The Vista head-end server has all the required controller databases and software to be able to centrally maintain and modify network configuration and controller software for the entire School Board. The Vista head-end server is the only system that can access the LacNet programming variables inside the controllers for real-time configuration of setpoint and time scheduling parameters.
.5 The graphics and controller database must be presented inside the Vista head-end server in its native format in order to preserve the real-time speed, integrity and multi-site administration of the entire system.

.3 The controls company shall have a service office and maintenance facility with in 6 kilometers of the Waterloo Region District Public School Board main office. The controls company shall be able to provide service to any school within 4 hours during normal working hours.

1.04 QUALITY ASSURANCE

.1 The system components shall be listed by Underwriters Laboratories Inc. and Canadian Standards Association.

.2 The system control products shall be stored and handled according to manufacturer's recommendations.

.3 The work shall be performed by skilled technicians all of whom shall be properly trained and qualified for this work.

PART 2: PRODUCTS

2.01 GENERAL

.1 The system shall integrate the operation of intelligent building management controllers distributed into the network.

.2 Provide web based access. Two Ethernet connections for communication shall be provided by the Electrical Division.

.3 The DDC System shall be generally comprised of the following devices to achieve the control functions described in this section:

.1 Distech Controls programmable controllers.
.2 Network repeaters as required by network lengths.
.3 Control relays.
.4 Control dampers and valves.
.5 Sensors, actuators and other input/output devices.

.4 Controllers shall execute the application programs, calculations, and commands to provide the control function specified for that unit. Each controller shall include its own micro-computer controller, power supply, input/output modules, termination modules and real time clock.

.5 Controllers shall be capable of full control functionality and alarm reporting independently or as a part of the DDC network.

.6 The system shall be stored in flash ram so no batteries are required.

.7 Each control device shall be modular and expandable to provide additional inputs and outputs and control functionality for that device

.8 Each controller shall be able to transfer and receive data via the network for performance of control functions.

.9 The system shall be modular, permitting expansion by adding hardware and software without changes in communication or processing equipment.

.10 The complete system shall be capable of communication over a BACnet network.

.11 The controllers shall monitor the status of all overrides and include this information in logs and summaries to inform the operator that automatic control has been inhibited.

.12 Controllers shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all subsidiary equipment and provide both local and remote annunciation of any component failures.

.13 Controllers shall activate an orderly shutdown of their operation in the event of loss of normal electrical power. Non-volatile memory shall be incorporated for all controller configuration data. The controllers shall automatically resume full operation without manual intervention.

.14 The controllers shall have sufficient memory to support their own operating system and data bases including:

.1 control processes
.2 energy management applications
.3 alarm management
.4 trend data
.5 operator input/output
.6 remote communications
.7 manual override monitoring

.15 Controllers shall incorporate the following software features:

.1 Energy management:
.a Time of Day Scheduling
.b Calendar Based Scheduling
.c Holiday Scheduling
.d Optimal Start and Stop
.e Demand Limiting
.f Heating/Cooling Interlock

.2 Alarm Management:
.a Alarm Management shall be provided to monitor, buffer and direct alarm reports to operator devices and memory files. The controllers shall perform alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic and prevent alarms from being lost.
.b All alarm or point change report shall include the points' English language description and the time and date of occurrence.
.c The user shall be able to define the specific reaction for each point, the priority level (3 in total) and ability to inhibit alarm reporting for each point.
.d The user shall be able to define conditions under which point changes need to be acknowledged by an operator and logged for analysis at a later date.
.e The user shall be able to print, display or store a unique 60 character alarm message to more fully describe the alarm condition or direct operator response. The message shall be customizable to describe each individual alarm.
.f In web access applications only critical alarms shall initiate a call to a remote operator device, otherwise call activity shall be minimized by time stamping and saving reports until a manual request is received or until the buffer space (minimum 50 alarms) is full.

.3 Trend Logs:
- .a Controllers shall provide an automatic roll-over trend log, which stores records up to an operator-selected number at an operator-selected sampling rate and then overwrites the oldest record with each new record.
- .b Sample intervals shall be from 1 minute to 24 hours.
- .c Provide graphical and tabular displays

.4 Runtime Totalization:
- .a The controllers shall automatically accumulate and store runtime hours for binary points with a sampling resolution of 1 minute. The user shall have the ability to define a warning limit to trigger maintenance or user-defined messages.

..5 Event Totalization:
- .a Controllers shall have the ability to count events (such as on/off) and store up to 10 million events before reset with a user-defined limit used to trigger a user-defined message.

.6 Custom Programming:
- .a The controllers shall permit user defined custom control processes based on:
  - any system measured data or status
  - any calculated data
  - any results from other processes
  - Boolean logic
- .b The custom processes may be triggered by:
  - Time-of-day
  - calendar date
  - events (point alarm etc.)

.7 The control strategy for each control loop shall be performed by software within the controller. The sequence of events required for each control loop is described for each system in the control sequence.

.8 Outdoor air temperature indication shall be available at each controller as an integral part of the control strategies for that controller. Should the network transmission of the common outdoor air temperature (or any other common value) fail, then each controller shall use the last good value received.

2.02 NETWORK ARCHITECTURE

.1 The controllers on the local network shall communicate via a two wire LonTalk TP/FT-10 network.

.2 The control network shall be able to expand to match the requirements of the facility, including any future building additions.

.3 The control network shall be able to support a total developed length of 305 meters without using a network repeater.

2.03 CONTROL PANELS

.1 Control panels shall be fully enclosed cabinets with all steel construction. Cabinets shall have a hinged door with locking latch or bolt-on cover plate. All cabinet locks shall be common keyed. Cabinets shall be finished with two coats of paint.

2.04 TEMPERATURE SENSORS

.1 Provide thermistor temperature sensors, not requiring transmitters, to measure temperature.

.2 Accuracy shall be +/-0.2°C from 0 to 70°C.

.3 Space sensors in occupied areas shall be Greystone TE200 series, type AE or Distech Smart Comfort SO having an integral push button for unoccupied override and an integral slider to adjust set point (LED display not required).

.4 In corridors and where noted on the drawings, provide stainless steel plate type sensors (push button override and LED display not required), Greystone TE200 series, type AS or equal.

.5 Duct temperature sensors shall be Greystone TE200 series, type B or equal having a stainless steel probe length to suit application and ABS enclosure. Duct averaging temperature sensors shall be Greystone TE200 series, type FD or equal having an element length to suit application, copper probe and ABS enclosure.

.6 Immersion temperature sensors shall be Greystone TE200 series, type C or equal having a ¼" OD stainless steel probe, 4" long and ABS enclosure. Immersion sensors shall be complete with thermowells. Thermal conductive compound shall be added inside the thermowell to provide optimum thermal transfer from the fluid to sensor. Stainless steel thermowells shall be used for steel pipe and brass thermowells shall be used in copper pipe.

.7 Outdoor temperature sensors shall be Greystone TE200 series, type F or equal having an ABS gasketed cover. A thermal radiation cover shall limit the sensor to solar radiation exposure.

2.05 CARBON DIOXIDE SENSORS

.1 Sensors shall Greystone CDD series or equal having the following features:

(1) 0-2000 ppm factory default detection range, field adjustable.
(2) Non-dispersive infrared sensing element with self-calibration algorithm.
(3) Guaranteed 5 year calibration interval.
(4) Powered by either AC or DC source.
(5) Accuracy: within 50 ppm or 3% of reading (whichever is greater).
(6) Operating humidity range: 0-95% RH.
(7) Operating temperature range: 0 to 50°C or greater.
(8) Stability: less than 2% full scale in 15 years
(9) Response time: less than 2 minutes for 90% step change.

.2 Duct mounted sensors shall be complete with ABS enclosure complete with sampling tube.

.3 Space mounted sensors shall be executive space type without LCD display.

2.06 DIFFERENTIAL PRESSURE SENSORS

.1 Differential pressure sensors shall be provided for liquid or air differential pressure applications. The differential pressure range shall be selected to match the application. Select materials suitable for the measured variable, i.e.: water or air, and to withstand a minimum of two times the maximum pressure of the highest pressure range.

.2 Each sensor shall be provided with an industry standard, 0 to 10 Vdc output signal mounted at the sensor. The transmitter and sensor shall have a combined accuracy and repeatability of 1.0% of the differential pressure range. A pushbutton zero adjustment shall be provided.

2.07 FREEZESTATS

.1 Freezestats shall be complete with a vapour filled 20 foot bulb and 4 foot capillary. Wire freezestats to shut down the respective fans should temperature over any 12 in. of sensor length drop below the adjustable setpoint (2°C). Freezestats shall have manual reset.

PART 3: EXECUTION

3.01 INSTALLATION

.1 All controllers and components in the system and on the network shall be installed according to manufacturer recommendations, general installation standards for digital controls and in accordance with the approved shop drawings.

.2 Locate room sensors in the locations shown on the mechanical drawings. All sensors shall be mounted at barrier free height (3'-11" (1175 mm) above finished floor).

.3 All control components for off site system access shall be located where noted on the drawings. The Electrical Contractor shall provide all required connections / cabling for off site access to the web access components.

.4 All programmable controllers, web access components, relays and other control components shall be located within control panels. Control Panels shall be wall mounted and shall be located within suspended ceiling spaces or other locations approved by the Consultant.

.5 The Electrical Contractor will provide hand-off-auto switches in all starters controlled by the BAS.

.6 The Electrical Contractor will provide dedicated 120 VAC, 15 ampere power circuits wired to junction boxes on each floor for controls transformers.

.7 The supply of all motorized temperature control dampers complete with actuators shall be by this Section, except for dampers and actuators supplied with packaged air handlers. All dampers shall be installed into the duct system by the HVAC Trade complete with necessary duct transitions, access doors, etc. The Temperature Control Contractor shall be responsible for the actuators and all coordination with the HVAC Contractor.

.8 Generally duct mount carbon dioxide sensors shall be used where specified for air handling units; but, for gyms and single zone libraries, a wall mount carbon dioxide sensor shall be mounted next to the room temperature sensor.

.9 Freezestats shall be installed so that their sensing element runs horizontally across the coil face (not diagonally) with no more than 12" vertical drops at the outside coil frame. The full face of the coil shall be covered with no horizontal runs being more than 12" apart. The top and bottom horizontal run shall be within 6" of the coil frame. If more than one freezestat is required they shall be wired in series in order to detect a low temperature in portion of the coil. The sensing elements shall be firmly secured in place to avoid vibration without added air restriction.

3.02 SYSTEM START-UP AND ACCEPTANCE

.1 Upon completion of installation, test, adjust and calibrate controls provided under this Section.

.2 On system completion, a demonstration of complete system operation shall be made to the Owner's authorized representative and Consultant.

.3 The Consultant shall verify through the Owners representatives that the entire system is complete and operating to the satisfaction of the Owner before final acceptance is approved.

3.03 TRAINING

.1 The Contractor shall provide competent instructors to give full instruction to designated personnel in the adjustment, operation and maintenance of the system installed rather than a general training course. Instructors shall be thoroughly familiar with all aspects of the subject matter they are to teach. All training shall be held during normal work hours of 8:00 a.m. to 4:30 p.m. weekdays as follows:

.2 Provide 4 hours of training for Owner's operating personnel. Training shall include:

.1 Explanation of drawings, operations and maintenance manuals
.2 Explanation of web access program
.3 Explanation of adjustment procedures
.4 Trend Analysis

3.04 IDENTIFICATION

.1 Provide system identification and provide nameplates identifying the following (nameplates shall be keyed to the wiring diagrams):

.1 Duct mounted sensors.
.2 Control panels (identify as to equipment / systems controlled). Each panel shall include an as-built drawing showing all the connected control points.
.3 Identify the emergency ventilation control switch with 'GLOBAL ROOFTOP UNIT CONTROL - VENTILATION LOCKOUT'

3.05 TESTING AND BALANCING

.1 During the system testing and balancing by the Testing and Balancing Agency, demonstrate the operation of all controls. During balancing procedures, set controls to a fixed mode (bypass damper locked fully closed and all zone dampers locked fully open) to prevent any changes during the balancing procedure.

3.06 ELECTRICAL WIRING

.1 Control transformers for the building automation / VVT temperature control systems shall be supplied and wired by the Temperature Control Trade from 120 V power sources in junction boxes provided by the Electrical Contractor. (At least one at each end of each floor accessible above ceiling tile in a corridor). All low voltage wiring (below 50 V) to the building automation / VVT temperature control systems shall be by the Temperature Control Contractor.

.2 All wiring shall be installed to the standards specified in the Electrical Division.

.3 Use Echelon recommended orange jacket cable for all network wiring.

.4 Run all wiring in EMT conduit where exposed, where running within concrete block walls and where required by the Ontario Electrical Code (conduit supplied and installed by the Temperature Control Contractor). Plenum rated cable shall be used in return air ceiling plenums.

.5 Where wiring runs through Corridor suspended ceiling spaces, run in wall hooks where possible. The wall hooks shall be provided by the Electrical Contractor where indicated on the electrical drawings.

.6 Control relays necessary for BAS operation shall be provided by the Temperature Control Contractor but all contactors and their power supplies handling power wiring to the equipment shall be by the Electrical Contractor.

3.07 SEQUENCE OF OPERATION

.1 General:

.1 All setpoints shall be adjustable.

.2 Outdoor air temperature shall be broadcasted to all controllers.

.3 New systems shall use existing outdoor air sensor

.4 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.

.5 Cooling Mode: Mechanical cooling is enabled if the outdoor air temperature is above 14°C.

.6 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.

..7 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.

.8 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.

.2 Air Handling Units HVAC-2 and HVAC-3

1 Air Handers shall be started & stopped according to an operator programmed time schedule or manually through the operator workstation. Supply and exhaust air fan status shall be monitored by a current sensor.

.2 Air Handlers shall operate in conjunction with VVT Dampers and perimeter heating control valves to maintain space temperature and ventilation.

.3 Air Handlers to vary supply and exhaust/return air flows via variable frequency drives supplied with air handling unit.

.4 When units are in the occupied heating mode the mixing air dampers shall be opened to allow minimum outside air volume and the unit shall maintain a minimum supply air temperature of 68°F(20°C) (adjustable) by modulating the stages of gas heat. The perimeter radiation is the first stage of heat. On a call for heat the perimeter heating control valves shall modulate to maintain the space setpoint temperature. When perimeter heating control valve is 100% open and space is still calling for heating, the DDC Control system shall calculate the system requirements adjust the discharge temperature of the air handler accordingly.

.5 The HVAC units shall utilize their ASHP heating mode to maintain discharge air temperature until outdoor ambient drops to 41ºF (5ºC). At ambient temperatures below 41ºF (5ºC) the ASHP heating will be disabled and the gas heating section in the unit shall modulate to maintain discharge temperature setpoint.

.6 In occupied cooling mode, the air handler's gas heating section and perimeter heating control valves shall be 100% off (locked out), the outside air dampers, return air dampers and mixed air dampers shall modulate from minimum outside air position up to 100% outside air to maintain discharge temperatures as required by the call from the VVT damper's remote room sensors. When the outside air temperature rises above 60°F (15.5°C) (adjustable) then the mixing dampers are closed to their minimum outside air volume position & the unit's Mechanical DX cooling (ASHP) will be energized and compressors staged to maintain the required discharge supply air temperature to provide cooling air to the space via VVT dampers. **Note**: The air handlers have minimum one digital control compressor each with multiply stages of cooling, the staging of the compressors shall utilize this feature to its fullest.

.7 Enthalpy wheel in unit shall operate in ventilation mode and cooling mode to recover energy from return/exhaust air. Recirculation and bypass dampers in Air handlers to modulate the capacity of enthalpy wheel. Defrost control shall include an adjustable temperature sensor and VFD on the enthalpy wheel motor to slow down the rotation of the wheel. The VFD and the defrost strategy done by built-in controls with the air handlers.

.8 Minimum Required Outdoor Airflow Set point:

.1 During occupied hours, a duct mounted CO_2 sensor shall be used to modulate the fresh air intake damper to below the minimum occupied ventilation rate during periods when the space CO_2 levels are within the acceptable CO_2 setpoint of 700 ppm (adjustable) above the outside ambient concentration level

.9 During unoccupied periods the air handler shall be off, the mixed air dampers shall be closed to the outside air and the heating and cooling sections shall be off. A 65°F (18ºC) (Adjustable) space set point temperature shall be maintained by utilizing the perimeter radiation and heating control valves, as the first stage of heat. Should this strategy be unable to maintain setback temperatures in the spaces then the mixing dampers shall open 100%, the fresh air and exhaust air dampers shall remain closed, the supply air fan shall cycle on/off at 50% capacity and the gas heating section energized as required at low fire to maintain setpoint. Minimum on & off times shall be incorporated into the unoccupied operation to reduce unit short cycling. An occupancy sensor in any of the spaces on the system shall be able to return the unit to occupied operation for a preset time interval.

.10 Prior to occupancy the space temperature shall be checked & if it is 4°F (2°C) above or below the occupancy setpoint then the unit shall be started at a calculated time interval before occupancy time so that the space temperature will be at setpoint at the occupancy time. Note: fresh air damper shall remain closed during morning warm-up.

.11 If the systems supply discharge air temperature falls below 40°F (4.5°C) with the heating section energised, then the supply air low limit controller (freeze stat) shall stop the unit. If the units supply discharge air temperature rises above 140°F (60°C) then the supply air high limit controller shall stop the unit.

.12 Logged Points:
Supply Air Temperature
Return Air Temperature
Mixed Air Temperature
DX Coil Discharge Air Dry bulb Temperature
DX Coil Discharge Air Wet bulb Temperature
Supply Air Duct Pressure
Supply Fan Status
Exhaust/Return Fan Status
Filter Status
Return air CO_2
Outdoor CO_2
Unit Run Time

.13 Alarm Points:
High Supply Air Temperature
Low Supply Air Temperature
SA Fan Failure
EXH/RA Fan Failure
Enthalpy Wheel Failure
High Air Filter Status

.3 **Air Handling Units HVAC-1,**

.1 Air Handling Unit HVAC-1 shall be started & stopped according to an operator programmed time schedule or manually through the operator workstation. Supply and exhaust air fan status shall be monitored by a current sensor.

.2 When unit is in the occupied heating mode the mixing air dampers shall be opened to allow minimum outside air volume. The HVAC unit shall utilize its ASHP heating mode to maintain space temperature until outdoor ambient drops to 41ºF (5ºC). At ambient temperatures below 41ºF (5ºC) the ASHP heating will be disabled and the gas heating section in the unit shall modulate to maintain space temperature setpoint.

.3 In occupied cooling mode, the unit heating section shall be 100% off (locked out), the outside air damper, return air damper and mixed air damper shall modulate from minimum outside air position up to 100% outside air to maintain set point temperature as determined by the remote room sensor. When the outside air temperature rises above 65°F (18.3°C) (adjustable) then the mixing dampers are closed to their minimum outside air volume position & the unit's mechanical DX cooling section is energized and compressors staged to maintain the required room setpoint to provide cooling air to the space. **Note:** one of the unit's compressors is a digital control compressor each with multiply stages of cooling, the staging of the compressors shall utilize this feature to its' fullest.

.4 Minimum Required Outdoor Airflow Set point:

1. During normal everyday occupancy the fresh air dampers shall be a minimum position when in heating or mechanical cooling mode.

2. During assembly occupied mode, a duct mounted CO_2 sensor in the return air duct shall be used to modulate the fresh air intake damper to beyond the minimum occupied ventilation rate as required to maintain the space CO_2 levels below the acceptable CO_2 setpoint concentration of 700 ppm (adjustable), the unit shall be capable of up to a maximum of 40% outside air.

.5 During unoccupied periods the air handler shall be off, the mixed air dampers shall be closed to the outside air and the heating and cooling sections shall be off. A 65°F (18ºC) (adjustable) space set point temperature shall be maintained the cycling the supply air fan on/off and the gas heating section energized as required. Minimum on & off times shall be incorporated into the unoccupied operation to reduce unit short cycling. An occupancy sensor shall return the unit to occupied operation for a preset time interval.

.6 Prior to occupancy the space temperature shall be checked & if it is 4°F (2°C) above or below the occupancy setpoint then the unit shall be started at a calculated time interval before occupancy time so that the space temperature will be at setpoint at the occupancy time. Note: fresh air damper shall remain closed during morning warm-up.

.7 If the systems supply discharge air temperature falls below 40°F (4.5°C) with the heating section energised, then the supply air low limit controller (freeze stat) shall stop the unit. If the units supply discharge air temperature rises above 140°F (60°C) then the supply air high limit controller shall stop the unit.

.8 Logged Points:
Supply Air Temperature
Return Air Temperature
Mixed Air Temperature
Coil Discharge Air Drybulb Temperature
Coil Discharge Air Wetbulb Temperature
Supply Fan Status
Exhaust/Return Fan Status

Filter Status
Return air CO_2
Outdoor CO_2
Unit Run Time

.9 Alarm Points: High Supply Air Temperature
Low Supply Air Temperature
SA Fan Failure
EXH/RA Fan Failure
High Air Filter Status

.3 **VVT Dampers:**

.1 The application uses a PID algorithm for all modulating control. HVAC unit's discharge air temperature is monitored by the VVT zone damper controller through the direct digital controller (DDC) network and is used by the VVT zone damper controller to control the VVT zone damper control logic in a heating action (RA) or cooling action (DA) based on the current HVAC unit's mode of operation.

.2 When the HVAC unit provides cooling and the VVT zone requires cooling, the VVT zone damper modulates between an adjustable minimum and maximum damper position to satisfy the zone cooling demand.

.3 When the HVAC unit provides heating and the VVT zone requires heating, the VVT zone damper modulates between an adjustable minimum and maximum damper position to satisfy the zone heating demand. When the HVAC unit mode of operation is the opposite of what is required in the VVT Zone, the VVT Zone damper overrides the minimum damper position and fully closes to prevent the zone from overcooling or overheating until the HVAC unit is no longer actively heating or cooling or has switched to the mode of operation required by the zone.

.4 In VVT Zones with perimeter heating, when VVT Zone is calling for heating with damper at minimum position and HVAC unit is in cooling mode, auxiliary contacts shall start to modulate 2-way heating control valve on radiation to prevent the zone from overcooling.

.5 During unoccupied periods and subject to appropriate outside air lockouts, the associated VVT zones terminal load demand triggers the HVAC unit to start and operate in the heating or cooling mode until the heating or cooling demands setback temperatures have been satisfied for all the VVT zones.

.6 Logged Points: Space Temperature
Supply Air Temperature
Supply Air Volume

.7 Alarm Points: High Space Temperature
Low Space Temperature

END OF SECTION

END OF INDEX

PART 1 : GENERAL

1.01 REQUIREMENTS INCLUDED

.1 The specifications of Section 26 05 01 shall apply to and govern the work of Divisions 26, 27 and 28 and shall be read as an integral part of each Section.

.2 The Electrical Drawings and these Specifications are complementary to each other and each forms a part of this contract. In the event of discrepancies between Drawings and Specifications, the more restrictive conditions shall apply unless a written clarification is obtained from the Consultant.

.3 Misinterpretation of any requirement of the Drawings or Specifications will not relieve this Division of responsibility to complete the work. If in doubt, contact the Consultant for written clarification. If clarification is not sought the Consultant's decision shall be final and binding on the Contractor.

.4 Related Work

.1 Submittals Section 26 05 02

1.02 SYSTEM DESCRIPTION

.1 Supply all labour, tools, equipment, materials and transportation required for the installation and proper operation of the complete systems as shown on the Drawings, as specified herein, or as reasonably inferable from both.

.2 Work to be Supplied and Installed

The work of this Division includes, but is not limited to supply and installation of the following systems:

Secondary Distribution
Lighting
Wiring Devices
Fire Alarm System
Communication Systems
Wiring for Other Trades
Renovations and Removal of Existing Equipment

1.03 REFERENCES

.1 The Specifications for the Divisions as listed below shall govern the work of all Sections of this Division.

Existing Conditions	Division 02
Mechanical	Division 21, 22 and 23

1.04 WORKMANSHIP

.1 Only first-class workmanship by skilled electricians will be accepted, not only with regards to durability, and safety, but also with regard to its neatness of installation, and overall accessibility. Present a neat and clean installation on completion to the satisfaction of the Consultant. Any unsatisfactory workmanship shall be replaced at no extra cost.

.2 Employ a competent foreman to supervise the work.

.3 Employ qualified and experienced trades people employed to perform specific work such as installation or testing of specific systems including fire alarm systems, special systems, etc.

1.05 DRAWINGS

.1 Drawings, which accompany these specifications, are diagrammatic and show the power distribution, number and general location of the electrical equipment, outlets and required circuiting. They do not show all structural and mechanical details and are not intended to be shop or working drawings.

.2 Do not scale drawings but use only dimensions, which are shown. Where exact building dimensions and details are required, use only figured dimensions on the Architectural or Structural Drawings or job site dimensions.

.3 Make alterations to device and equipment locations as required, co-ordinate with other trades at no extra cost.

.4 No deviations from the Drawings or Specifications will be permitted without written authorization from the Consultant.

1.06 RECORD & SHOP DRAWINGS

.1 Provide record drawings and shop drawings in accordance with Section 26 05 03, Submittals.

1.07 PERMITS AND FEES

.1 Obtain and pay for all permits and fees required for the execution and inspection of the electrical work and pay all charges incidental to such permits.

.2 The contract documents have been approved by ESA. The successful Electrical Contractor shall request the file number after being awarded the project, prior to submission for permit.

.3 Arrange and pay for any special inspection of equipment specified when required.

.4 On completion of the electrical work, obtain and submit to the Consultant the Electrical Safety Authority Final Unconditional Inspection certificate together with the maintenance manuals.

1.08 RULES AND REGULATIONS

.1 Provide all materials and installation in accordance with the latest editions of the Canadian Electrical Code, Ontario Electrical Safety Code, CSA Standards and Bulletins, the Electrical Safety Authority Department Special Inspection, The Ontario Fire Marshal and any other more restrictive requirements of all applicable Municipal and Provincial Codes and Regulations.

.2 The Contract Drawings show the minimum standard acceptable regardless of any lesser standards set by any Codes or Regulations having jurisdiction.

1.09 CO-OPERATION OF TRADES

.1 Read Specifications and Drawings of other trades and conform with their requirements before proceeding with any work specified in this Division related to the other trades.

.2 Co-operate with all other trades on the job, so that all equipment can be satisfactorily installed, and so that no delay is caused to any other trade.

1.10 CO-OPERATION OF TRADES – LIFE SAFETY AND FIRE PROTECTION SYSTEMS

.1 All life safety systems and fire protection systems and their components shall be verified to ensure that they are functioning according to the intent of their design.

.2 The life safety systems and fire protection systems and their components shall include but not be limited to; fire alarm systems, sprinkler system, standpipe systems, smoke control, ventilation, pressurization, door hold-open devices, elevator recalls, smoke and fire shutters and dampers, emergency power, emergency lighting, etc.

.3 Where life safety and fire protection systems are installed, the commissioning of these integrated systems shall also be performed to ensure proper operation and inter-relationship between the systems. The commissioning of these integrated systems shall be the responsibility of Division 26. Refer to Fire Alarm Systems Section 28 31 00.

1.11 EXAMINATIONS

.1 Before submitting tenders, carefully examine the Architectural, Structural, Electrical and Mechanical Drawings and all Specifications having a bearing on the work of this Division. Visit the site of the building and thoroughly ascertain that the work of this Division can be carried out satisfactorily without any changes to the Drawings or Specifications. No extras will be allowed for anything, which would have been revealed during such an examination.

.2 Examine the proposed locations of equipment and fixtures of other trades and report any defects or interference with the work of this Division in writing to the Consultant. Affected work shall not commence until any discrepancies adversely affecting the work of this Division are remedied.

.3 Fully understand the function of the systems described in this Division. Have no doubt as

to the extent of the systems and/or materials and labour required. Contact the Consultant for clarification. No extras will be allowed to complete systems inadequately installed or not fully operational.

1.12 ABBREVIATIONS & DEFINITIONS

.1 Abbreviations used on Electrical Drawings and in this Division are generally listed below:

OBC	Ontario Building Code
CSA	Canadian Standards Association
FHP	Fractional Horse Power
C	Conduit
E.C.	Empty Conduit
Trans.	Transformer
F @	Fused at
SP (DP)	Single Pole (Double Pole)
3P	Three Pole
SN	Solid Neutral
Disc. Sw	Disconnect Switch
LP	Lighting Panel
PP	Power Panel
DP	Distribution Panel
WP	Weatherproof
MH	Mounting Height
OESC	Ontario Electrical Safety Code
NFPA	National Fire Protection Association
NFC	National Fire Code
EEMAC	Electrical Equipment Manufacturer's Association of Canada
ANSI	American National Standards Institute
ULC	Underwriter Laboratories of Canada
RT	Rain Tight
FA	Fire Alarm
EXP	Explosion Proof

.2 Wherever the words "approved", "satisfactory", "directed", "permitted", "inspected", "instructed", "required", "submit", "order", or similar words or phrases are used in the specification, it shall be understood, unless the context implies otherwise, that the words "by (to) the Consultant" follows.

.3 Wherever the word "provide" is used in this specification or on the drawings, it shall be understood, unless the context implies otherwise, that it is equivalent to "supply and install".

1.13 ELECTRICAL EXTRAS AND CREDITS

.1 Changes to the contract requiring additions to or deletions from the work of this Division shall be carried out upon written request of the Consultant. Extras to the contract or credits shall be submitted with a complete cost breakdown as follows:

.1 Materials, quantities and unit prices for all equipment required or deleted.

.2 Unit man hours.

.3 Total material cost.

.4 Total man hours.

.5 Hourly rate. (Refer to Supplementary Conditions and General Contract).

.6 Total overhead and profit. (Refer to Supplementary Conditions and General Contract).

.2 Equipment and material costs shall be accepted at net costs only.

.3 Invoices, time sheets, and other evidence of costs shall be provided upon request by the Consultant.

.4 Prices not submitted in this format will not be accepted.

1.14 OPERATING AND MAINTENANCE MANUALS

.1 Submit operating and maintenance manuals in accordance with Section 26 05 02, Submittals.

1.15 GUARANTEE

.1 Upon completion of the work of this Division and prior to final payment, provide to the owner a written guarantee that for one year from the date of acceptance, any defect in workmanship or materials will be corrected at no cost to the Owner except where Owner misuse, neglect, or abnormal conditions have caused the defect.

.2 This guarantee shall not supersede any longer Guarantee furnished by a manufacturer.

1.16 INSPECTION

.1 All work and materials covered by these Specifications shall be subject to inspection at any time, by the Consultant or the Owner's Representative.

.2 If the Consultant or Owner's representative finds that any material or workmanship does not conform with these specifications undertake to correct such workmanship within 5 days of notification by the Consultant.

1.17 FINAL INSPECTION

.1 Notify the Consultant when the final inspection of the work shall be performed. Defects or deficiencies found during this inspection shall be corrected to the satisfaction of the Consultant before final payment is made.

1.18 DAMAGE TO OTHER WORK

.1 This Trade shall be responsible for all damages to his own work or the work of other trades caused by the execution of work by this Division.

.2 Provide protective covers on or around equipment and materials to prevent damage during construction.

PART 2 : PRODUCTS

2.01 MATERIALS AND EQUIPMENT

.1 All materials and equipment shall be new and conform to CSA Standards. All materials and equipment shall be approved for their intended use by the authority having jurisdiction.

.2 Material or equipment specified by technical description shall be provided with the best commercial qualities obtainable for the purposes described.

.3 Maintain uniformity of manufacturer, type, and style, within a particular group of equipment or class or type of fixture.

.4 Requests for extra money, time or equipment substitution due to late ordering of equipment will not receive any consideration.

.5 The listing of specific manufacturers does not imply acceptance of their products. Any listed manufacturers must meet the specifications in their entirety.

2.02 ALTERNATES AND SUBSTITUTIONS

.1 Whenever a substitute or alternate product is proposed for use, this Contractor shall guarantee that such proposed substitutes or alternates will not adversely affect the requirements allocated on the drawings for the material or item or plant or equipment specified. He shall agree to bear any additional expense incurred due to the use of proposed substitutes or alternates, particularly in connection with any required changes in the work of any other division.

.2 Requests for approval shall be accompanied by complete specifications for the equipment, showing dimensions, ratings, photometrics, cost reductions, etc.

.3 No substitutions or alternates will be allowed after tendering close.

.4 Any equipment installed, without the Consultant's written approval, shall be removed and the correct equipment installed at no extra cost.

.5 In the event the approved alternate equipment is not available for any reason, the specified equipment shall be installed.

.6 When proposing an alternative product make all affected parties aware of any structural,

architectural, mechanical, or electrical design changes necessary to accommodate the alternative product. The contractor is responsible for paying all costs incurred, which may result from the acceptance of the alternative. Any cost savings anticipated must include all additional costs incurred for any changes to the original design.

PART 3 : EXECUTION

3.01 GENERAL REQUIREMENTS

.1 The location of any panels, equipment, outlet, raceway, and wiring may be changed by the Consultant if the new location is within a limit of 3 metres (10') radius of the original location. Provide changes without extra cost if requested before installation.

.2 Do not install wall-mounted equipment at locations where built-in furniture or other equipment is to be installed. In cases of conflict, install equipment above the built-in furniture and clear the trim by approximately 150 mm (6") unless otherwise instructed by the Consultant.

.3 Arrange for openings in the walls and floors for transportation and installation of equipment. Extra charges for cutting and making good of walls or floors for the work will not be accepted.

.4 Adjust phase loading on all panels and switchgear so as not to exceed a 10% phase imbalance of current at operating load conditions.

.5 Megger test all feeders prior to energizing. Submit test results in maintenance manuals.

.6 Measure voltage at all feeder supply connectors and at the load connections. Tests to be conducted at normal operating conditions. Submit test results in maintenance manuals.

3.02 STORAGE OF MATERIALS

.1 Provide proper facilities for a workshop, tool shop, office space and protection of materials and equipment. Coordinate location with General Contractor.

.2 Store all material, equipment, panels, luminaires, etc. in a dry, clean place and cover as necessary to preserve factory finish.

3.03 WASTE AND SURPLUS MATERIALS

.1 Keep the premises free of accumulation of waste and surplus materials.

.2 On completion of the contract, this Division shall remove all tools, scaffolding, surplus material, scrap and debris resulting from the work of this Division from the site.

.3 Clean all equipment such as panel boxes, luminaires, switches receptacles, etc., of all dirt, dust and paint at the time of final acceptance of the work.

3.04 SLEEVES, HOLES AND PATCHING

.1 Supply and set all necessary sleeves for this contract prior to pouring of concrete. There will be no allowance for holes or sleeves missed during initial construction.

.2 Holes through concrete structural members shall be schedule 40 steel pipe sleeves. Holes through exterior walls and/or roof are to be properly flashed and made weather-proof. All holes through concrete or steel structural members shall be approved by the Structural Consultant.

.3 All cutting, patching, sleeves and grouting is to be done by fully qualified craftsmen of that respective trade. All costs for cutting and patching required by this Division are to be included in the tender.

.4 All cutting, patching, sleeving, etc. shall be carried out under the direct supervision of the General Contractor, and to the satisfaction of the Consultant.

3.05 GROUNDING AND TESTING

.1 Provide a complete grounding system throughout All grounds are not shown on the drawings.

.2 Under this Section, test all equipment and wiring supplied and installed in this contract at any time requested by the Consultant. Provide all meters materials and labour to carry out these tests. All readings shall conform to the requirements of the Local and Provincial codes which apply to this Specification.

.3 Test May Include:

.1 Voltage reading on near full load at main service switch, distribution panel feeders, transformer feeders, and load connection points for Mechanical & Electrical equipment.

.2 Amperage readings of service and each panel feeder.

.3 Ground fault insulation resistance.

.4 Continuity of metal raceways.

.5 Operation of each piece of equipment and system for correct function.

.4 Written records of the tests performed indicating date of test, equipment name, purpose of test, device used for testing and measured results. Include test results in maintenance manuals.

3.06 CORROSION, PROTECTION & TOUCH-UP

.1 Provide prime and paint finish on exterior ferrous metal.

.2 All priming shall be free of runs or drips. Scratches, chipped or rough items will not be accepted. Sand smooth and refinish.

.3 All shop painted equipment damaged in transit or during installation shall be touched-up to match existing finishes.

.4 Provide protection of installed materials from abuse and damage during construction. Provide all necessary protective coatings or shields to prevent damage to installed equipment until final acceptance by the Owner.

3.07 EQUIPMENT IDENTIFICATION

.1 Identify all equipment such as panels, cabinets, contactors, starters, disconnect switches, transformers, switchgear with labels as specified below.

.2 Labels shall be 3 mm (1/8") thick lamacoid plates, black with 6 mm (1/4") white lettering, mechanically fastened to the equipment.

.3 Mount nameplates on the top inside cover on all panels and on the front cover of equipment for the respective system.

.4 The wording on these plates shall conform generally with that used in these Specifications and on the Drawings. All fused disconnects to include size and type of fusing on equipment name plate. All panels to have mains voltage indicated. Panel nameplates to indicate from where and which distribution they are fed from.

.5 Mechanically fasten nameplates directly on the equipment. For small size equipment install nameplates on the wall above or under equipment.

.6 Colour code all conduits and metallic sheathed cables according to the following standards:

.1 Colour to be min. 25 mm (1") band of plastic tape or spray bomb.

.2 Colour code at entrance/exit to wall, ceiling, or floor and minimum 15 m (50') intervals.

.3 Systems colour code for conduits, metallic cables, and low voltage wiring sheath.
Green – Lighting Controls
Red - Fire Alarm
Blue – Communications/Data
Orange - Auxiliary Power.

.7 Colour code conductors as follows:
Phase A - Red
Phase B - Black
Phase C - Blue
Neutral - White
Ground - Green

.8 The junction boxes of all power and lighting systems shall be labelled indicating circuits contained within.

.9 CIRCUIT IDENTIFICATION:
Provide p-touch labelling, 6mm (1/4”) tape, white with black lettering with receptacle circuit number. Place one on front of coverplate and one inside box.

3.08 MOUNTING AND MOUNTING HEIGHTS

.1 Provide all supports and bases for the work of this trade. Every conduit run shall have at least one support. Only approved conduit supports shall be used.

.2 Support every outlet box, junction box, panel tub, etc. independent of conduits running to it.

.3 No piece of equipment shall be mounted on a wall or panel with the underside of the equipment less than 460 mm (18") above the floor except for equipment over 1650 mm (5'-6") high which shall be mounted with the top side of the equipment 2100 mm (7'-0") above the floor or as directed in the field.

.4 Panels for mounting of equipment shall consist of #10 gauge steel on an angle iron frame. The complete panel is to be thoroughly cleaned of all dirt, rust and loose material and be given two coats of grey enamel before mounting any equipment.

.5 In areas of combustible construction mount service box and panelboards on spacers to provide 50 mm (2") ventilated distance between back of the panel and the backboard.

.6 Install switches, receptacles, outlets, etc., on one common centre line, one above the other, when shown on the drawings in a grouping.

.7 Dimensions refer to the centre line of equipment above the finished floor unless otherwise shown or specified. Mounting heights in stairwells refer to the floor, landing or stair tread directly below the equipment.

.8 Install equipment at heights as directed on legend:

.1	Power and Lighting	Standard
	Circuit Breaker Panels	72" (1830 MM) to top
	Individual Safety Switches	60" (1520 MM) O/C
	Individual Motor Control	60" (1520 MM) O/C
	Convenience Receptacles	18" (460 MM) O/C
	Above Counter Receptacles	42" (1070 MM) O/C
	Above Desk Receptacles	36" (915 MM) O/C
	Light Switches	39" (1000 MM) O/C
	Thermostat Outlets	47" (1200 MM) O/C
.2	Fire Alarm System	
	Manual Pull Stations	47" (1200 MM) O/C
	Signal Devices	90" (2280 MM) O/C

	End of Line Resistors	60" (1520 MM) O/C
.3	Communication System	
	Telephone Cord Set	18" (460 MM) O/C
	Telephone Wall Set	63" (1600 MM) O/C
	Computer Data Outlet	18" (460 MM) O/C

END OF SECTION

PART 1 : GENERAL

1.01 REQUIREMENTS INCLUDED

.1 Shop drawings and product data

.2 Working/Interference drawings

.3 As-built drawings

.4 Operating and maintenance manuals including extended warranties.

.5 Related Work

.1	Basic Materials and Methods	Section 26 05 03
.2	Fire Stopping	Section 26 05 04
.3	Lighting Controls	Section 26 09 43
.4	Panelboards	Section 26 24 16
.5	Lighting	Section 26 51 00
.6	Public Address and Assistive Listening	Section 27 51 16
.7	Fire Alarm System	Section 28 31 00

1.02 ADMINISTRATIVE

.1 Submit to Consultant submittals listed for review. Submit with reasonable promptness and in an orderly sequence so as to not cause delay in the construction schedule. 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 is allowed.

.2 Work affected by the submittal not to proceed until the review is complete unless an approval is obtained from the Consultant.

.3 Review submittals prior to submission to the Consultant. This review represents that necessary requirements have been determined and verified, and that each submittal has been checked and co-ordinated with the requirements of the Contract Documents.

1.03 SHOP DRAWINGS

.1 Submit shop drawings in accordance with the General Requirements of Division 1 and as required in various sections of these specifications and on the drawings.

.2 Shop drawings to be submitted with a cover sheet(s) on the Contractor's letterhead listing the following information:

- Project:
- Owner/Client:
- Architect:
- Mechanical/Electrical Consultant:
- General Contractor:
- Electrical Contractor:
- Supplier
- Specification Section
- Materials or Equipment submitted

Include space for review stamps by Consultant, General Contractor and Electrical Contractor.

.3 Prepare and submit for review, where specified, shown or considered necessary by the Consultant, shop drawings showing details of work as follows:

.1 Fabrication and erection dimension.

.2 Sections, arrangements and details which indicate complete construction as well as interconnections with other work.

.3 Location and type of anchors and fastenings.

.4 Materials including gauges, thickness, sizes and finishes.

.5 Descriptive names of equipment and mechanical and electrical characteristics when applicable.

.6 Data verifying that superimposed loads will not affect function, appearance, and safety of work shown on shop drawings as well as other work interconnected.

.4 Submit shop drawings, unless otherwise specified in form of electronic copies.

.5 Manufacturer's printed data sheets for standard items are acceptable providing pertinent characteristics are identified and relate to specified items. Submit eight (8) copies of data sheets except where specified otherwise.

.6 Check shop drawings and data sheets, before submission as follows:

.1 Against contract documents and other applicable shop drawings, to ensure that work adjacent to and affecting other work is accurately detailed.

.2 To ensure that work shown on shop drawings conforms to requirements of Contract Documents.

.3 Enclose notice in writing of any variations from requirements of Contract

Documents.

.7 Indicate on shop drawings that they have been checked by applying stamp "checked and certified correct for construction", including date and Contractor's signature. Drawings and details submitted without such stamp or whenever it is evident that drawings have not been checked (despite approval stamp) will not be reviewed and will be returned to Contractor.

.8 The Consultant's review of shop drawings and data sheets pertain to general design only. Errors in dimensions, quantities or interference will be marked if noticed, but this will not in any way relieve Contractor from his responsibility to complete work as shown and specified.

.9 All shop drawings are to be submitted in Imperial dimensions.

.10 Shop drawings are to be returned with "Reviewed", "Revised as noted" or "Revise and Submit".

.1 "Reviewed" - Drawings conform with the general design concept.

.2 "Revised as noted" - Drawings conform with the general design concept subject to the corrections noted. Drawings to be corrected and resubmitted for final review and incorporation into maintenance manuals. Such submission is not to hold up manufacture.

.3 "Revise and Resubmit" - Drawings are rejected and manufacture of this equipment is not to proceed. Drawings are to be resubmitted with required corrections on equipment.

1.04 WORKING/INTERFERENCE DRAWINGS

.1 Before commencing any work, the Contractor is to prepare working/interference drawings, to ensure that all components, including any components of other divisions, are to be properly accommodated within the spaces provided, ensuring all clearances required by jurisdictional authorities and for proper maintenance are indicated and maintained.

.2 Prepare drawings to indicate co-ordination and method of installation of a system with other systems where their relationship is critical. Ensure all details of equipment, apparatus and connections are co-ordinated.

.3 As an alternative to preparing interference drawings, regularly scheduled meetings on site with all associated trades are to be conducted as necessary but not less than one per week.

.4 Failure to co-ordinate with all other trades could result in reworking of installed equipment, conduit or wiring at the discretion of the Consultant. Any reworking to accommodate the installation of other trades to be performed at no extra cost.

1.05 AS-BUILT DRAWINGS

.1 As-built drawings are to be maintained in accordance with the general requirements of Division 1.

.2 The Consultant is to provide this Division with an extra set of white prints on which to show clearly in red ink, as the job progresses, all changes and deviations from the plans, including all changes as part of change orders, site instructions or site conditions.

.3 Record location of concealed electrical services and components. Dimension and reference all concealed and buried electrical services from visible and accessible permanent features of structure.

.4 Maintain as-built drawings on site for periodic review by Consultant.

.5 In accordance with the Commissioning Schedule Plan, submit a complete set of record drawings, marked “as-built” and dated.

1.06 MAINTENANCE DATA AND OPERATING INSTRUCTIONS

.1 Submit three (3) copies of Operation and Maintenance Manual individually bound in suitable sized hard backed three-ring binders.

.2 Front cover of each binder to be suitably lettered as follows:

OPERATION AND MAINTENANCE MANUAL FOR
(Project Name)

(Owners Name)
(Date)

.3 Provide plastic tab indices for all sections of the manual, provide separate sections for each major piece of equipment and for groups of smaller products.

.4 Provide master index at the beginning of each binder indicating all items included in each section.

.5 Provide list of names, addresses and telephone numbers of equipment suppliers, Installing Contractors, General Contractors, Architect and Consulting Engineer.

.6 Provide final review shop drawings of each manufactured item in addition to the operating and maintenance instructions.

.7 Operating instructions to include:

.1 General description of each electrical system.

.2 Step by step procedure to follow in commissioning each piece of equipment.

.3 Schematic control diagrams for each separate system.

.4 Drawings of each control panel identifying all components on the panels and their function.

.5 All electrical equipment wiring diagrams.

.8 Maintenance instructions are to include:

.1 Manufacturer's maintenance instructions for each item of electrical equipment installed under this Division. Instructions are to include installation instructions, parts numbers and lists, name of supplier and maintenance instructions.

.2 Summary list of each item of electrical equipment requiring maintenance, indicating the name of the equipment item, maintenance required and frequency of maintenance.

.3 Copies of all panel directories.

.9 Provide written warranty on the Contractor's letterhead addressed to the Owner, copied to the General Contractor.

1.07 EXTENDED WARRANTIES

.1 The contractor is to submit extended warranties for specific materials and/or work specified in their respective sections.

.2 Extended warranties are to be issued on the General Contractor's letterhead, under seal, and issued in the name of the owner.

END OF SECTION

PART 1 : GENERAL

1.01 REQUIREMENTS INCLUDED

.1 Conform to General Conditions, Supplementary General Conditions and Sections of Division 01, as applicable.

.2 Conform to General Electrical Provisions, Section 26 05 01 as applicable.

.3 Related Work

.1	Submittals	Section 26 05 02

1.02 SCOPE OF WORK

.1 Work to be Supplied and Installed

.1 Raceways
.2 Conductors
.3 Armoured Cable
.4 Wire Connections and Devices
.5 Outlet Boxes
.6 Pull and Junction Boxes
.7 Cabinets
.8 Supporting Devices
.9 Backboards
.10 Access Panels
.11 Housekeeping Pads
.12 Wiring Devices and Cover plates
.13 Contactors
.14 Time Switches
.15 Motor Starters
.16 Motor and Circuit Disconnects
.17 Fuses

1.03 QUALITY ASSURANCE

.1 Install all equipment to the minimum of Ontario Electrical Safety Code standards, unless stricter standards are indicated on the drawings or in this specification. In all situations the more restrictive standard of material and installation shall apply.

1.04 REFERENCES

.1 CSA Standards

C22.2 No. 62	Surface Raceways and Lighting Fixture Raceways and Fittings.
C22.2 No. 83	Electrical Metallic Tubing.

C22.2 No. 211.1	EB1 and DB2/ES2 PVC Conduit.
C22.2 No. 211.2	Rigid PVC Conduit.
C22.2 No. 211.3	Rigid Fibreglass Reinforced Epoxy (RE) Conduit and Associated Fittings.
CAN3-C21.2	Control Cable for Low Energy Circuits.
C22.2 No. 35	Extra-Low-Voltage Control Circuit Cables, Low-Energy Control Cable, Extra-Low-Voltage Control Cables.
C22.2 No. 38	Thermoset Insulated Wires and Cables.
C22.2 No. 48	Nonmetallic Sheathed Cable.
C22.2 No. 51	Armoured Cables.
C22.2 No. 52	Service-Entrance Cables.
C22.2 No. 75	Thermoplastic-Insulated Wires and Cables.
C22.2 No. 124	Mineral Insulated Cables.
C68.3	Power Cables with Thermoset Insulation.
C22.2 No. 227.1	Electrical Nonmetallic Tubing.
C22.2 No. 227.2	Flexible Liquid-Tight Nonmetallic Conduit.
C22.2 No. 227.3	Flexible Nonmetallic Tubing.
C22.2 No. 56	Flexible Metal Conduit and Liquid-Tight Metal Conduit.
C22.2 No. 45	Rigid Metal Conduit.
C22.2 No. 85	Rigid PVC Boxes and Fittings.
C22.2 No. 18	Outlet boxes, Conduit Boxes and Fittings.
C22.2 No. 40	Cutout, Junction and Pull Boxes.
C22.2 No. 65	Wire Connectors.
C22.2 No. 14	Industrial Control Equipment.
C22.2 No. 177	Clock-Operated Switches
C22.2 No. 4	Enclosed Switches
C22.2 No. 111	General Use Switches
C22.2 No. 55	Specialty Use Switches
C22.2 No. 106	HRC Fuses
C22.2 No. 248	Low-Voltage Fuses

1.05 SUBMITTALS

.1 Submit shop drawings for the following pieces of equipment:

.1 Fire Rated Access Panels
.2 Wiring Devices and Coverplates
.3 Contactors
.4 Time Switches
.5 Motor Starters
.6 Motor and Circuit Disconnects
.7 Fuses

.2 Submit to the Engineer, in writing, a schedule of proposed feeders to be used if different than those specified on the drawings or in this specification.

PART 2 : PRODUCTS

2.01 GENERAL

.1 Where an alternate manufacturer is proposed for use, the proposed item must meet all qualifications of the specification.

.2 All materials/equipment of similar type shall be of one manufacturer.

2.02 RACEWAYS

.1 Provide raceway type as detailed on drawings. Where type is not specified, raceways shall be provided in accordance with Section 12 of the Ontario Electrical Safety Code.

.2 Provide all empty raceways and raceway systems complete with outlet boxes, coverplates, nylon fish wire, bushings, caps, etc.

.3 Size all raceways to suit the number and type of conductors and of sufficient size to permit easy removal of conductors at any time. Where raceway sizes are shown on the drawings, these sizes are minimum and in no case shall they be reduced.

.4 Colour code surface and exposed parts of raceways and all conduits as specified in Section 26 05 01.

.5 Where conduits cross expansion joints of building, provide expansion joints for conduit c/w grounding straps.

.6 All raceways shall be installed parallel to building lines.

2.03 CONDUCTORS

.1 Use R-90, RW-90, or T90 copper conductor building wires rated at 600 Volt, X-Link insulation.

.2 Where a particular type of insulation is specified, or shown, that type of wire shall be used.

.3 Use minimum # 12 copper wire unless otherwise specified. Minimum wire size is #10 for runs greater than 25m (82').

.4 All conductors shall be colour coded consistent with the OESC, Section 16010.

.5 Conductors up to and including # 10 shall be solid copper. Larger conductors shall be stranded.

.6 Size conductors for a maximum of 3% voltage drop from the supplying panel to the farthest outlet in the circuit.

.7 All joints must be approved solderless pressure connectors or insulated crimped connections terminated in boxes or fittings of adequate size.

.8 Conductors up to #6 AWG shall be copper. Conductors #6 AWG and larger may be

substituted with aluminum conductors sized for the equivalent current rating capacity. Submit proposed equivalent conductors and sizes for review by the Consultant. Aluminum conductors shall be ACM type alloy (1350 alloy not acceptable).

2.04 ARMOURED CABLE

.1 Armoured cable when used for final drops to lighting fixtures shall not exceed 3m (10') in length.

.2 AC-90 shall be allowed for branch circuit wiring in stud walls but shall not exceed 3m (10') in length exposed in ceiling.

2.05 WIRE CONNECTIONS AND DEVICES

.1 Install wire connectors as per Manufacturer and OESC requirements.

2.06 OUTLET BOXES

.1 Use outlet boxes to suit device and OESC requirements.

.2 Multiple-gang boxes shall be of one piece construction. Sectional boxes will not be permitted.

2.07 PULL BOXES AND JUNCTION BOXES

.1 Size pull boxes and junction boxes for the dimensions and cubic inch capacity as required by the OESC. for the application or as shown on the drawings.

.2 Pull boxes and junction boxes shall be constructed of code gauge steel, primed and painted, complete with screw-on or hinged covers.

.3 Junction boxes in hazardous locations shall be approved for such locations.

2.08 CABINETS - EQUIPMENT ENCLOSURES

.1 Cabinets to be code gauge steel, prime coated, c/w locking door flush lock and latch assembly and concealed flush hinges.

2.09 SUPPORTING DEVICES

.1 Every conduit or cable shall have at least one support. Only approved conduit supports will be accepted. Perforated pipe straps, tie wrap or wood support for conduits or outlet boxes etc., will not be accepted.

.2 Single conduit runs: Galvanized conduit straps, ring bolt type hangers or P.V.C. saddles.

.3 Horizontal multiple raceways runs: Conduit rack with minimum 25 percent spare capacity. Trapeze style hanger on threaded rod.

.4 Vertical multiple raceway runs: Electrical strut fastened to structure.

2.10 WIRING DEVICES AND COVERPLATES

.1 General

.1 Colour of devices and coverplates (other than stainless) to be confirmed by Consultant.
.2 Manufacturers: Hubbell, Bryant, Pass & Seymour, Leviton.
.3 All devices to be of the same manufacturer throughout.

.2 Switches

.1 All switches shall be extra heavy duty industrial grade, rated for 15A at 120/277 or 347V.
.2 Switches to be single pole, 3-way or 4-way, as indicated on the drawings.
.3 All switches to be of the same manufacturer throughout.

.3 Receptacles

.1 Duplex Receptacles
.1 Specification grade, rated 15A, 125VAC, U-ground type, parallel blade, CSA 5-15R configuration.
.2 Specification grade, rated 20A, 125VAC, U-ground type, parallel blade, CSA 5-20RA configuration.

.2 Ground Fault Interrupter Receptacle
.1 Rated 15A, 125VAC, U-grounded type, Class A requirement, trip level 4-6 mA, parallel blade, with test and reset switches, CSA 5-15R configuration.
.2 Rated 20A, 125VAC, U-grounded type, Class A requirement, trip level 4-6 mA, parallel blade, with test and reset switches, CSA 5-20RA configuration.

.3 Twist Lock Receptacles
.1 Provide twist lock receptacles, plugs and flexible cord at all pump motor locations. Refer to drawings and equipment schedule for receptacle ratings.

.4 Tamper Resistant Receptacles
.1 Rated 15A, 125V, U Ground, straight blade type, commercial grade, decora style EEMAC 5-15R; Leviton #TDR15-W or approved equal to be used in Child Care Area Rooms.

.9 Colour of receptacles to be determined by Architect.

.4 Coverplates

.1 Coverplates to be:

.1 In service areas - pressed galvanized.
.2 In office (finished) areas - stainless steel.
.3 In residential suites - nylon (colour to match device).
.4 In wet locations - grey, hinged gasketted Lexan, while in use.

2.11 CONTACTORS

.1 Manufacturers: Cutler Hammer, Allen Bradley, Asco Electric, Schneider Electric.

.2 Manual Contactors:

- c/w pilot light to indicate the on state.
- EEMAC rated enclosures for applicable mounting location.
- Rated 115/230 volts.
- Contacts rated as described on the drawings.
- Number of poles as required for load to be controlled.

.3 AC Magnetic Contactors for Automatic Control of Loads:

- Voltage of coil to match operating voltage described on the drawings.
- EEMAC rated enclosures for applicable mounting location.
- Rated 115/230 volts.
- Contacts rated as described on the drawings.
- Number of poles as required for load to be controlled.

.4 Enclosures shall be general purpose EEMAC type 1 surface mounted unless specified or shown otherwise on the drawings. Use EEMAC type 3R in weatherproof applications.

.5 All contactors shall be one manufacturer.

2.12 MOTOR STARTERS

.1 Manufacturers: Allen Bradley, Schneider Electric, Cutler Hammer, Siemens.

.2 All starters shall be EEMAC rated.

.3 Manual Starters: Single phase, single and two pole - c/w pilot light as required, thermal overloads, EEMAC rated enclosures where applicable. Rated 115/230 volts. Sized as required for motor load to be controlled.

.4 AC Magnetic Starters for Automatic Control of Single Phase and Three Phase Motor Loads:

- Operating voltage of coil to match voltage of operating system.
- Provide one set of auxiliary N/O and N/C contacts.
- Provide control transformer as required complete with primary fusing (HRC type).
- Provide H.O.A. switching as noted.
- Provide pilot light as indicated in motor schedule.

- Provide overload relays for each line voltage connection and heater elements to match nameplate FLA of motor controlled.

.5 AC Combination Magnetic Starters for Automatic Control of Single Phase and 3 Phase Loads:

- Fusible 3 pole, load break disconnect style switch c/w HRC time delay fuses.
- Operating switch c/w lock off facility and rotary action.
- Provide starter features as in paragraph .3.

.6 Enclosures shall be general purpose EEMAC type 1 surface mounted unless specified or shown otherwise on the drawings. Use EEMAC type 3R in weatherproof applications.

.7 All control wiring and raceways for control of equipment supplied by Division 23 unless noted otherwise on drawings.

2.13 MOTOR AND CIRCUIT DISCONNECTS

.1 General Requirements

.1 Where more than one manufacturer is named for an item, proposed item must meet all qualifications of the specification.
.2 All materials of similar type shall be of one manufacturer.
Acceptable Manufacturers: Arrow Hart, Bryant, Cutler Hammer, Schneider Electric, Siemens.

.2 Disconnect Switches

.1 This section governs local disconnect switches to be located adjacent to, or in close proximity to motorized equipment.
.2 Motor less than 1 H.P.: Fractional horse power motors less than 1/4 h.p. use rated general purpose switches; 1/4 h.p. or greater use h.p. rated, single throw, toggle, disconnect switches in rated enclosure.
.3 Motors 1 H.P. or larger: Provide h.p. rated disconnect switches to interrupt all the line voltage supply lines to the motor. Provide rated enclosures. Disconnect shall be single throw design, quick make, quick break, with reinforced fuse caps where required. Provide lock-off feature.

.3 Circuit Disconnects

.1 This section governs the use of disconnects for the purpose of local isolation switches for non-motorized electrical equipment and feeder circuits.
.2 Size disconnect switches for isolation and feeder protection as required by the connected load conditions or as indicated on the drawings. The more stringent of the two requirements shall govern in each situation.
.3 Provide fuse holders designed for the correct fuses as indicated on the drawings.
.4 Switch operation shall be quick make, quick break design with arc quenching facilities at the contacts.

.5 Provide sufficient size contact area for the ampere rating of the switch and the connected load to be interrupted.

2.14 FUSES

.1 HRC fuses rated above 600 amperes shall be CSA certified HRC-L fuses, of the types(s) specified below, and shall be in accordance with CSA Standard C22.2 No 106-M1985 or CSA certified HRC Class L fuses in accordance with CSA Bulletin No. 832-1971

.2 HRC fuses rated 600 amperes and smaller shall be CSA certified HRCI-J fuses of the type(s) specified below, and shall be in accordance with CSA Standard C22.2 No. 106 or specification C22.2 No. 106 with HRC-J (HRC-JY fuses are not acceptable) fuse dimensions and current-limiting performance in accordance with the appropriate ULC standard as specified below.

.3 Fuse interrupting rating shall be 200,000 amperes RMS symmetrical, unless otherwise noted.

.4 Time Delay fuses shall carry 500% of the rated current for a minimum of ten seconds and shall be labelled “Time Delay” by the manufacturer. (Exception: fuses rated 250V, 15-30A, an 8 second delay is permitted).

.5 Provide three spare fuses of each type and size installed. Provide spare fuse storage cabinet.

.6 Submit fuse melting and clearing time-current characteristic and current-limiting performance data for each fuse type and size above 200 Amps.

.7 Select fuses to provide a fully co-ordinated system for both overload and short circuit fault conditions.

.8 Application of all fuses shall comply with the Canadian Electrical Code - Part 1 and local inspection authority regulations.

.9 Unless otherwise noted on the drawings, Time Delay fuses for overcurrent protection of motor circuits are to be rated up to 150% of motor full-load current.

.10 Manufacturers: Bussman, Gould Shawmut, Littelfuse.

PART 3 : EXECUTION

3.01 GENERAL

.1 All equipment, devices and panels to be mounted plumbed-true.

.2 All equipment and panel labels to be mounted level.

.3 Provide a separate conductor and raceway system for each separate system.

3.02 RACEWAYS

.1 All raceways to be installed in concrete between floor levels must be reviewed with and approved by the Structural Engineer prior to installation. Where, in the opinion of the Structural Engineer, it is not acceptable to install raceways in concrete between floor levels, raceways shall be installed concealed in walls, ceilings etc.

.2 Empty ducts shall be capped at both ends. Provide 10 mm (3/8") nylon fish wire in each duct.

.3 Locate raceways at least 150 mm (6") clear of steam pipe, flues and similar items and do not install in slab under boilers, or like equipment.

.4 All conduit and raceways to be concealed in all finished areas. Exposed raceways and conduit are permitted only in service areas, utility rooms such as Mechanical and Electrical Rooms. Where exposed, they shall be neatly grouped and installed parallel to the building lines.

.5 Conduit must be plugged and kept clean and dry during installation and be free from kinks or foreign matter.

.6 Use flexible conduit (PVC jacketed in damp or wet locations) for final connections to all vibrating or moving equipment.

.7 Conduit installed in masonry to be coordinated with masonry trade.

.8 Flexible metal conduits shall be secured at intervals not exceeding 1.5m (5'-0") and within 300 mm (1’-0”) of outlet box or fittings except for lengths not over 900 mm (3’-0”) or terminals which require flexibility.

.9 Where the Consultant determines additional support is required, this shall be provided without cost to the Owner.

.10 Where conduits are proposed to pass through structural members, written approval must be obtained from the Structural Consultant.

.11 Provide pull boxes every 30 m (100') of conduit run to facilitate installation of conductors.

.12 Provide sleeves through floors for all conduits or cables passing through the floor. Sleeves shall extend 100 mm (4") above the finished floor. Caulk and make watertight on completion of work. Sleeves penetrating fire separations shall be caulked with an approved material to maintain the integrity of the separation.

.13 Provide acceptable pull boxes in telephone or system raceways to facilitate installation of conductors. Co-ordinate with cable installer prior to commencing work.

.14 Underground raceways shall be sealed/drained in accordance with OESC Section 22.

3.03 ARMOURED CABLE

.1 Provide acceptable insulating bushings between armour and conductors at all terminations.

.2 Provide acceptable cable straps within 300 mm (12") of any box or fitting and at 1.5 m (5') or less intervals throughout its length.

.3 Single conductor cables shall be installed as per manufacturer's recommendations to achieve desired rating of conductors.

.4 Support individual conductors with non-ferrous straps and hangers.

.5 Where aluminum armour comes in contact with copper piping a permanent non-metallic sleeve shall be installed.

3.04 CONDUCTORS

.1 Conductor length for parallel feeders to be identical.

.2 Wire or cable used for feeders shall be free of splices.

.3 Systems of different voltages shall be installed in separate raceways.

3.05 WIRE CONNECTIONS AND DEVICES

.1 All pressure connectors shall be tightened to the manufacturers stated pressures, for the wire size used.

3.06 OUTLET BOXES

.1 See Section 26 05 01, Part 3 for mounting heights.

.2 Mount all boxes, plumbed-true on vertical installations. Mount level on horizontal installations.

.3 All boxes to be installed flush mounted except in service areas, utility rooms such as Mechanical and Electrical Rooms.

.4 All boxes to be supported independent of conduits or cables.

.5 Test all boxes for continuity of ground through the box where the conduit is the grounding means.

.6 Openings in all boxes shall be punched or cut, no burning of holes allowed.

.7 Fill all K.O. openings not used with proper filler plates.

.8 Keep access doors to a minimum by locating equipment in easily accessible locations.

.9 Door swings are to be determined from the Architectural drawings for switch locations.

.10 A variation of location of 3 m (10') shall be provided without cost to the Owner if requested before installation of equipment. Confirm location prior to installation.

3.07 PULL BOXES AND JUNCTION BOXES

.1 Install pull and junction boxes so they are supported independent of raceways.

.2 Install pull boxes after every 30 m (100') of continuous raceway.

.3 Locate pull boxes above accessible ceiling spaces in inconspicuous locations wherever possible.

.4 Colour code pull boxes to indicate system involved.

3.08 EQUIPMENT ENCLOSURES

.1 Mount all surface mounted equipment enclosures on an approved fire rated backing, or unistrut channels.

.2 All recessed enclosures shall have trim for recessed mounting.

.3 Enclosures mounted in finished areas shall be finished to match.

.4 Terminate wiring in screw type terminal blocks or strips.

3.09 SUPPORTING DEVICES

.1 Install supporting devices to maintain headroom and clearances as described for conduits and conductors. Maintain a neat appearance and follow building lines where possible.

3.10 WIRING DEVICES AND COVERPLATES

.1 Mount all devices plumb and level against supporting wall.

.2 Do not mount devices back to back.

3.11 CONTACTORS

.1 Provide steel channel supports for all contactors located on walls.

.2 Locate contactors in a convenient location for accessibility and service. Wherever possible, locate in service spaces such as janitors closets, mechanical rooms, etc. Provide a self-supporting mounting surface where required.

.3 Provide weatherproof connections and raceways to all equipment exposed to the weather.

.4 Label each contactor to indicate the device it controls.

3.12 MOTOR STARTERS

.1 Provide steel channel supports for all starters located on walls.

.2 Locate combination starters as close as practicable to the equipment they control. Provide a self-supporting mounting surface where required.

.3 Starters located in motor control centre shall possess features as defined in this section and the motor schedule or drawings.

.4 Provide weather tight connections and raceways to all equipment exposed to the weather.

.5 Label each starter to indicate the device it controls.

3.13 MOTOR AND CIRCUIT DISCONNECTS

.1 General

.1 Provide proposed wording for all electrical equipment labels to the consultant for review and approval prior to installing the labels.

.2 Disconnect Switches

.1 Provide a separate self-supporting structure to support the disconnect device where the equipment or adjacent walls are not capable of supporting the device.
.2 Use weather tight connections to all EEMAC type 3R enclosures.
.3 Label each disconnect switch to indicate the device it controls.

.3 Circuit Disconnects

.1 Mount circuit disconnects securely to the structural elements of the building. Where the structure is not present or not of sufficient capacity to support the additional weight of the electrical equipment, provide sufficient reinforcing or construct additional facilities to support the load.
.2 Use weather tight connections to all EEMAC type 3R enclosures.
.3 Label each disconnect switch to indicate the device it controls.
.4 On all fused equipment, provide a label indicating fusing size and type on the outside of the fused equipment.

3.14 FUSES

.1 Ship fuses in original containers

.2 Do not ship equipment with fuses installed.

.3 Store spare fuses in original containers in fuse storage cabinet. Install fuse storage cabinet in electrical room.

.4 Install fuses in mounting devices immediately before energizing circuit.

.5 Prior to energization of any circuit, verify that the correct fuse is installed:
a) for the calculated or assumed circuit capacity, and
b) for the proper equipment and conductor protection requirements.

END OF SECTION

PART 1 : GENERAL

1.01 REQUIREMENTS INCLUDED

.1 Conform to the General Electrical Provisions, Section 26 05 01 as applicable.

1.02 RELATED WORK SPECIFIED ELSEWHERE

.1	Thermal and Moisture Protection	Division 7
.2	Submittals	Section 26 05 02
.3	Basic Materials and Methods	Section 26 05 03

1.03 QUALITY ASSURANCE

.1 Conform to the 2012 Ontario Building Code (OBC) Compendium containing the Building Code Act and including all amendments.

.2 Conform to CAN4-S115-M "Standard Method of Fire Tests of Fire Stop Systems".

1.04 SUBMITTALS

.1 Submit shop drawings in accordance with Section 26 05 02, paragraph 1.4 for the following items:

.1 Fire stopping materials.

.2 Manufacturers literature and installation instructions.

.3 Manufacturers Letter of Certification that project meets or exceeds specified requirements.

1.05 APPROVALS

.1 Additional manufacturers wishing to bid products other than the product specified herein, are to submit to Consultant prior to tender close a list of three past installations of products similar to those listed. Complete catalogue data along with deviations from the product specified are to be noted in the submittal to the Consultant. The manufacturer guarantees the proposed substitute product to comply with the product specified and as detailed on the drawings, unless the deviations are so noted in the submittal for approval.

PART 2 : PRODUCTS

2.01 FIRE STOP MATERIAL FOR SERVICE PENETRATIONS

.1 Provide materials and systems capable of maintaining effective barrier against flame, smoke and gases.

.2 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.

.3 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation.

.4 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens and volatile solvents.

.5 Fire stopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

.6 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes.

.7 Acceptable Manufacturers:

- Fyresleeve Industries Inc.
- General Electric Pensil Firestop Systems
- International Protective Coatings Corp.
- Rectorseal Corporation (Metacaulk)
- Proset Systems
- Minnesota Mining and Manufacturing (3M).
- Tremco.
- Hilti

PART 3 : EXECUTION

3.01 INSTALLATION

.1 Confirm location and extent of fire separations from architectural drawings.

.2 Inspect surface to be fire stopped. Report unsatisfactory conditions to Consultant in writing prior to commencement. Initiation of work to be deemed as acceptance of conditions and surfaces.

.3 Store all materials in accordance with manufacturer’s recommendations as to acceptable ambient temperatures. Damaged or deteriorated materials are not to be used and are to be removed from the site.

.4 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturers instructions in all conduit, cable, duct etc. penetrations in new or existing fire separation to provide temperature, flame and smoke rated seals not less than the fire resistance rating of the assembly, or separation.

.5 Seal all holes made by through-penetrations and un-penetrated openings to ensure continuity and integrating of fire separation, including where existing component or device has been removed.

.6 Notify Consultant and/or Authority having jurisdiction for inspection prior to concealing or enclosing fire stopping materials and service penetrations.

.7 Remove excess material and debris and clean adjacent surfaces immediately after application. Leave in a tidy condition.

END OF SECTION

PART 1 : GENERAL

1.01 REQUIREMENTS INCLUDED

.1 Conform to Division 1, General Requirements and Section 26 05 01, General Electrical Provisions.

.2 Related Work

.1	Mechanical Work	Division 23
.2	Submittals	Section 26 05 02
.3	Basic Materials and Methods	Section 26 05 03

1.02 SCOPE OF WORK

.1 Work to be Supplied and Installed

.1 Complete power supply wiring and control equipment (starters, disconnects, relays, etc.) for all mechanical equipment.
.2 Complete wiring for control of mechanical systems where noted on drawings.
.3 Complete empty conduit system for low voltage controls as indicated on the Drawings, or specified herein.
.4 Supply and installation of control transformers as indicated on the Drawings and specified elsewhere, within this Division.

.2 Work Installed and Furnished by Others

.1 Installation of all mechanical equipment as specified in Division 23.

PART 2 : PRODUCTS

2.01 MATERIALS

.1 Materials specified herein are as defined in the General Electrical Provisions, Section 260501, Item 2.2.

2.02 MECHANICAL EQUIPMENT

.1 Generally motors will be supplied with voltages as follows:

.1 Up to and including 1/2 H.P., 120 V single phase, 60 Hz.
.2 Above 1/2 H.P., 208V or 600V, 3 phase, 60HZ.
.3 Provide wiring and equipment, etc. as shown for the respective equipment. Refer to Equipment Schedule on drawings for complete requirements.

PART 3 : EXECUTION

3.01 GENERAL

.1 Empty conduits from the thermostat, or thermostat outlet box to be stubbed above to accessible ceiling spaces, unless noted otherwise.

.2 Provide 120/24 VAC control transformers for the control system where indicated on the Drawings; 24V connection by Division 23.

END OF SECTION

PART 1 : GENERAL

1.01 REQUIREMENTS INCLUDED

.1 Conform to Division 01, General Conditions and Section 260501, General Electrical Provisions as applicable.

.2 Related Work

.1 Submittals Section 260502

1.02 DESCRIPTION

.1 Changes and alterations to existing facilities and equipment caused by the work of this division.

1.03 EXISTING EQUIPMENT

.1 All existing equipment and associated wiring and conduit shall be removed from the renovated area unless noted otherwise on drawings.

.2 All existing equipment removed shall be handed over to the Owners and/or discarded at their discretion.

1.04 FAMILIARIZATION

.1 It is this contractor’s responsibility to visit the site and become thoroughly familiar with the existing building, equipment and systems prior to submitting tender price.

PART 3 : EXECUTION

3.01 GENERAL

.1 Provide under this Section for the relocation or re-routing of existing conduits and other electrical equipment remaining which are exposed during the work.

.2 Where existing wall or ceiling is being removed and/or replaced or where new drywall is being installed on existing studs, remove and reinstall all electrical equipment and wiring. Use information from the site and from architectural drawings to determine this division’s scope of work.

.3 It is the responsibility of this division to patch and repair all surfaces affected by work of this trade. All patching and repairs must be done by an approved means acceptable to the Architect.

.4 Refer to the attached asbestos audit for the building, prior to proceeding with work.

.5 Where asbestos will be disturbed in the execution of this contract, comply with the regulation respecting asbestos on construction projects and in buildings and repair operations made under the Occupational Health and Safety Act, Ontario Regulation 645/85 and local requirements pertaining to asbestos. Asbestos inspection reports have been bound into this specification for use by this Contractor. Employ only licensed asbestos removal Contractors to execute abatement of all asbestos.

.6 This Contractor shall visit the site and examine the existing conditions and make necessary allowances in his tender price for removal, rerouting, relocation and reconnecting of equipment as may be necessary for the execution and completion of this project.

.7 Wiring, conduits, etc., located in areas being altered or demolished, but feeding outlets or equipment required to remain in service shall be rerouted as required to maintain the continuity of these services to the satisfaction of the Engineer.

.8 Include for strapping existing conduits and cables that are not properly supported and are required to remain above the ceilings. Determine exact extent of work on site.

.9 This Contractor shall provide adequate protection to existing equipment throughout the project and particularly where wiring, piping, equipment, etc. have become exposed to mechanical injury or moisture in the course of the alternations.

.10 Existing distribution equipment in areas designated to be demolished shall be permitted to be reused only as indicated on the drawings.

.11 Existing equipment being reused shall be checked for proper operation. Reused equipment shall not have any sign of physical abuse or corrosion. Any knockouts removed in existing equipment being reused shall be plugged.

.12 All wiring made redundant due to demolition/renovation work shall be disconnected and removed to the nearest distribution point upstream that is not affected by demolition/renovation work. All concealed conduit made redundant due to demolition/renovation work may remain provided it does not adversely affect any new installations, unless it is noted to be removed on the drawings. All exposed conduit in finished areas made redundant due to demolition/renovation work shall be removed and the wall patched.

.13 Existing wiring devices shall be permitted to be reused as indicated on the drawings. Existing outlet boxes may be reused if “as new” condition. Existing branch circuit wiring will only be permitted to be reused in existing non accessible walls/ceilings where the existing wiring is of adequate size, has acceptable bonding conductor and is as new condition.

.14 All existing panel schedules, zone legends and distribution equipment identification shall be reworked to reflect any changes made by any demolition/renovation work.

3.02 CHANGE OVER SERVICES

.1 To obtain permission for an interruption, submit a request at least two weeks before, stating the time the interruption is to begin, expected duration and the services and area affected. Where in the opinion of the Consultant it is advisable or desirable to maintain service in the area or any part of the area involved during the interruption, provide such temporary wiring, equipment, etc., as required or as may be deemed necessary by the Consultant to maintain services. No additional payments will be made for any additional cost or inconveniences which may incur. Under NO circumstances will the Contractor's operation be allowed to interfere with or interrupt the tenants or the owners of the building

END OF SECTION

PART 1 : GENERAL

1.01 REQUIREMENTS INCLUDED

.1 Conform to General Conditions, Supplementary General Conditions and Sections of Division 01, as applicable.

.2 Conform to General Electrical Provisions, Section 26 05 01 as applicable.

.3 Related Work

.1	Submittals	Section 26 05 02
.2	Basic Materials and Methods	Section 26 05 03

1.02 SYSTEM DESCRIPTION

.1 Work supplied and installed by this Division or their subtrades

.1 Conduit, wiring, disconnect switches, device boxes, and termination of 24VDC and 120/208 VAC wiring for the following equipment:
Lighting Controls (Supplied by Division 26)

1.03 QUALITY ASSURANCE

.1 All equipment to be installed to minimum of Ontario Electric Safety Code Standards, unless indicated otherwise on these drawings or in this specification.

1.04 SUBMITTALS

.1 Submit shop drawings for the following:

.1 Lighting Controls

PART 2 : PRODUCTS

2.01 GENERAL

.1 Conduits, device boxes, wiring and disconnect switches are specified under other sections of this division.

2.02 ANALOG LIGHTING CONTROLS

.1 Analog lighting control design is based on Wattstopper Lighting Controls system. Products from ‘Greengate’ and ‘Sensor Switch’ shall be considered an equivalent. Any

other proposed equals shall be submitted for approval by the consultant not later than 3 days prior to tender close or as outlined in the front end documents. Contractor will be responsible for any design layout and installation modifications required for the proposed alternate.

.2 Analog Lighting Controls, where noted, shall be as follows:

.1 **Relay Power Packs**

Power pack shall be BZ-50 for 120V locations. Power packs shall be installed concealed within suitably sized junction box at ceiling height. Provide additional power packs or auxiliary relay packs as necessary for switching layouts indicated on drawings.

.2 Occupancy Sensors

W – Series Ultrasonic Ceiling Mounted Occupancy Sensor. Sensors shall be mounted at approximately 10’-0” AFF in locations shown on drawings. Sensors shall be installed to a surface mounted 4” junction box. Sensor installation shall be coordinated with existing ceiling mounted equipment and may require the sensor to be suspended from existing ceiling to achieve preferred height or clearance from other equipment. W-2000H, W-2000A, W-1000A, and W-500A sensors are utilized in design. Provide power pack(s) as necessary for the areas indicated on the drawings.

DT-200 Series Dual Technology Wall Mounted Occupancy Sensor. Sensor shall be mounted at approximately 10’-0” AFF in locations shown on drawings. Sensors shall be installed to a surface mounted 4” junction box. Occupancy types shall be set up to allow either detection type to turn on lights or maintain lights, verify switch settings are set accordingly. Provide power pack(s) as necessary for the areas indicated on the drawings.

DT-300 Series Dual Technology Ceiling Mounted Occupancy Sensor. Sensor shall be mounted at approximately 10’-0” AFF in locations shown on drawings. Sensors shall be installed to a surface mounted 4” junction box. Sensor installation shall be coordinated with existing ceiling mounted equipment and may require the sensor to be suspended from existing ceiling to achieve preferred height or clearance from other equipment. Occupancy types shall be set up to allow either detection type to turn on lights or maintain lights, verify switch settings are set accordingly. Provide power pack(s) as necessary for the areas indicated on the drawings.

PW-100/200-120V Passive Infrared Single/Dual Relay Wall Switch Sensor. Switch to be mounted in within recessed single gang box in location shown. Colour to be confirmed by owner. Switch shall close the relay at zero crossing to protect the contacts

PART 3 : EXECUTION

3.01 INSTALLATION

.1 Lighting Controls

.1 Provide line voltage wiring to power pack/room controller and from power pack/room controller to local light fixtures as shown on drawings.

.2 Provide low voltage control wiring between power pack and sensor for analog lighting controls. Where lighting control wiring is installed in an area with exposed ceilings, all wiring shall be installed in conduit and conduit shall be painted to match.

.3 Provide CAT6A cable c/w RJ45 terminations from sensors and/or switches to room controllers for digital lighting controls. Exterior sheathing of CAT6A wiring shall be green in colour. Where lighting control wiring is installed in an area with exposed ceilings, all wiring shall be installed in conduit and conduit shall be painted to match.

.4 Install power pack and/or room controller devices concealed within suitably sized junction boxes.

.5 Occupancy sensor time delay to be set to 20 minutes.

.6 Confirm locations of lighting control sensors on site with the Consultant.

.7 Provide set-up/commissioning of lighting control devices by manufacturer's representative. Owner's representative shall be provided a one hour on-site instruction of the lighting system operation and typical room set-up procedure and adjustment.

END OF SECTION

PART 1 : GENERAL

1.01 REQUIREMENTS INCLUDED

.1 Conform to General Conditions, Supplementary General Conditions and Sections of Division 01, as applicable.

.2 Conform to General Electrical Provisions, Section 26 05 01 as applicable.

.3 Related Work

.1	Submittals	Section 26 05 02
.2	Basic Materials and Methods	Section 26 05 03

1.02 SYSTEM DESCRIPTION

.1 Work to be Supplied and Installed:

.1 Panelboards.

.2 Circuit Breakers.

.2 Provide panelboards and circuit breakers as indicated in panelboard schedules on drawings.

1.03 QUALITY ASSURANCE

.1 Acceptable Manufacturers:

.1 Schneider Group

.2 Cutler Hammer

.3 Siemens

1.04 REFERENCES

.1	Panelboards	C.S.A. C22.2 No. 29
.2	Ground Fault Circuit Interrupters	CSA C22.2 No.144.
.3	Moulded Case Circuit Breakers	CSA C22.2 No.5.

1.05 SUBMITTALS

.1 Submit shop drawings for the following:

.1 Panelboards.

.2 Circuit Breakers.

PART 2 : PRODUCTS

2.01 PANELBOARDS

.1 Code gauge steel construction, finished in baked grey enamel, with removable front cover and panel trim for surface or recessed mounting as applicable.

.2 Panel design to provide easy access to neutral bar.

.3 Provide locking front cover with 2 keys. Lock to be recessed in door for a flush appearance.

.4 Provide typed directory card behind plastic film in metal frame.

.5 Panel directories to be included in maintenance manuals as well as electronic copies.

.6 Minimum current rating - refer to panel schedule(s) on drawings.

.7 Minimum branch circuits - refer to panel schedule(s) on drawings.

.8 Bolt-on circuit breaker design.

.9 Mains material - tinned copper bus, rated 3 phase, 4 wire unless noted otherwise on drawings - refer to panel schedule(s) on drawings.

.10 Provide a NEMA 1 enclosure or all indoor installations.

2.02 CIRCUIT BREAKERS

.1 Quick-make quick-break design, c/w arc quenching device, trip free handle, thermal overload protection and instantaneous magnetic trip, ambient temperature compensating type. Breaker frame size and mounting type to match required interrupting capacity and panel type.

.2 Two pole and three pole breakers are to have a common trip.

.3 Minimum interrupting capacity shall be 10kAIC unless listed otherwise on the drawings - refer to panel schedule(s). (To be confirmed through the short circuit and coordination and arc flash hazard study.)

PART 3 : EXECUTION

3.01 PANELBOARDS

.1 All equipment to be mounted, plumbed true.

.2 Mounting heights to be as noted in Section 26 05 01 or as amended by the drawings.

.3 All recessed panels to be mounted with suitable flush trim.

.4 All panelboards serving I.T. servers at I.T. rooms shall have a 200% neutral installed.

.5 Provide spare 32 mm (1 1/4") EMT raceway into accessible ceiling space from each recessed panel. Provide nylon pull wires and cap open end.

.6 Provide drip proof shields on all panelboards installed in sprinklered areas.

.7 Provide lamacoid nameplates mechanically fastened to the electrical equipment to identify each panel. Letter size to be as described in Section 26 05 01.

.8 Provide electronic copies of panel directories to the owner upon completion of project.

3.02 CIRCUIT BREAKERS

.1 All circuit breakers shall be identified as per Section 26 05 03.

.2 Install circuit breakers as required.

.3 Ensure all circuit breakers mounted in panelboard have the specified interrupting capacity required for that piece of equipment.

3.03 FIELD QUALITY CONTROL

.1 Provide spot checks on all terminations as directed by the Consultant. Tighten all loose connections discovered.

END OF SECTION

PART 1 : GENERAL

1.01 REQUIREMENTS INCLUDED

.1 Conform to General Conditions, Supplementary General Conditions and Sections of Divisions 01 as applicable.

.2 Conform to General Electrical Provisions, Section 26 05 01 as applicable.

.3 Related Work

.1	Submittals	Section 26 05 02
.2	Basic Materials and Methods	Section 26 05 03

1.02 SYSTEM DESCRIPTION

.1 Description of Work

.1 Provide and install lighting fixtures complete with lamps, ballasts and all mounting hardware and trim required for the type of mounting and the architectural conditions.

.2 Provide spare lamps (10 percent of each type min. qty. - 1) for all fluorescent and/or H.I.D. lighting fixtures. LED fixtures specified do not require any spare lamps/modules.

1.03 REFERENCES

.1 OESC Section 30.

1.04 SUBMITTALS

.1 Submit shop drawings for the following:

.1 Light fixtures

1.05 FIXTURE CATALOGUE REFERENCES

.1 The fixture catalogue numbers listed do not include all required accessories to provide a complete installation of the fixtures as intended or as described. The description of each fixture should be carefully read prior to quoting and the tender price shall include all such necessary accessories and characteristics.

.2 No extras will be allowed for the failure to provide such accessories.

PART 2 : PRODUCTS

2.01 LIGHT EMITTING DIODE (LED) LIGHT FIXTURES

.1 Analog lighting control design is based on Wattstopper Lighting Controls system. Products from 'Greengate' and 'Sensor Switch' shall be considered an equivalent. Any other proposed equals shall be submitted for approval by the consultant not later than 3 days prior to tender close or as outlined in the front end documents. Contractor will be responsible for any design layout and installation modifications required for the proposed alternate.

.2 LED Lamps shall meet the following criteria:

.1 Colour Rendering Index: 80 minimum (unless noted otherwise)
.2 Colour Temperature: 4000K (unless noted otherwise)
.3 Rated Life: 50,000 hours (minimum) at 70% lumen maintenance.
.4 Tested according to IES LM-79 and LM-80 procedures
.5 Minimum 3 year limited warranty.

2.02 GENERAL LIGHTING FIXTURE REQUIREMENTS

.1 Commercially Listed Fixtures: Lighting fixtures shall be of the types, sizes, ratings, etc. listed on Fixture Schedule on Drawings.

.2 Delivery: Assemble completely all fixtures at the Manufacturer's plant and deliver to the project site in original cartons. Ensure that a dry and protected space is available for proper storage before delivery of production fixtures.

2.03 HANGERS AND FITTINGS

.1 General

.1 Support fixtures as shown on the drawings, level, plumb and true with the structure and other equipment, and in a horizontal or vertical position as intended.

.2 Wall or side bracket mounted fixture housings shall be rigidly installed and adjusted to give a neat flush fit to the surface on which it is mounted.

.3 All hangers, supports, fastenings or accessory fittings shall be protected against corrosion. Care shall be taken during the installation to assure that insulation and corrosion protection is not damaged.

.2 Supports

.1 Self-alignment ball joint hangers shall be used for rod suspended fixtures, and ceiling canopies shall be fitted tightly to the ceiling without restricting the alignment of the hanger.

.2 Support fixtures by hangers and mounting arrangements which will not cause the fixture frame, housing, sides or lens frame to be distorted, or prevent complete alignment of several fixtures in a row.

.3 Mounting methods for fixtures on or in suspended ceilings are to be as follows:
- .1 Secure surface mounted equipment with twist clip fasteners to inverted 'T' bar ceilings and independently support clips using jack chain to structure above.
- .2 Where cross member supports are required above the ceiling to provide support points, these are to be steel channels or angles.
- .3 Toggle bolts of the snap-on or spring-in type are not to be used through drywall, tile or similar type ceilings.
- .4 Lay-in or recessed luminaires (or luminaires mounted to the lower surface of suspended ceilings) shall be secured to the building structure. Each fixture shall be secured at opposite ends by a minimum of No. 12 AWG (2.70mm) galvanized soft annealed, mild steel wire (pencil rod) or fixture chain of adequate strength.

.3 Suspension Length

.1 The suspension length for all ceiling-mounted, suspended types of lighting fixtures, as listed in the Fixture Schedule, shall be the overall length from the ceiling to the lowest point of the fixture body, reflector, or glassware in its hanging position.

.2 The length of the stems or chain hangers of suspended fluorescent lighting fixtures shall be adjusted to hang all fixture bodies in the same room level and in the same horizontal plane, unless specifically required to be otherwise on the electrical drawings.

.4 Chain Hangers

.1 Where fixtures are specified to be chain hung, the chain used shall be No. 4 Tensile bright zinc coated with a strength of 181 kg. Attachments shall be made using No. 105 'S' hooks. Wires running down chain to fixture shall be run in flexible conduit and shall be attached to chain with cable clips.

2.04 FIXTURE CONSTRUCTION

.1 All interior fixtures shall comply with CSA Standard C22.2 No.9, latest edition, complete with accessories and components, complying with relevant CSA standards applicable to accessory or component.

.2 Fixture lens, where specified, shall be flat and in hinged metal frame unless otherwise specified, made from clear acrylic lenses and shall be 100% virgin acrylic **minimum** 3.2mm (.125") thick.

.3 Unless otherwise indicated, lighting fixture bodies shall be minimum 20 gauge, cold rolled

prime steel of rigid construction with knockout, as required. Fixture rigidity shall permit any suspension method without sag. Fluorescent fixtures shall be suitable for either individual or continuous mounting. Fixture sockets shall apply continuous holding pressure on lamps. All metal edges are to be smoothly finished.

.4 Fixtures shall be finished in baked white enamel (or other colour if specified or requested by the Consultant), which shall resist chipping, corrosion and discolouration. Before finishing all metal shall be chemically degreased and neutralized.

.5 The finishing paint shall cover all metal edges. Reflecting surfaces shall be white with an average reflectance of not less than 85%.

.6 All fixtures shall be CSA approved and/or approved by the Electrical Safety Authority.

.7 All fixtures shall be provided as described in the light fixture schedule and electrical specifications. Both fixture description and model numbers of approved fixtures listed in the schedule make up the specified fixture type. Contractor shall be responsible for ensuring fixtures are provided and installed as described in both drawings and specifications.

PART 3 : EXECUTION

3.01 INSTALLATION

.1 Install fixtures complete with all mounting hardware and trims for a neat, finished appearance.

.2 Ensure that all fixtures installed in built-in enclosures can be serviced for lamp changing, ballast changing, etc.

.3 Install all fixtures plumbed true.

.4 Co-ordinate fixture locations with other trades on site prior to rough in.

.5 Supply the specified spare lamps in labelled cartons, identifying wattage, voltage and fixture reference.

END OF SECTION

PART 1 : GENERAL

1.01 REQUIREMENTS INCLUDED

.1 Conform to General Conditions, Supplementary General Conditions and Sections of Division 01, as applicable.

.2 Conform to General Electrical Provisions, Section 26 05 01 as applicable.

.3 Related Work

.1	Submittals	Section 26 05 02
.2	Basic Materials and Methods	Section 26 05 03
.3	Telecommunication System Cabling	Section 27 13 00
.4	Firestopping	Section 26 05 04

1.02 SYSTEM DESCRIPTION

.1 This document describes Cable Tray, Conduit, and electrical installation requirements to support the Data and Voice Cabling.

1.03 REFERENCES

.1 Applicable Standards & Codes

.1 Ontario Electrical Safety Code

.2 CSA T-527-94: Grounding and Bonding for Communications in Commercial Buildings

.3 CSA T-528-93: Design Guidelines for Administration of Telecommunication and Infrastructure in Commercial Buildings

.4 CSA T-529-M95: Design Guidelines for Telecommunications Wiring System in Commercial Buildings

.5 CSA T-530-M99: Building Facilities, Design Guidelines for Telecommunication

.6 Ontario Building Code

PART 2 : PRODUCTS

2.01 GENERAL REQUIREMENTS

.1 Fish wires - pull wires - minimum 3 mm (1/8") nylon braided cord.

2.02 BACKBOARDS

.1 Behind Equipment Cabinets, install ¾" (20mm) good one side, plywood on all walls. This plywood is to be painted with a minimum quantity of one (1) coat of primer and two (2) coats of a light colored non-conductive fire retardant paint. The plywood shall extend 8'-0" (2440mm) above the floor, and be 4'-0" (1220mm) wide at a minimum.

2.03 CABLING J-HOOKS

.1 Non-continuous cable supports shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables; cUL Listed.

.2 Non-continuous cable supports shall have flared edges to prevent damage while installing cables.

.3 Non-continuous cable shall have a cable retainer strap to provide containment of cables within the hanger. The cable retainer strap shall be removable and reusable and be suitable for use in air handling spaces.

.4 Non-continuous cable supports shall have an electro-galvanized or G60 finish and shall be rated for indoor use in non-corrosive environments.

.5 Non-continuous cable supports shall be ERICO CableCat™ J-hook series CAT64HP double hooks or approved equal. J-Hooks shall be of the screw on type, hammer on will not be accepted.

2.04 PULL BOXES

.1 A pull box shall be placed in conduit runs where:

.1 The length is over 100' (30m), or
.2 There are more than two 90-degree bends.

.2 Pull boxes shall be constructed of code gauge steel and shall have a rust resistant finish.

.3 In all instances pull boxes shall be placed in straight sections of conduit run and shall NOT be used in lieu of a bend. Corresponding ends of the conduit are to be aligned with each other. Conduit fittings shall not be used in place of pull boxes and/or conduit bends.

.4 Pull boxes shall be placed in a readily accessible location.

.5 Pull box locations shall be identified on the As Built Drawings.

.6 Pull boxes shall be labelled on the exposed exterior.

.7 Pull box sizes shall be as follows:

Size of	Size of Pull Box	For each additional

Conduit:	Width	Length	Depth	conduit increase width:
1” (25mm)	4” (100mm)	16” (406mm)	2” (50mm)	2” (50mm)
2” (50mm)	8” (200mm)	36” (915mm)	5” (127mm)	5” (127mm)
3” (75mm)	12” (300mm)	48” (1220mm)	6” (150mm)	6” (150mm)
4” (100mm)	15” (380mm)	60” (1500mm)	8” (200mm)	8” (200mm)

2.05 CONDUIT

.1 All conduits shall be thin wall EMT, reamed and bushed at both ends.

.2 Flexible metal conduit shall not be used for the installation of voice and data cabling.

.3 PVC conduit, unless poured in floor slab, shall not be used for the installation of voice and data cabling.

.4 Conduit runs shall be a maximum of 100’ (30m) in length with a maximum of two 90 degree bends between pull points, unless otherwise specified.

.5 The inside radius of a bend in a conduit shall not be less than:

.1 Six times the internal diameter when the conduit is less than 2” (50mm) in diameter, or
.2 Ten times the internal diameter when the conduit is larger than 2” (50mm) in diameter.

.6 A pull cord or fish tape shall be installed in all conduits. Conduits shall be identified and labelled at both ends; tags shall identify start and finish of conduit runs.

.7 Conduits shall be Columbia-MBF True Color, BLUE.

2.06 FIRE PROTECTION

.1 Fire-stop all wall and/or floor penetrations.

.2 Conduit penetrations will be returned to the integrity of the existing fire barrier.

.3 Provide STI EZ-Path Fire Rated raceway, as noted on the drawings.

.4 Provide manufacturers letter of certification that project meets or exceeds specified requirements (ULC).

2.07 FIRE RATED PATHWAYS

.1 Provide fire rated pathways as shown on the drawings and as specified hereinafter. Include all associated hardware required for a complete and professional installation to the satisfaction of the Engineer.

.2 All pathways shall be heavy-duty specification grade with an intumescent insert material allowing for 0 to 100-percent visual fill of conductors.

.3 The pathway shall include both internal and external firestopping.

.4 The pathway shall utilize a fire and smoke sealing system that automatically adjusts to the addition or removal of cables.

.5 The pathway shall require no maintenance under normal use and shall accommodate future cable changes without mechanical adjustments and/or removal or replacement of protective materials.

.6 Pathways to be provided with steel wall plates allowing for single or multiple devices to be ganged together.

PART 3 : EXECUTION

3.01 CONDUIT INSTALLATION

.1 Where wall outlets are indicated for telephone and/or data cabling, provide ¾" (19mm) EMT conduit with 4" x 4" x 2½" (100mm x 100mm x 64mm) outlet boxes with single outlet reducer plates from accessible ceiling space to drop locations on floors as indicated on Drawings.

.2 Where wall outlets (for telephone and/or data cabling) are indicated in walls that do not protrude to the finished ceiling, utilize chase sections of wall for routing of conduits. Provide continuous raceways to outlets.

.3 Where telephone and/or data cabling outlets are indicated within systems furniture, utilize riser poles (supplied with furniture) for cabling drops to the furniture.

.4 Provide EMT conduits from Telecom riser closets to computer rooms and LAN rooms as indicated on Drawings for the installation of backbone cabling.

.5 Back to back outlet boxes shall be offset 12" (300mm) apart.

.6 All conduits entering a main computer room or LAN room (unless otherwise stipulated) will protrude into the area from 1 to 2" (25-50mm) without a bend.

.7 Where possible, conduit runs shall follow building grid lines.

.8 Outlet boxes shall be placed at the same height from finished floor level as adjacent electrical duplex receptacles.

.9 The cable distribution system conduits be bonded together at the main computer room and LAN rooms and bonded to the telecommunications bus bar within the rooms using a No. 6 awg green jacketed stranded copper ground wire.

3.02 CABLE HOOK INSTALLATION

.1 Follow manufacturer's recommendations for allowable fill capacity for each size non-continuous cable support.

.2 Do not exceed load ratings specified by manufacturer.

.3 Provide mounting support (threaded rod, beam clamp, wall anchor, etc.) as required by location of installation. Clamps to be of screw-on type, hammer-on type will not be accepted.

.4 Maximum spacing shall not exceed 3'-0"

3.03 TELECOMMUNICATIONS BONDING BACKBONE SYSTEM

.1 The telecommunications bonding backbone (TBB) has been installed as part of the base building construction. The TBB is a system composed of green jacketed stranded copper conductors and insulated copper buss bars which extend vertically from the Building Grounding Electrode Conductor through the core area telecom closets.
Provide extension of this system to the computer rooms and Lan rooms within the building. The following general requirements shall apply when extending the TBB system:

.1 An insulated pre-drilled copper busbar, minimum dimensions of ¼" (6mm) thick x 4" (100mm) wide x 18" (457mm) in length shall be installed on the wall by each data cabinet adjacent to the cable entrance conduits. These busbars shall be mounted on the adjacent wall closest to the wall on which the cable entrance ducts are mounted; 6" (150mm) from the corner of the LAN room and 6" (150mm) AFF.

.2 A #3 awg green jacketed stranded copper ground wire shall be installed from the copper busbars installed in the core area telecom closet to the busbars installed within the main computer rooms and the LAN rooms.

.3 All joints to the grounding wires shall be done using irreversible compression-type connectors, exothermic welding, or equivalent.

.2 The metallic components of the horizontal distribution supporting infrastructure (conduits, cable trays and ducts) shall be bonded to the telecommunications busbars of the main computer rooms or LAN rooms in which they originate using a #6 awg green jacketed stranded copper ground wire.

3.04 FIRE RATED PATHWAYS

.1 Pathways shall be installed in locations where indicated on the drawings, above the acoustic tile ceiling.

.2 Install pathways in accordance with the manufacturer's recommendations.

.3 Apply the factory supplied gasketing material prior to the installation of the wall plates.

.4 Secure wall plates to devices per the equipment manufacturer's recommendations.

.5 Provide manufacturer's Letter of Certification that the project (as installed) meets or exceeds the specified requirements for fire rating (ULC).

3.05 AS BUILT DRAWINGS

.1 As built drawings will be produced and delivered to the design authority on completion of installation. The as built drawings shall consist of marked up installation drawings.

END OF SECTION

APPENDIX - X - SCHEDULE AND DETAILS

00850 LIST OF DRAWINGS

1.1 **Architectural**

A0-0 COVER & OBC MATRIX

A2-0 OVERALL ALL FIRST & SECOND FLOOR PLANS

A2-1 OVERALL EXISTING ROOF AND PARTIAL SECOND FLOOR AND ROOF PLANS

A2-2 PARTIAL FIRST FLOOR PLAN TECH WING DEMOLITION & PROPOSED

A2-3 TECH WING CLASSROOM & CORRIDOR INTERIOR ELEVATIONS

A2-4 TECH WING CLASSROOM INTERIOR ELEVATIONS

A2-5 TECH WING CLASSROOM INTERIOR ELEVATIONS

A2-6 STAFF ROOM - DEMO. & NEW, INTERIOR ELEVATION AND BARRIER FREE ADO

A2-7 PARTIAL FIRST FLOOR TECH WING WINDOW REPLACEMENT & DETAILS

A6-1 PARTIAL FIRST FLOOR PLAN TECH WING DEMOLITION CEILING & PROPOSED

1.2 **Structural**

S1.0 ROOF FRAMING PLAN, DETAIL, GENERAL NOTES

S2.0 STEEL STUD DETAILS

1.2 **Mechanical**

M000 MECHANICAL TITLE SHEET

M100 PARTIAL FLOOR PLAN - SANITARY DEMOLITION & NEW SANITARY

M200 PARTIAL FLOOR PLAN - DEMOLITION & NEW DOMESTIC

M300 PARTIAL PLAN – HEATING DEMOLITION

M301 PARTIAL PLAN – NEW HEATING

M400 PARTIAL FLOOR & ROOF PLAN – HVAC DEMOLITION

M401 PARTIAL FLOOR & ROOF PLAN – NEW HVAC

M402 SECTION & DETAILS – NEW HVAC

M500 MECHANICAL SCHEDULES & DETAILS

1.3 **Electrical**

E000 ELECTRICAL TITLE SHEET

E100 PARTIAL FLOOR PLAN – DEMOLITION & NEW LIGHTING

E200 PARTIAL FLOOR PLAN – DEMOLITION & NEW POWER

E201 PARTIAL FLOOR PLAN – DEMOLITION & NEW POWER

E202 PARTIAL FLOOR PLAN – DEMOLITION & NEW POWER

E300 ELECTRICAL RISER DIAGRAM

E301 ELECTRICAL SCHEDULES & DETAILS

Room Finish Schedule

Room No.	Room Name	Floor		Base		Wall		Ceiling			Remarks
		mat'l	finish	mat'l	finish	mat'l	finish	mat'l	finish	height	
8-3A	NEW MANUFACTURING CLASSROOM	EX-WD	REF.	EX-WD	EX./ MATCH EX.	EX..	EP-PT	EXP.	SG-PT	EX.	NEW AND PATCH WOOD FLOORING AND NEW BASE
8-5	NEW TECH DESIGN CLASSROOM	EX-WD	REF	EX-WD	EX./ MATCH EX	EX./GYP. BD.	EP-PT	EXP.	SG-PT	EX.	NEW AND PATCH WOOD FLOORING AND NEW BASE
8-5A	NEW SOUND BOOTH	EX-WD	REF.	EX-WD	EX./ MATCH EX	EX./GYP. BD.	EP-PT	-	ACT	3200	NEW AND PATCH WOOD FLOORING AND NEW BASE
8-7A	NEW CLASSROOM	EX-WD	REF.	EX-WD	EX./ MATCH EX	EX./GYP. BD.	EP-PT	EXP.	SG-PT	EX.	NEW AND PATCH WOOD FLOORING AND NEW BASE
8-7B	NEW CLASSROOM	EX-WD	REF	EX-WD	EX./ MATCH EX	EX./GYP. BD.	EP-PT	EXP	SG-PT	EX.	NEW AND PATCH WOOD FLOORING AND NEW BASE
8-7C	NEW GRAPHICS CLASSROOM	EX-WD	REF.	EX-WD	EX./ MATCH EX	EX./GYP. BD.	EP-PT	EXP	SG-PT	EX.	NEW AND PATCH WOOD FLOORING AND NEW BASE
8-9A-B	EX. COMPUTER ELECTRICS	EX-WD	REF	EX-WD	EX./ MATCH EX	EX./GYP. BD.	EP-PT	-	ACT	3200	
8-11	EX, COMPUTER LAB	EX-WD	REF	EX-WD	EX./ MATCH EX	EX./GYP. BD.	EP-PT	-	ACT	3200	
2-8	NEW STAFF ROOM	EX.	LVT	RUB		EX.	EP-PT	-	ACT	+/- 3024	NEW FLOORING AND NEW BASE
8	CORRIDOR	EX.	TER	-	TER	CONC. BLK.	EP-PT	EX.	EX.	EX.	PATCH & MAKE GOOD ALL SURFACES AFFECTED BY SCOPE OF WORK

LEGEND:

ACRYL	INTERIOR ACRYLIC PAINT	EP	EPOXY	P.LAM	PLASTIC LAMINATE	S/S	STAINLESS STEEL
ACT	ACOUSTIC CEILING TILE	EX	EXISTING	POR	PORCELAIN TILE	TER	TERRAZZO
BLK	BLOCK	EXP	EXPOSED	PT	PAINT	RUB	RUBBER BASE
CONC	CONCRETE	GYP	GYPSUM BOARD	SFT	SAFETY FLOORING	VCT	VINYL COMPOSITE TILE
CPT	CARPET	LEP	LATEX EPOXY	SG	SEMI-GLOSS	VSF	VINYL SHEET FLOORING
EG	EGGSHELL	LVT	LUXURY VINYL TILE	SPF	SPORTS FLOORING	REF	SAND AND REFINISH

End of Section

Door and Frame Schedule

Door No.	Door								Frame			Fire Rating	Remarks
	width	height	thick	type	mat'l	finish	glass	grille	type	mat'l	finish		
8-3A	MATCH EX.	MATCH EX.	45	A	HM	PT	FRG	-	-	HM	PT	45 MIN	NEW DOOR AND FRAME AT EXISTING OPENING
8-5A	950	2150	45	B	HM	PT	TG	-	-	HM	PT	-	SOUND DROP SEAL
8-7A	950	2150	45	A	HM	PT	FRG	-	-	HM	PT	45 MIN	
8-7B	950	2150	45	A	HM	PT	FRG	-	-	HM	PT	45 MIN	
8-7C-1	950	2150	45	B	HM	PT	TG	-	-	HM	PT	-	
8-7C-2	950	2150	45	B	HM	PT	TG	-	-	HM	PT	-	

End of Section

Colour Schedule

PART 1 - GENERAL

1.1 **Reference**

.1 Comply with the requirements of Division 1. This Colour Schedule is to be read in conjunction with all other contract documents.

.2 Colour selections are based on specific manufacturer's products and further review and adjustments will be made once successful suppliers and/or manufacturers are known.

PART 2 - LIST OF FINISHES

1. Terrazzo:

Manufacturer:	Unknown
Colour:	Match Existing
Code:	Unknown
Application:	Patch existing terrazzo in corridors to match existing
Contact:	Unknown

2. Porcelain Tile:

1. **(POR-1):**

Manufacturer:	Olympia Tile
Collection:	Cristallo Glass Tiles
Colour:	Super White
Code:	KV.CR.SWT.0,6X1,9GL
Finish:	Gloss
Size:	50mm x 305mm (2” x 12”)
Thickness:	6 mm (1/4”)
Application:	Walls (Field) – Backsplash in New Staff Room
Contact:	Peony Seto 416-785-9555 ext.1254

3. Grout:

1. **(GT-1):**

Manufacturer:	Mapei
Colour:	38 Avalanche
Application:	Wall – unsanded Ultra/ Mastic 1 with Plastijoint acrylic latex grout additive
Paired with Tile(s):	POR-1
Contact:	Mapei Jeff McCoppen 905-799-6884

4. Transition Strip:

1. **(TRAN-1):**

Manufacturer:	Schluter
Style:	Schiene
Finish:	Satin Anodized Aluminum (AE)
Size:	8mm (5/16”)
Item No.	AE 80 **Contractor to verify correct item No. required**
Location:	VSF to Terrazzo Transition Strips Cap for all POR wall tiles at top & side of exposed tiles

Colour Schedule

PART 2 - LIST OF FINISHES (cont'd)

4. Transition Strip (cont'd)**:**

2. **(TRAN-2):**	Manufacturer:	Schluter
	Style:	Schiene
	Finish:	Satin Anodized Aluminum (AE)
	Size:	33mm (1/8")
	Item No.	AE 30
		Contractor to verify correct item No. required
	Location:	LVT to VCT Transition Strip in Staff Room

5. Wood Flooring:

1. (WD-1):	Manufacturer:	Unknown – Match Existing
	Product:	Unknown – Match Existing
	Colour:	Unknown – Match Existing
	Size:	Unknown – Match Existing
	Sheen/Finish:	Unknown – Match Existing

6. Luxury Vinyl Tile:

1. **(LVT-1):**	Manufacturer:	Tandus Centiva, A Tarkett Company
	Item:	Adaptt
	Style:	Woodlot #SSP
	Colour:	Cherrywood #2314 (red brown)
	Plank Size:	150mm x 915mm (6" x 36")
	Installation Method:	Herringbone **OR** Unidirectional (See Finishes Drawings)
	Material:	Heterogeneous Vinyl Tile
	Wear Layer Thickness:	20mm
	Overall Thickness:	4.5mm (0.177")
	Edge Treatment:	Microbeveled
	Emboss Option:	Standard Emboss
	Welding Rod Colour:	TA7 Rusty Nail
	Application:	Floor – Pods
		See Floor Finishes Drawings for locations and patterns
	Contact:	Janet Sayers 647-542-2514

7. Rubber Base:

1. **(RUB-1):**	Manufacturer:	Johnsonite – Tarkett
	Colour:	40 Black
	Characteristics:	TightLock for Resilient Topset (Coved)
		TDCR-XX (Rubber)
	Profile:	6.35 mm thick – wedge design with a toe (Coved)
	Height:	111.1 mm (4-3/8")
	Details:	Coved, complete with preformed inside/outside corners
	Contact:	Janet Sayer 647-542-2514

Colour Schedule

PART 2 - LIST OF FINISHES (cont'd)

8. Wood Base:

1. **(WD-2):**	Manufacturer:	
	Colour:	
	Height:	Match Existing
	Profile:	Match Existing
	Application:	In Tech Classrooms

9. Plastic Laminate:

1. **(PL-1):**	Manufacturer:	Wilsonart	
	Colour Name & #:	Kensington Maple 10776-60	
	Finish:	Matte Finish	
	Application:	**Millwork Units (Base & Upper Cabinets) In Classrooms and Staff Room**	
2. **(PL-2):**	Manufacturer:	Wilsonart	
	Colour Name & #:	Pewter Mesh 4878-38	
	Finish:	Fine Velvet Finish	
	Application:	**Countertop in Classrooms**	
	Contact:	Wilsonart Jan Bibic	416-319-8107
3 **(PL-3):**	Manufacturer:	Formica	
	Colour Name & #:	Glamour Cherry 6208-43	
	Finish:	Suede	
	Application:	**Countertop in Staff Room**	
	Contact:	Maria Bannon Turvey	C: 416-592-0664

10. Paint:

1. **(PT-1):**	Manufacturer:	Dulux Paints	
	Colour:	Match Existing	(Light Creamy-White)
	Code:	Unknown	
	Application:	General – Corridor Walls / Classroom Walls General – Gypsum Wall Board (Walls / Ceilings)	
2. **(PT-2):**	Manufacturer:	Dulux Paints	
	Colour:	Match Existing	
	Code:	Unknown	
	Application:	Painted Doors	
3. **(PT-3):**	Manufacturer:	Dulux Paints	
	Colour:	Match Existing	
	Code:	Unknown	
	Application:	HM Door Frames	
	Contact:	Dulux Paints - Steven Whyte	416-420-3603

Colour Schedule

PART 2 - LIST OF FINISHES (cont'd)

10. Paint (cont'd)**:**

4. **(PT-4):**	Manufacturer:	Rosco Canada
	Colour:	#05711 Chroma Key Green (bright green)
	Phase Angle:	242º
	Luminance:	57
	Finish:	Matte
	Solvent:	Water
	Binder Type:	Vinyl Acrylic
	Film Thickness:	2mm. Dry Film
	Coverage:	Approx 300 sq.ft. per gallon
	Location:	Green Screen in New Tech Design Classroom 8-5
	Note:	Also available in Chroma Floor
	Contact:	Chris Plummer Chris.Plummer@rosco.com (905)-475-1400

11. Coat Rack:

1.	Manufacturer:	Bayco ASI
	Product:	Executive Line.Model CL-50 Wall mounted 2100 mm long
	Coat Rack Colour:	Bayco Anodized
	Location	Exist. Staff Room 2-8
	Note:	Colour selection is based on this manufacturer's products. Equal or approved alternates may also be considered. Architect's approval is required prior to ordering.

End of Section

DIVISION – 1

1-101 Standard abbreviations
1-102 Standard abbreviations
1-103 Standard symbols
1-104 Wall Types

DIVISION 4 – 1

4-101 Control Joint at Interior Door (Section + Elevation)
4-103 Typical Bullnose Block Corner Detail.
4-107 Typ. Door Jamb at Block Wall

DIVISION 6 – 2

6-203 Cabinet types

DIVISION 6 – 6

6-601 Counter Detail

DIVISION – 7

7-101 Cove Base detail
7-102 Section Detail at New Door
7-103 Existing Condition Door Remove Existing Door
7-104 Existing Condition at Lockers Remove Existing Lockers
7-105 New Wood Floor and Base Detail
7-106 Mechanical Roof Top Unit Curb Detail

DIVISION – 8

8-400 Door Types
8-401 Screen Types
8-500 Hollow Metal Frame Details
8-501 Hollow Metal Frame Details
8-502 Hollow Metal Frame Details

AC/ACT	ACOUSTIC CEILING TILE
ACR	ACRYLIC
AD	AREA DRAIN
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AGGR	AGGREGATE
AL	ALUMINUM
AP	ACOUSTIC PANEL
APG	ARMOURED PLATE GLASS
APPROX.	APPROXIMATE
ARCH	ARCHITECTURAL
AS SPEC.	AS SPECIFIED
ASPH	ASPHALT
ASS'Y	ASSEMBLY
ATTEN.	ATTENUATION
A/V	AIR VAPOUR
BAT	BATTENS
BC	BOTTOM CURB
BD	BOARD
BF	BARRIER-FREE
BITUM.	BITUMINOUS
BKCS	BOOKCASE
BLDG	BUILDING
BLK	BLOCK
BLKHD	BULKHEAD
BM	BEAM
BOT	BOTTOM
BRK	BRICK
BUR	BURLAP
C	CHAIR
CB	CATCH BASIN
CFI	CONCRETE FACED INSULATION
CEM	CEMENT
CER	CERAMIC TILE
CG	CORNER GUARD
CHBD	CHALKBOARD
CI	CAST IRON
CJ	CONTROL JOINT
CL	CENTRE LINE
CLB	CENTRE LINE OF BLOCK
CLG	CEILING
CLO	CLOSET
CLR	CLEAR
CM	COFFEE MACHINE
CNTR	COUNTER
CO	CASED OPENING
COL	COLUMN
CONC	CONCRETE
CONN	CONNECTION
CONSTR.	CONSTRUCTION
CONT.	CONTINUOUS
CORR	CORRIDOR
CP	CONTROL PANEL
CPAN	COMPOSITE PANEL
CPT	CARPET
CTG	COATING
CTR	CENTRE
CTSK	COUNTER SUNK
C/W	COMPLETE WITH
CV	CONVECTOR
DBL	DOUBLE
DEPT	DEPARTMENT
DET.	DETAIL
DF	DRINKING FOUNTAIN
DG	DOUBLE GLAZE
DH	DOUBLE HUNG
DIA.	DIAMETER
DIM	DIMENSION
DISP	DISPENSER
DK	DECK
DN	DOWN
DO	DOOR OPENING
DS	DOWNSPOUT
DW	DISHWASHER
DWG	DRAWING
DWR	DRAWER
E	EAST
EA.	EACH
EF	EXHAUST FAN
EJ	EXPANSION JOINT
EL	ELEVATION
ELECT	ELECTRICAL
EMER	EMERGENCY
EN	ENAMEL
ENCL	ENCLOSURE
EP	EPOXY
EQ	EQUAL
EQMT	EQUIPMENT
ES	EGG SHELL
EX.	EXISTING
EXPAN	EXPANSION
EXP	EXPOSED
EXT	EXTERIOR
FA	FIRE ALARM
FAAP	FIRE ALARM ANNUNCIATION PANEL
FD	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FDN	FOUNDATION
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FF	FORCED FLOW HEATER
FG	FIXED GLASS
FHC	FIRE HOSE CABINET
FIN	FINISH
FL	FLOOR
FLASH	FLASHING
FLEX.	FLEXIBLE
FLUOR	FLUORESCENT
FLT	FLOAT
FOB	FACE OF BLOCK
FOB(EX.)	FACE OF BLOCK (EXISTING)
F.PT	FLAT PAINT
FR	FRIDGE
F.RET	FIRE RETARDENT
FRR	FIRE-RESISTANCE RATED
FT	FOOT or FEET
FTG	FOOTING
FURR	FURRING
FUT	FUTURE
F&G	FELT & GRAVEL
GA	GAUGE
GALV	GALVANIZED
GB	GRAB BAR
GL	GLASS
GL.BL.	GLAZED BLOCK
GND	GROUND
GR	GRADE
GSR	GAS SERVICE REGULATOR
GRA	GRAVEL
GWG	GEORGIAN WIRE GLASS
GYP	GYPSUM
HB	HOSE BIB
HC	HOLLOW CORE
HDWD	HARDWOOD
HD	HAND DRYER
HDWE	HARDWARE
HGT	HEIGHT
HM	HOLLOW METAL
HORIZ.	HORIZONTAL
HP	HYDRO POLE
HR	HOUR
HSS	HOLLOW STEEL SECTION
HTG	HEATING
HW	HOT WATER HEATER
ID	INSIDE DIAMETER
IFOB	INSIDE FACE OF BLOCK
IMP	INSULATED METAL PANEL
INV	INVERT
INSUL	INSULATION
INT	INTERIOR
JAN	JANITOR
JT	JOINT
KIT	KITCHEN
LAM	LAMINATE
LAV	LAVATORY
LDIG	LIGHT DIFFUSING INSULATED GLASS
LEP	LATEX EPOXY PAINT
LF	LATERAL FILE
LF	LATERAL FILE
LKR	LOCKER
LP	LIGHTING PANEL
LS	LIGHT STANDARD
LT WT	LIGHT WEIGHT
LV	LATERAL FILE
LVT	LUXURY VINYL TILE
M	METAL
MAX.	MAXIMUM
MCT	MARMOLEUM COMPOSITE TILE
M.D.F.	MEDIUM DENSITY FIBREBOARD
MECH	MECHANICAL
MEMB	MEMBRANE
MFR	MANUFACTURER
MGAT	MAKE GOOD ALL TRADES
MH	MAINTENANCE HOLE
MIN	MINIMUM
MIR	MIRROR
MISC	MISCELLANEOUS
MO	MASONRY OPENING
MOR	MORTAR
MR	MOISTURE RESISTANT
MSB	MEDIUM SAND BLAST
MTD	MOUNTED
MUL	MULLION
MW	MICROWAVE

FOR CONTINUATION SEE DWG. NO. 1-102

Kingsland + ARCHITECTS INC.

KINGSLAND + ARCHITECTS INC
219 Dufferin Street , Suite 308b
Toronto, Ontario M6K 3J1
ph 416.203.7799
fax 416.203.7763

ISSUED:

DRAWING NAME: STANDARD ABBREVIATIONS

DATE: March 2024

SCALE: N.T.S.

DRAWN: K+

PROJECT NO: A23018

PROJECT NAME: Forest Heights C.I.

CHECKED: K+

DWG NO: 1-101

REV. 0

N	NORTH
ND	NAPKIN DISPOSAL
NIC	NOT IN CONTRACT
NO. or #	NUMBER
NOM.	NOMINAL
NS	NON SLIP
NTS	NOT TO SCALE
OA	OVER ALL
OBS	OBSCURE
O.C.	ON CENTRE
OFB	OUTSIDE FACE OF BLOCK
OD	OUTSIDE DIAMETER
OHD	OVERHEAD DOOR
OPNG	OPENING
OPP	OPPOSITE
OWSJ	OPEN WEB STEEL JOIST
P	PLASTIC
PARG	PARGING
PART	PARTITION
PB	PARTICLE BOARD
PC	PRECAST
PERF	PERFORATED
PG	PLATE GLASS
PL	PLATE
P.LAM	PLASTIC LAMINATE
PLAS.	PLASTER
PLY	PLYWOOD
PNEU	PNEUMATIC
POL	POLISHED
POR	PORCELAIN TILE
PP	POWER PANEL
PPG	POLISHED PLATE GLASS
PR	PAIR
PREFIN	PREFINISHED
PT	PAINT
PTD	PAPER TOWEL DISPENSER
QT	QUARRY TILE
R	RISER
RAD	RADIUS
RD	ROOF DRAIN
REF	REFERENCE
REFR	REFRIGERATOR
REINF	REINFORCED
RESIL.	RESILIENT
REQ.	REQUIRED
RFG	ROOFING
RGTR	REGISTER
RH	ROOF HOPPER
RM	ROOM
RO	ROUGH OPENING
RTT	RESILIENT TERRAZZO TILE
RUB	RUBBER
RWL	RAIN WATER LEADER

S	SOUTH
SC	SOLID CORE
SCHED	SCHEDULE
SD	SOAP DISPENSER
SECT	SECTION
SG	SEMI GLOSS
SH	SHELF
SHR	SHOWER
SHT	SHEET
SIL	SILICONE
SIM	SIMILAR
SL.BLK.	SLAG BLOCK
SP	SPRAYED
SPAN	SPANDREL PANEL
SPEC.	SPECIFICATION
SPF	SPORTS FLOORING
SPG	SPANDREL GLASS
SP.BK.	SPLASHBACK
SQ	SQUARE
SS	STAINLESS STEEL
SSCG	STAINLESS STEEL CORNER GUARD
SSKP	STAINLESS STEEL KICKPLATE
S.SUR.	SOLID SURFACE
ST	STOVE
STA	STATION
STD	STANDARD
STN	STAIN
STL	STEEL
STG	STORAGE
STRUCT	STRUCTURAL
STY	STYLE
SUP	SUPPORT
SUSP	SUSPENDED
SVF	SHEET VINYL FLOORING
SYM	SYMMETRICAL
T	
	TREADS
TB	TOWEL BAR
TBL	TABLE
TC	TOP OF CURB
TEC	TECTUM
TEL	TELEPHONE
TER	TERRAZZO
T&G	TONGUE & GROOVE
THK	THICK
THRES	THRESHOLD
TKBD	TACKBOARD
T/O	TOP OF
TPG	TEMPERED PLATE GLASS
TR	TRIM
TRAN	TRANSITION
TTD	TOILET TISSUE DISPENSER
TV	TELEVISION
TW	TOP OF WALL
TYP.	TYPICAL
UNF	UNFINISHED
UNGL	UNGLAZED
UNIV.	UNIVERSAL
U.O.N.	UNLESS OTHERWISE NOTED
UR	URINAL
U/S	UNDERSIDE

VRT	VINYL REINFORCED TILE
VSF	WINYL SAFETY FLOOR
VWC	VINYL WALLCOVERING
W	WEST
W/	WITH
W.C.	WATER CLOSET
WD	WOOD
W/O	WITHOUT
WHBD.	WHITEBOARD
WP	WATERPROOF
WR	WASHROOM
WSCT	WAINSCOT
WT	WEIGHT
WWM	WELDED WIRE MESH

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ISSUED:

DRAWING NAME: STANDARD ABBREVIATIONS (CONT'D)

PROJECT NAME: Forest Heights C.I.

DATE: March 2024

DRAWN: K+

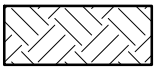
CHECKED: K+

SCALE: N.T.S.

PROJECT NO: A23018

DWG NO: 1-102

REV. 0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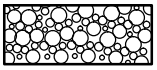
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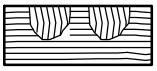
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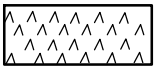
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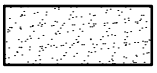
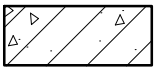
SLAG FILL


SAND, PLASTER
& CEMENT


CAST–IN–PLACE
CONCRETE


PRECAST CONCRETE


LIGHT WEIGHT CONCRETE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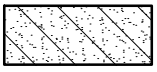
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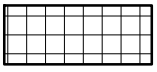
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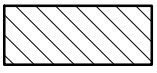
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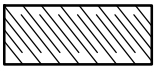
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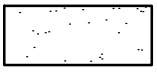
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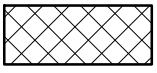
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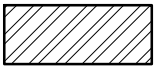
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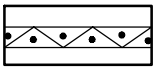
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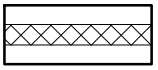
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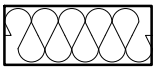
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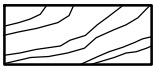
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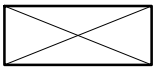
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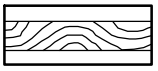
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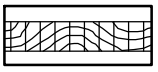
PARTITION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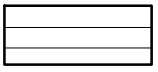
STUD PARTITION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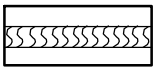
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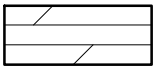
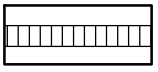
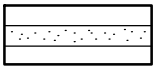
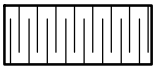

PLYWOOD/M.D.F./PARTICLE BOARD

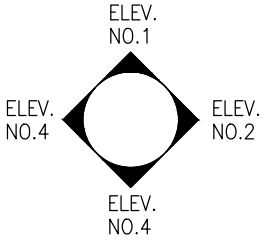

ACOUSTIC TILE


METAL LATH
& PLASTER


GYPSUM BOARD


TECTUM


RIGID INSULATION



INTERIOR ELEVATION
SEQUENCE

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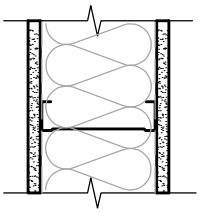
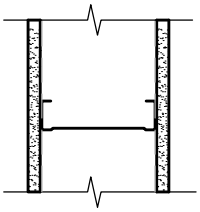
219 Dufferin Street , Suite 308b
Toronto, Ontario M6K 3J1
ph 416.203.7799
fax 416.203.7763

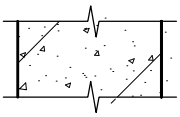
ISSUED:	DRAWING NAME: STANDARD SYMBOLS	DATE: March 2024	SCALE: N.T.S.	
		DRAWN: K+	PROJECT NO: A23018	
	PROJECT NAME: Forest Heights C.I.	CHECKED: K+	DWG NO: 1–103	REV. 0



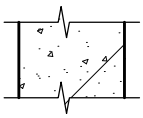
W1 16mm GYPSUM BOARD
152mm METAL STUD
SOUND INSULATION
16mm GYPSUM BOARD



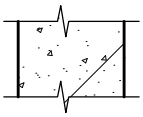
W1a 16mm GYPSUM BOARD
152mm METAL STUD
16mm GYPSUM BOARD



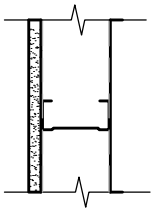
*W2 190mm CONC. BLK.



W3 CONC. BLK.
MATCH EXISTING WALL THICKNESS



W4 140MM CONC. BLK.



W5 16mm GYPSUM BOARD
92mm METAL STUD

NOTE:
*FS DENOTES WALL TO HAVE A FIRE SEPARATION.

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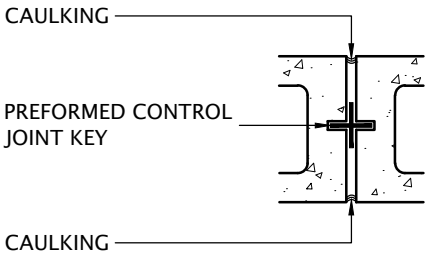
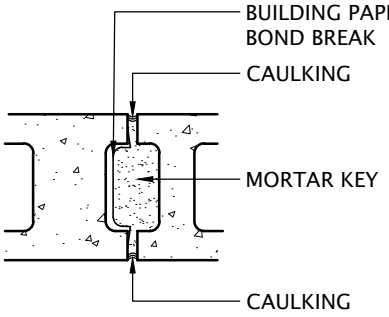
ISSUED:	DRAWING NAME: WALL TYPE SCHEDULE	DATE: March 2024	SCALE: 1:10
		DRAWN: K+	PROJECT NO: A23018
	PROJECT NAME: Forest Heights C.I.	CHECKED:	DWG NO: 1-104 / REV.

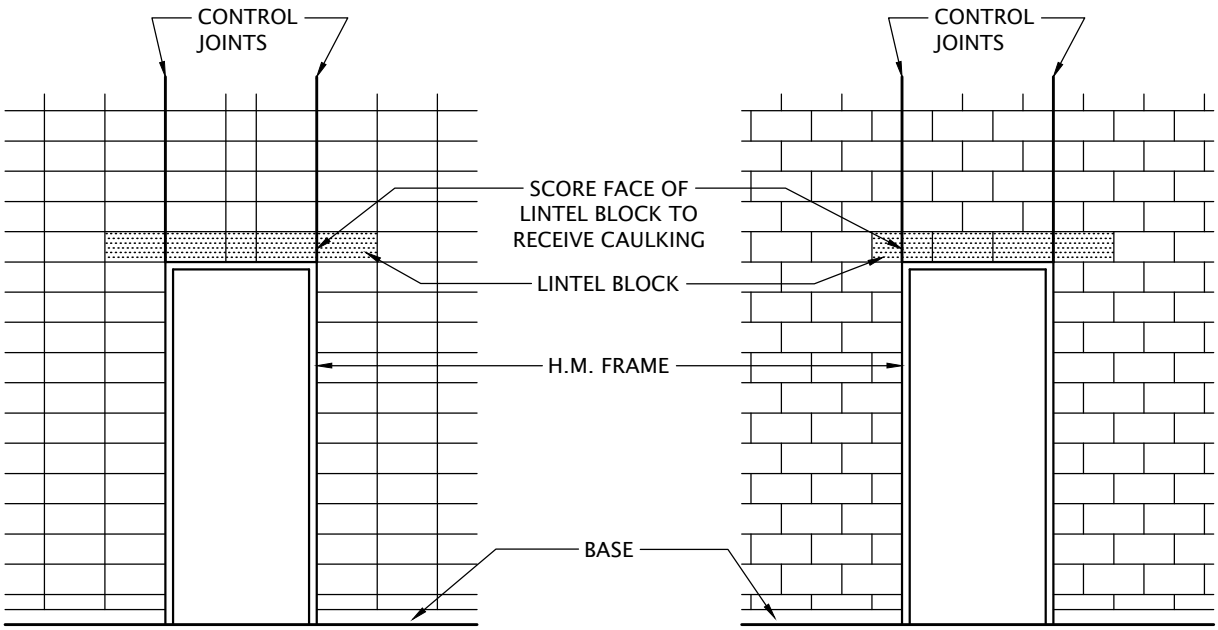


CONTROL JOINT FOR NON LATERAL STABILITY OF WALL



CONTROL JOINT FOR LATERAL STABILITY OF WALL

SECTIONS



STACK BOND ELEVATION

RUNNING BOND ELEVATION

NOTE: EXTEND CONTROL JOINT TO U/S OF STRUCTURE ABOVE

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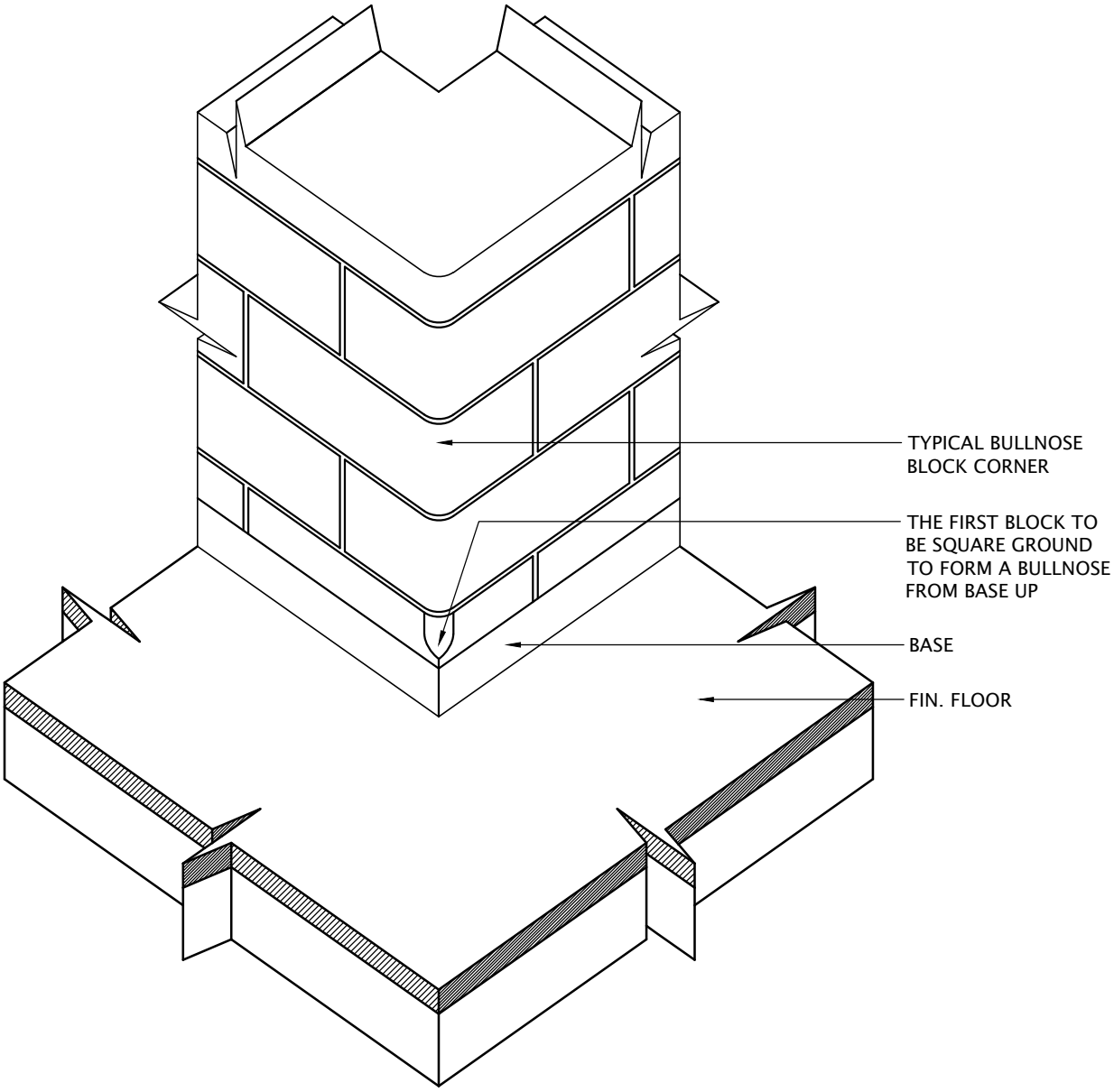
fax 416.203.7763

ISSUED:	DRAWING NAME: CONTROL JOINT AT INTERIOR DOOR	DATE: March 2024	SCALE: N.T.S.	
		DRAWN: K+	PROJECT NO: A23018	
	PROJECT NAME: Forest Heights C.I.	CHECKED: K+	DWG NO: 4-101	REV. 0



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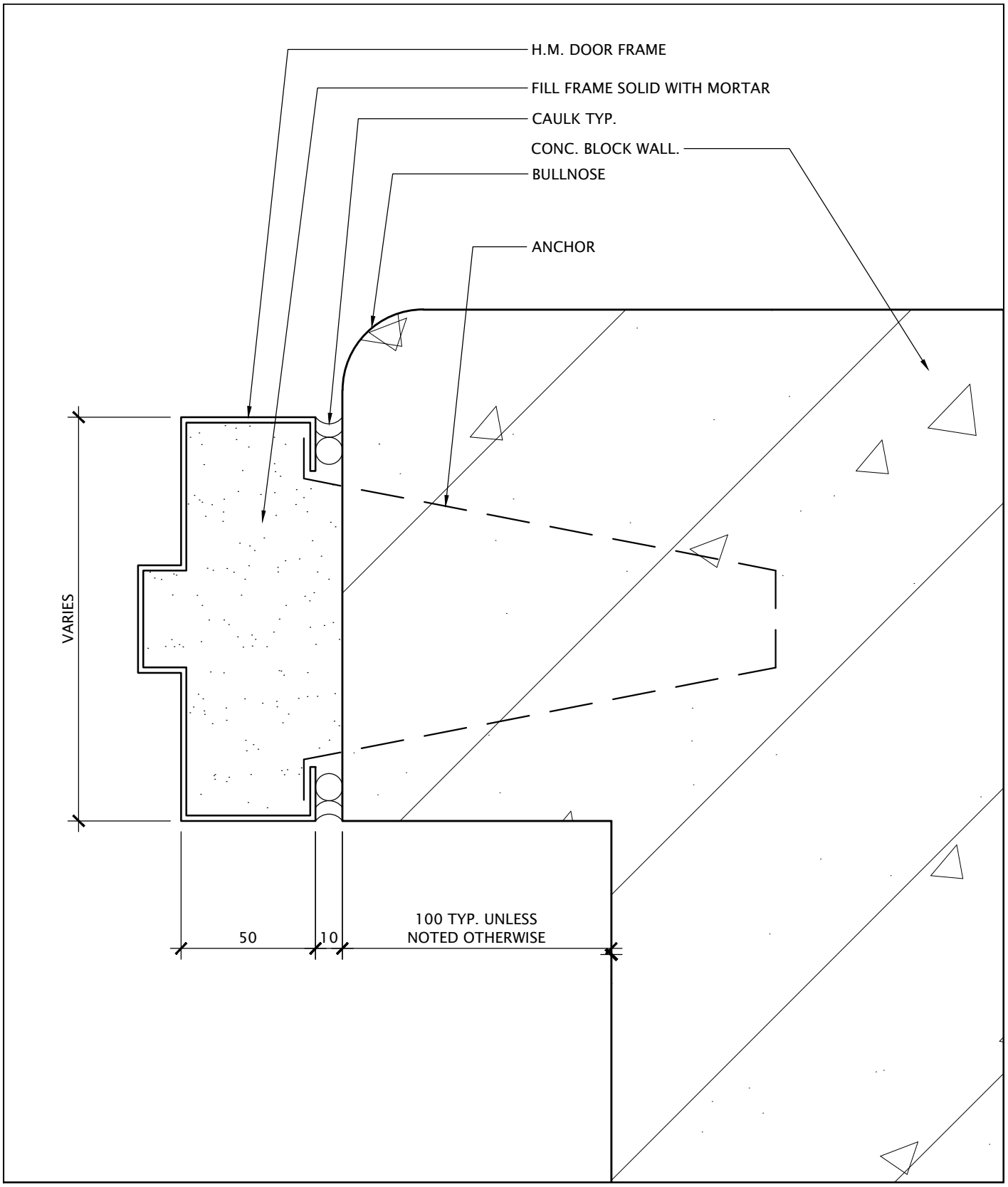
Toronto, Ontario M6K 3J1
ph 416.203.7799
fax 416.203.7763

ISSUED:	DRAWING NAME: TYP. BULLNOSE BLOCK CORNER DETAIL	DATE: March 2024	SCALE: 1:5	
		DRAWN: K+	PROJECT NO: A23018	
	PROJECT NAME: Forest Heights C.I.	CHECKED: K+	DWG NO: 4-103	REV. 0



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ph 416.203.7799
fax 416.203.7763

ISSUED:

DRAWING NAME:
TYP. DOOR JAMB
AT BLOCK WALL

PROJECT NAME:
Forest Heights C.I.

DATE: March 2024

DRAWN: K+

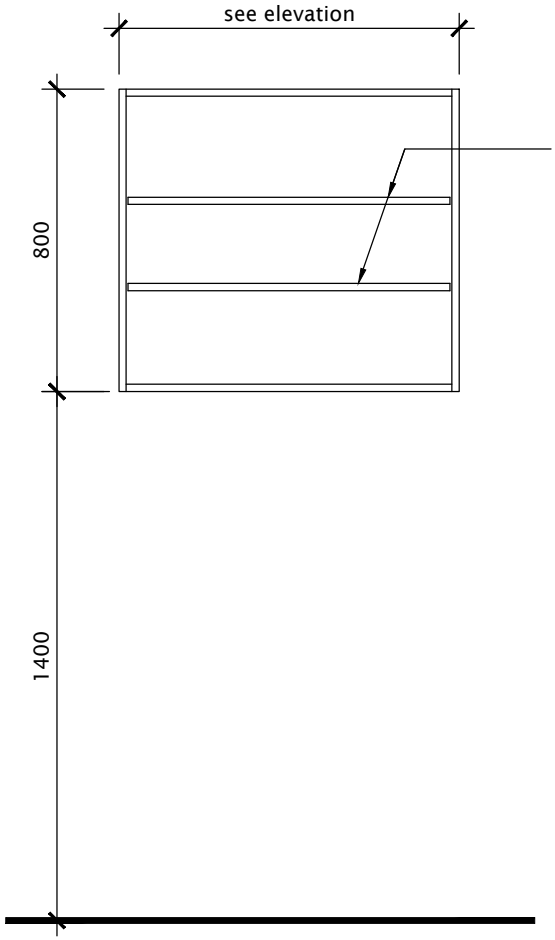
CHECKED:

SCALE: 1:2

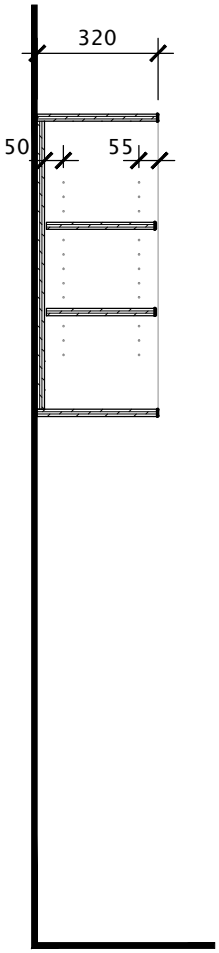
PROJECT NO: A23018

DWG NO: 4-107

REV. 0



ELEVATION



SECTION

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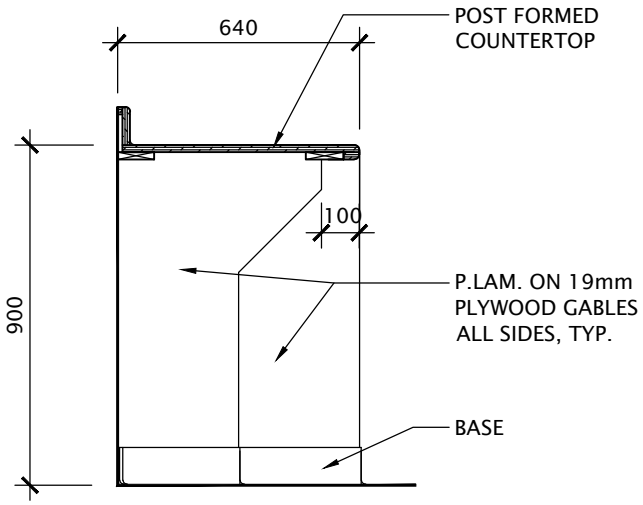
fax 416.203.7763

ISSUED:	DRAWING NAME: CABINET TYPES	DATE: March 2024	SCALE: 1:20	
		DRAWN: K+	PROJECT NO: A23018	
	PROJECT NAME: Forest Heights C.I.	CHECKED: K+	DWG NO: 6-203	REV. 0



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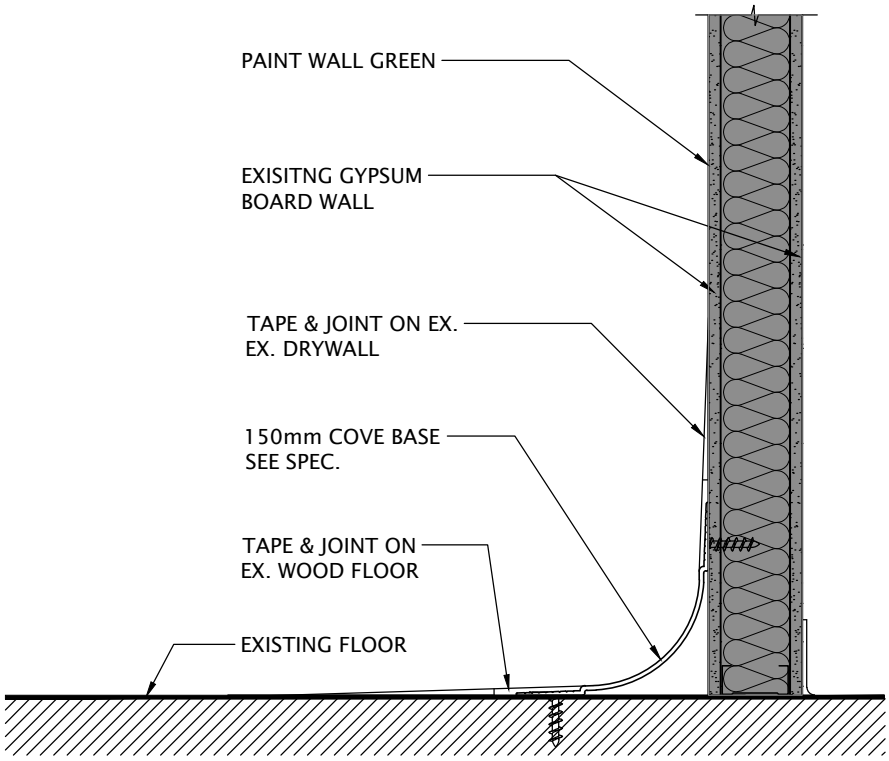
fax 416.203.7763

ISSUED:	DRAWING NAME: CABINET TYPES	DATE: March 2024	SCALE: 1:20
		DRAWN: K+	PROJECT NO: A23018
	PROJECT NAME: Forest Heights C.I.	CHECKED: K+	DWG NO: 6-601 / REV. 0



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Toronto, Ontario M6K 3J1
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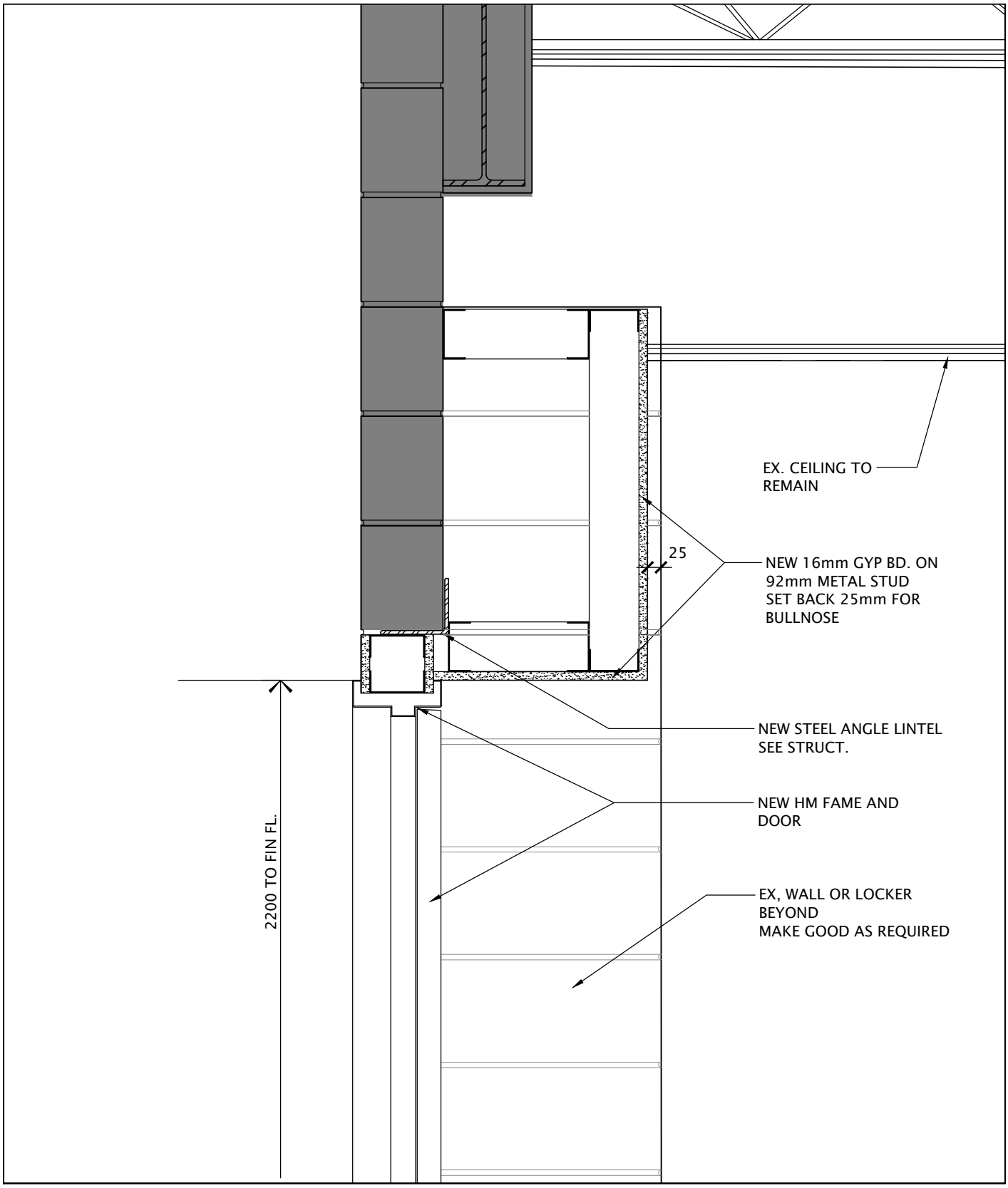
fax 416.203.7763

ISSUED:	DRAWING NAME: COVE BASE DETAIL	DATE: March 2024	SCALE: 1:10	
		DRAWN: K+	PROJECT NO: A23018	
	PROJECT NAME: Forest Heights C.I.	CHECKED: K+	DWG NO: 7-101	REV. 0



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ph 416.203.7799
fax 416.203.7763

ISSUED:

DRAWING NAME:
SECTION DETAIL AT
NEW DOOR

PROJECT NAME:
Forest Heights C.I.

DATE: March 2024

DRAWN: K+

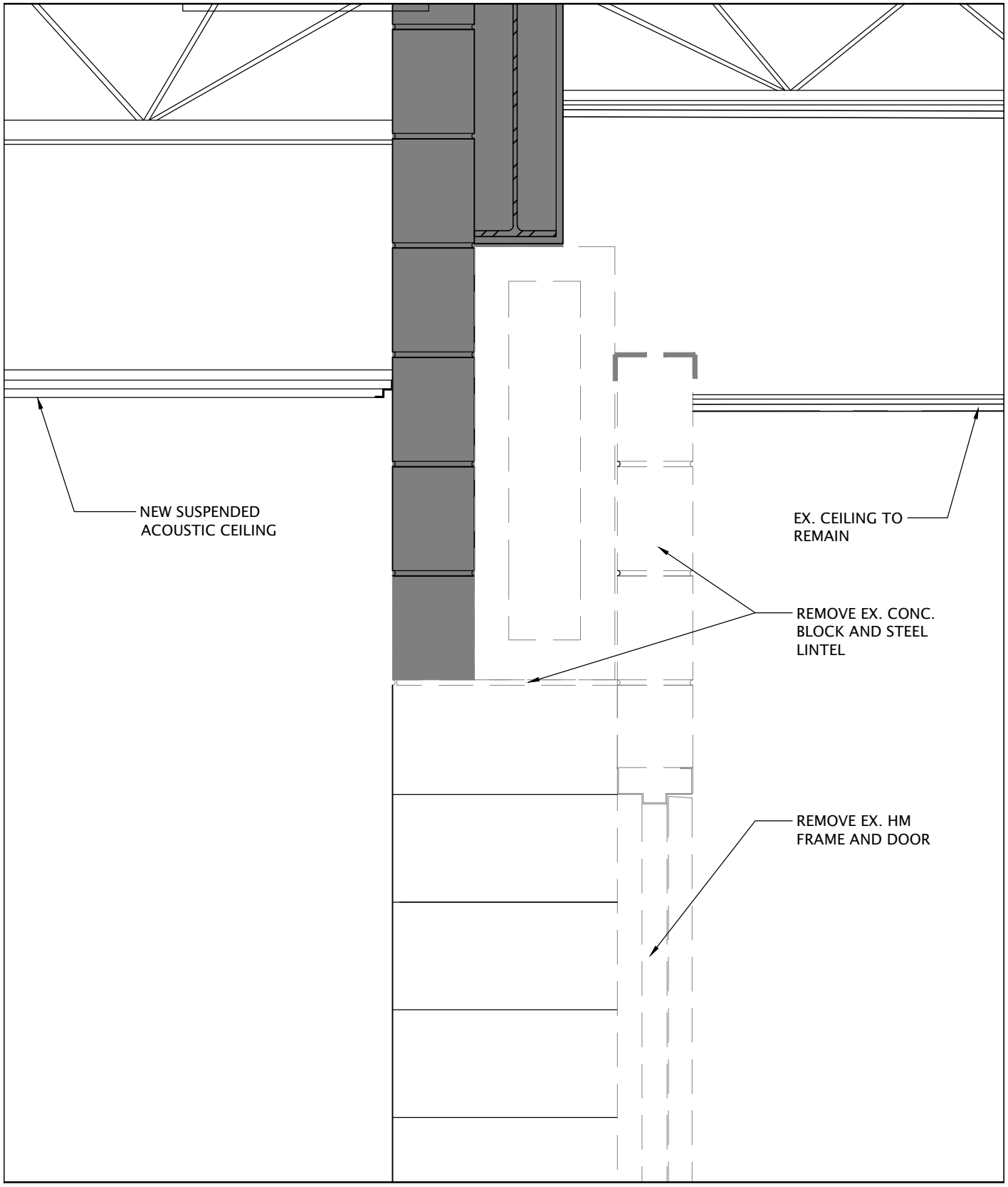
CHECKED: K+

SCALE: 1:5

PROJECT NO: A23018

DWG NO: 7-102

REV.



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ARCHITECTS INC.

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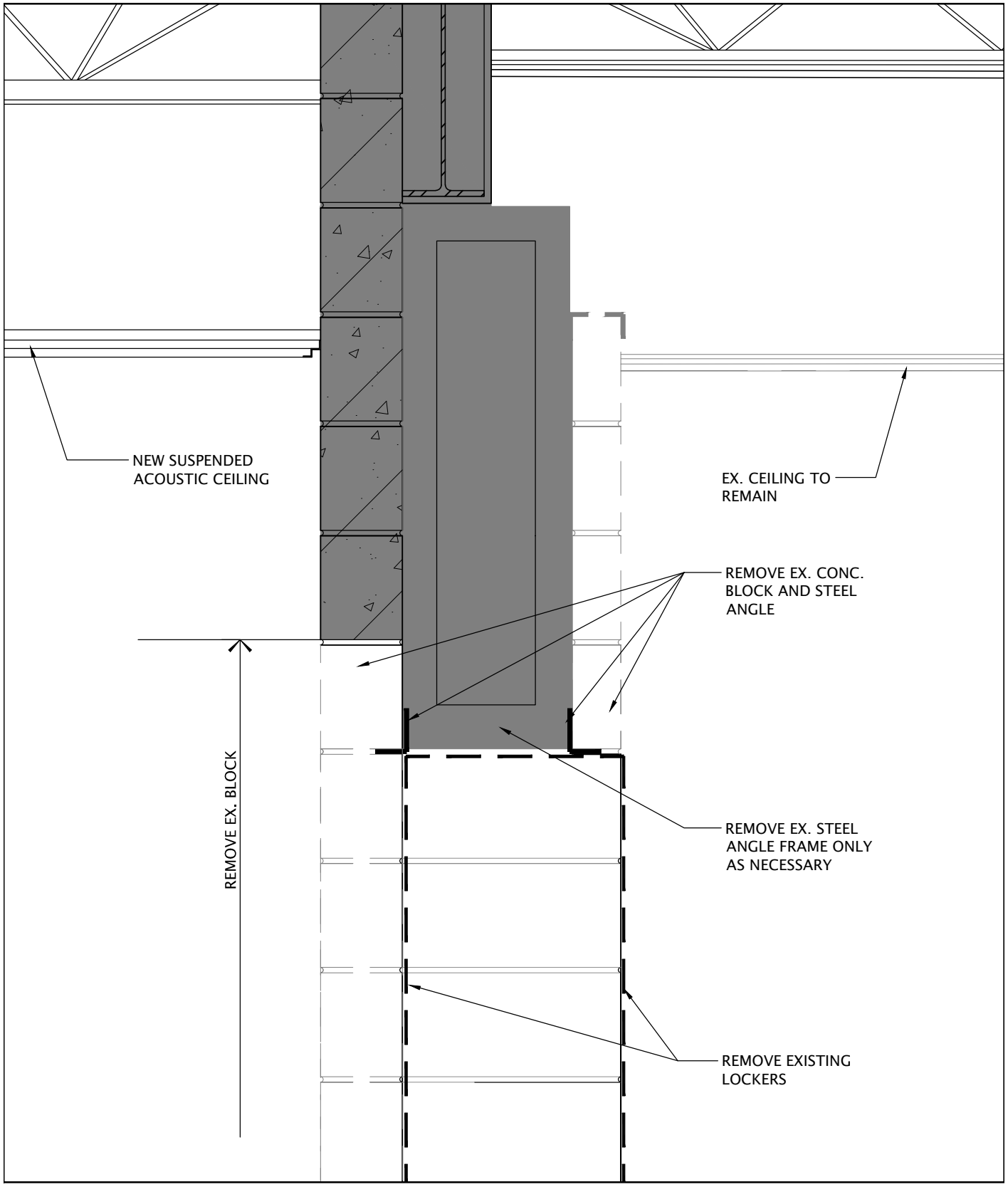
219 Dufferin Street , Suite 308b
Toronto, Ontario M6K 3J1
ph 416.203.7799
fax 416.203.7763

ISSUED:	DRAWING NAME: EXISTING CONDITION AT DOOR REMOVE EXISTING DOOR	DATE: March 2024	SCALE: 1:10
		DRAWN: K+	PROJECT NO: A23018
	PROJECT NAME: Forest Heights C.I.	CHECKED: K+	DWG NO: 7-103 / REV.



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219 Dufferin Street , Suite 308b
Toronto, Ontario M6K 3J1
ph 416.203.7799
fax 416.203.7763

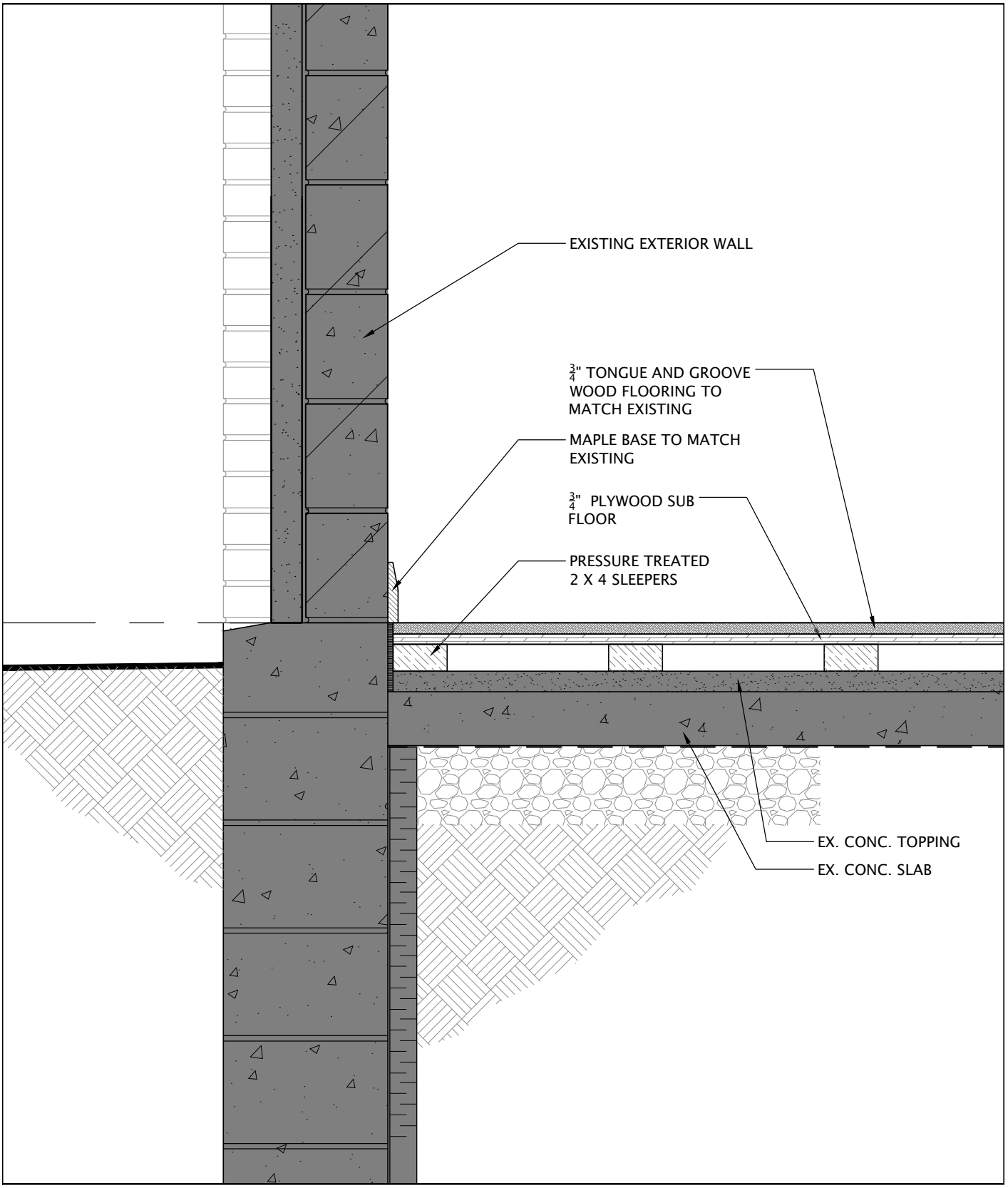
ISSUED:

DRAWING NAME:
EXISTING CONDITION AT LOCKERS
REMOVE EXISTING LOCKERS

PROJECT NAME:
Forest Heights C.I.

DATE: March 2024
DRAWN: K+
CHECKED: K+

SCALE: 1:10
PROJECT NO: A23018
DWG NO: 7-104
REV.



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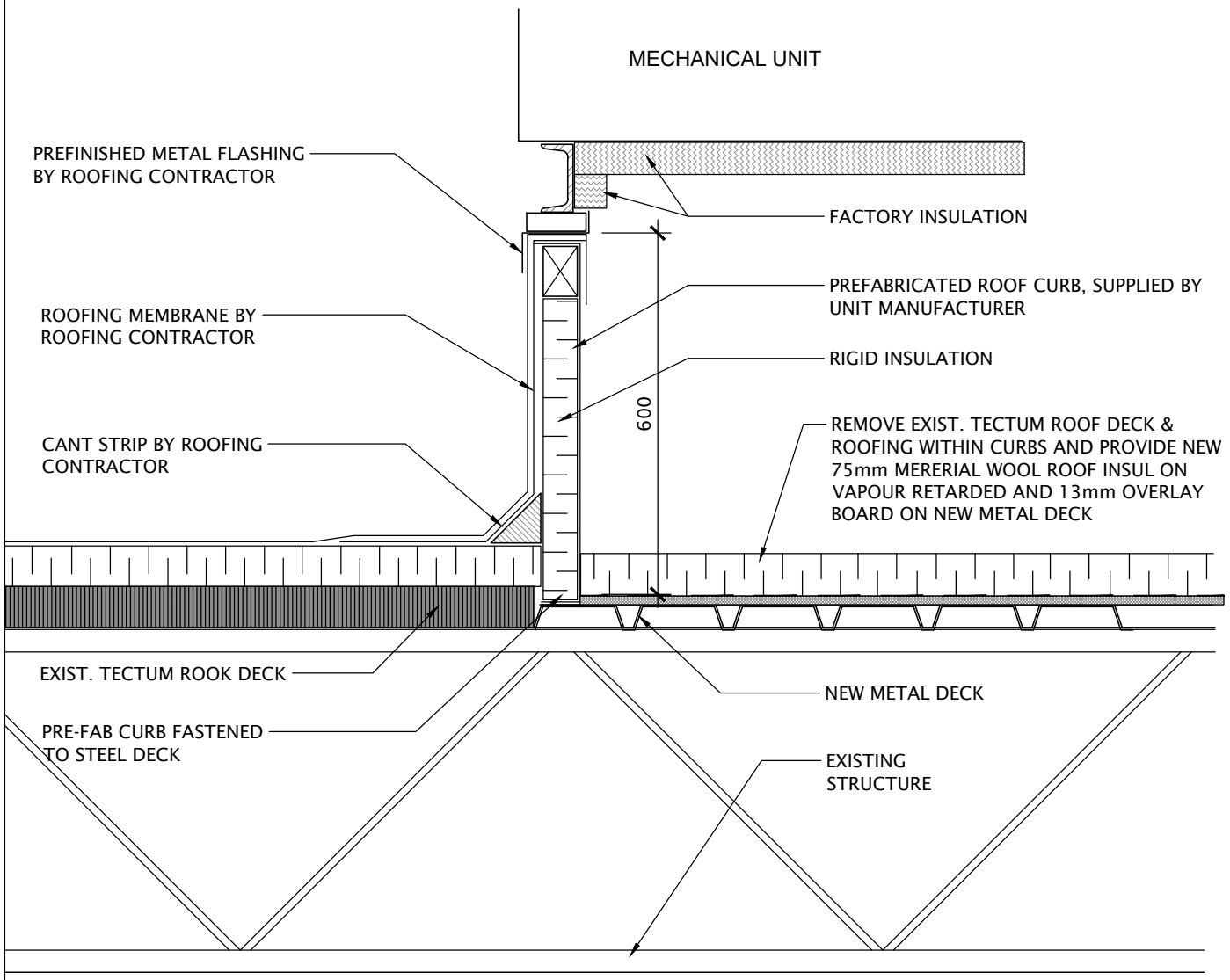
Toronto, Ontario M6K 3J1
ph 416.203.7799
fax 416.203.7763

ISSUED:	DRAWING NAME: NEW WOOD FLOOR AND BASE DETAIL	DATE: March 2024	SCALE: 1:10
		DRAWN: K+	PROJECT NO: A23018
	PROJECT NAME: Forest Heights C.I.	CHECKED: K+	DWG NO: 7-105 / REV.



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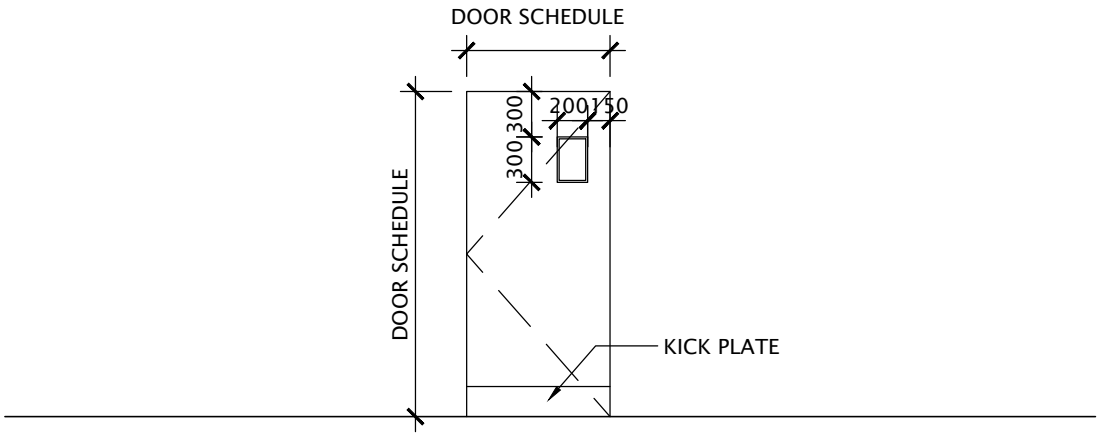
ph 416.203.7799
fax 416.203.7763

ISSUED:	DRAWING NAME: MECHANICAL ROOF TOP UNIT CURB DETAIL	DATE: March 2024	SCALE: 1:10	
		DRAWN: K+	PROJECT NO: A23018	
	PROJECT NAME: Forest Heights C.I.	CHECKED: K+	DWG NO: 7-106	REV.



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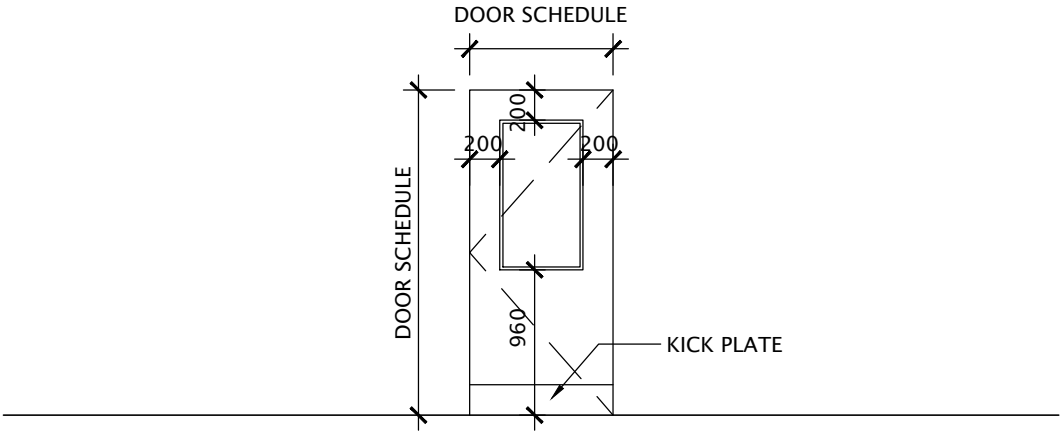

B

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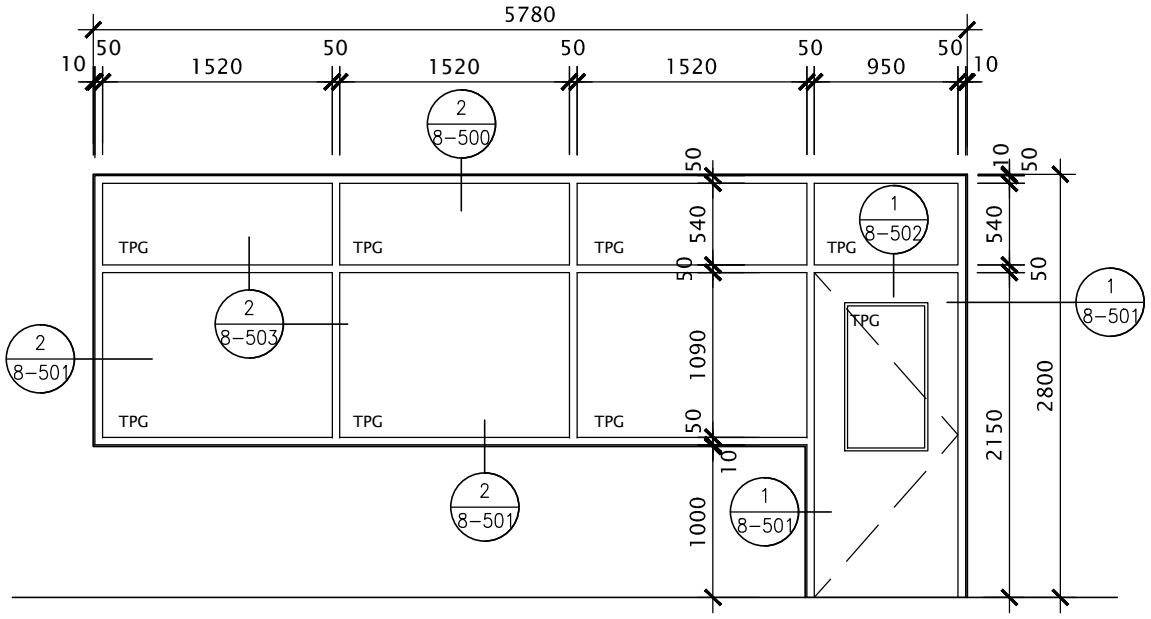
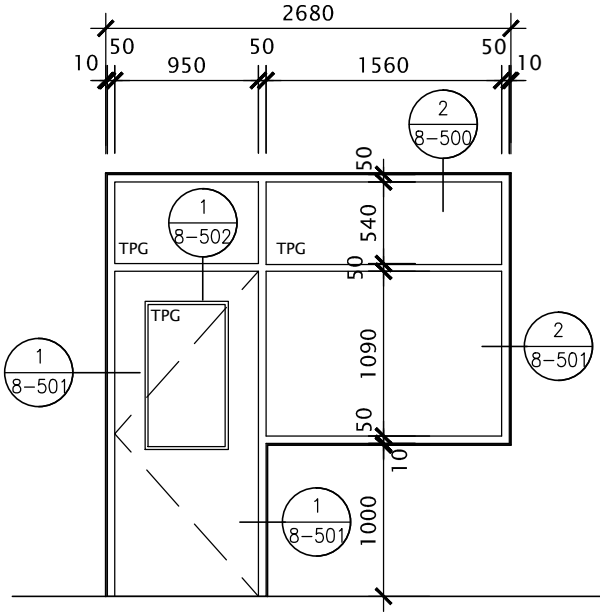
219 Dufferin Street , Suite 308b
Toronto, Ontario M6K 3J1
ph 416.203.7799
fax 416.203.7763

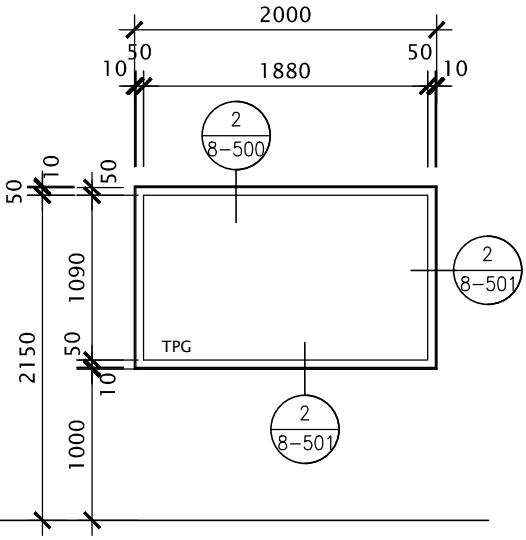
ISSUED:	DRAWING NAME: DOOR TYPES	DATE: April 2021	SCALE: 1:50	
		DRAWN: K+	PROJECT NO: A20017	
	PROJECT NAME: Forest Heights C.I.	CHECKED:	DWG NO: 8-400	REV. 0



S1

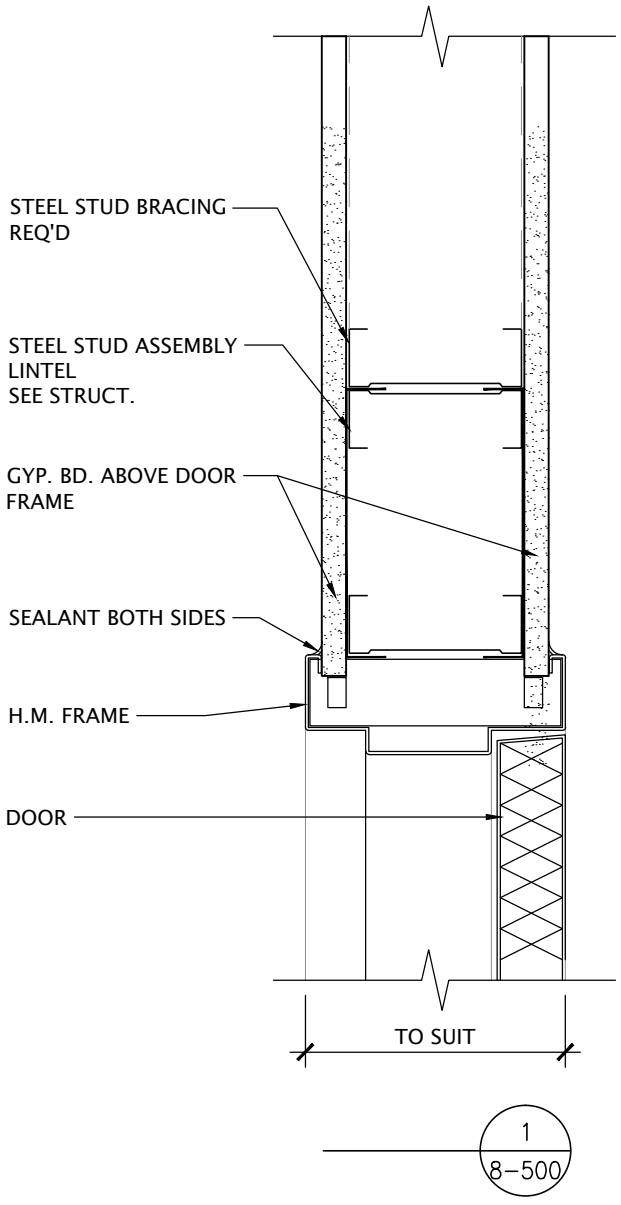


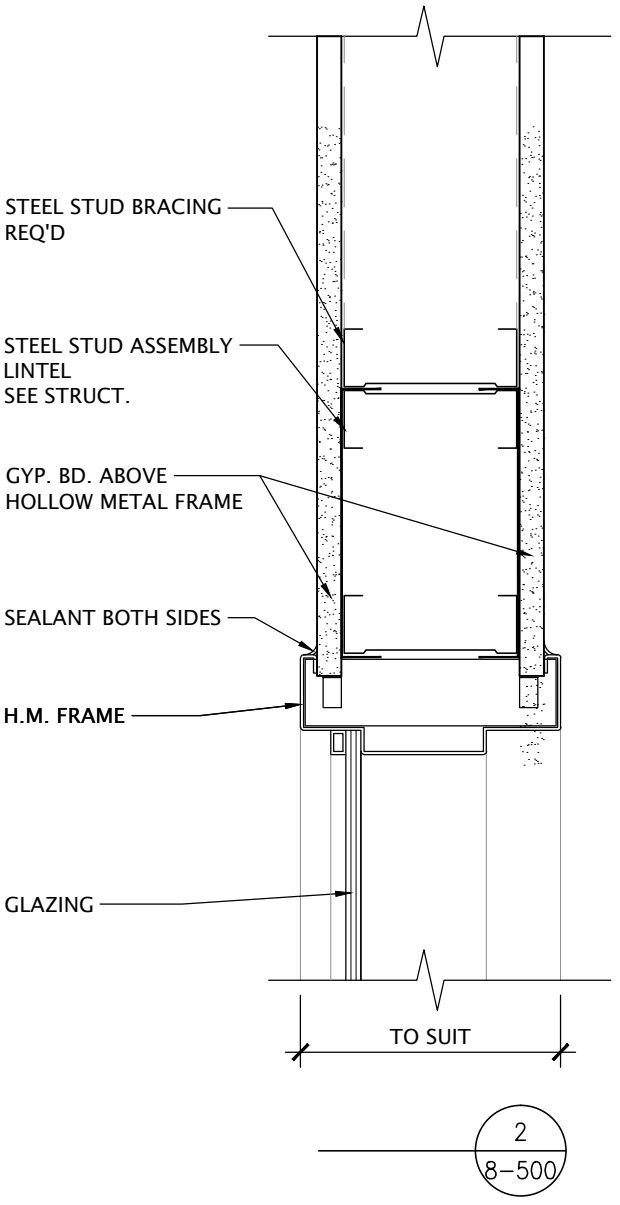
S2



S3

Kingsland + ARCHITECTS INC.	ISSUED:	DRAWING NAME: SCREEN TYPES	DATE: April 2021	SCALE: 1:50	
			DRAWN: K+	PROJECT NO: A20017	
KINGSLAND + ARCHITECTS INC 219 Dufferin Street , Suite 308b Toronto, Ontario M6K 3J1 ph 416.203.7799 fax 416.203.7763		PROJECT NAME: Forest Heights C.I.	CHECKED:	DWG NO: 8-400	REV. 0





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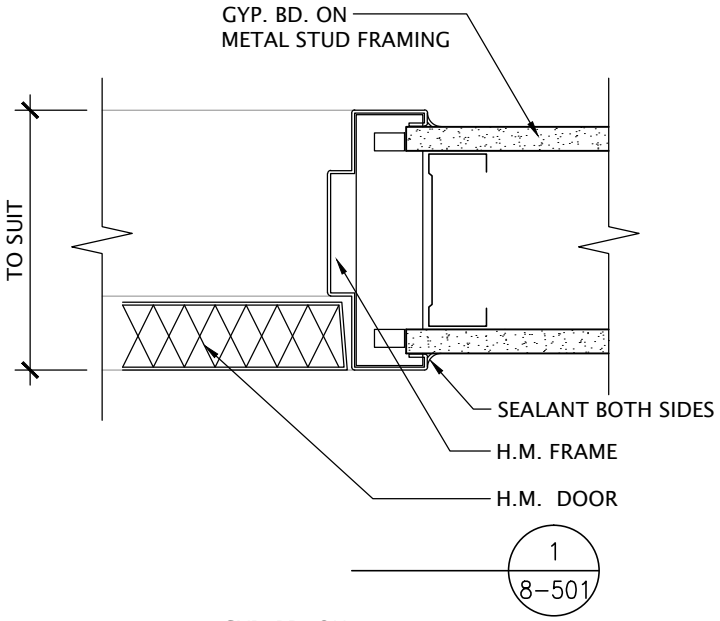
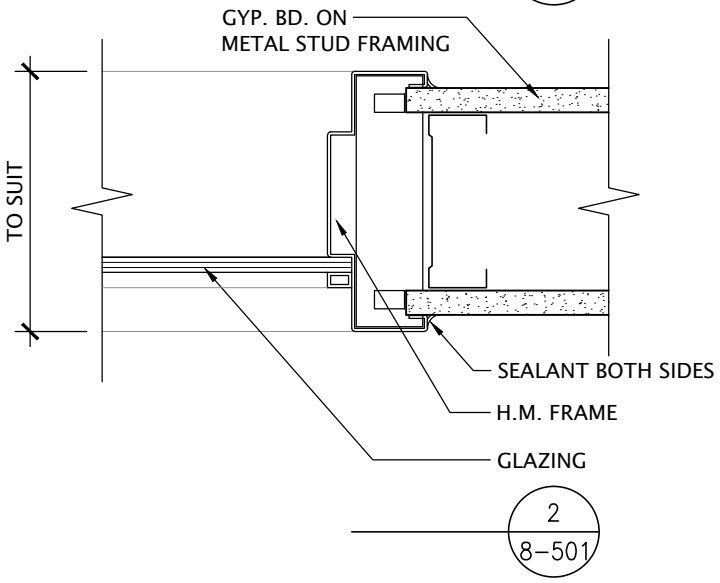
Toronto, Ontario M6K 3J1
ph 416.203.7799
fax 416.203.7763

ISSUED:	DRAWING NAME: HOLLOW METAL FRAME DETAILS	DATE: March 2024	SCALE: 1:5	
		DRAWN: K+	PROJECT NO: A23018	
	PROJECT NAME: Forest Heights C.I.	CHECKED: K+	DWG NO: 8-500	REV.





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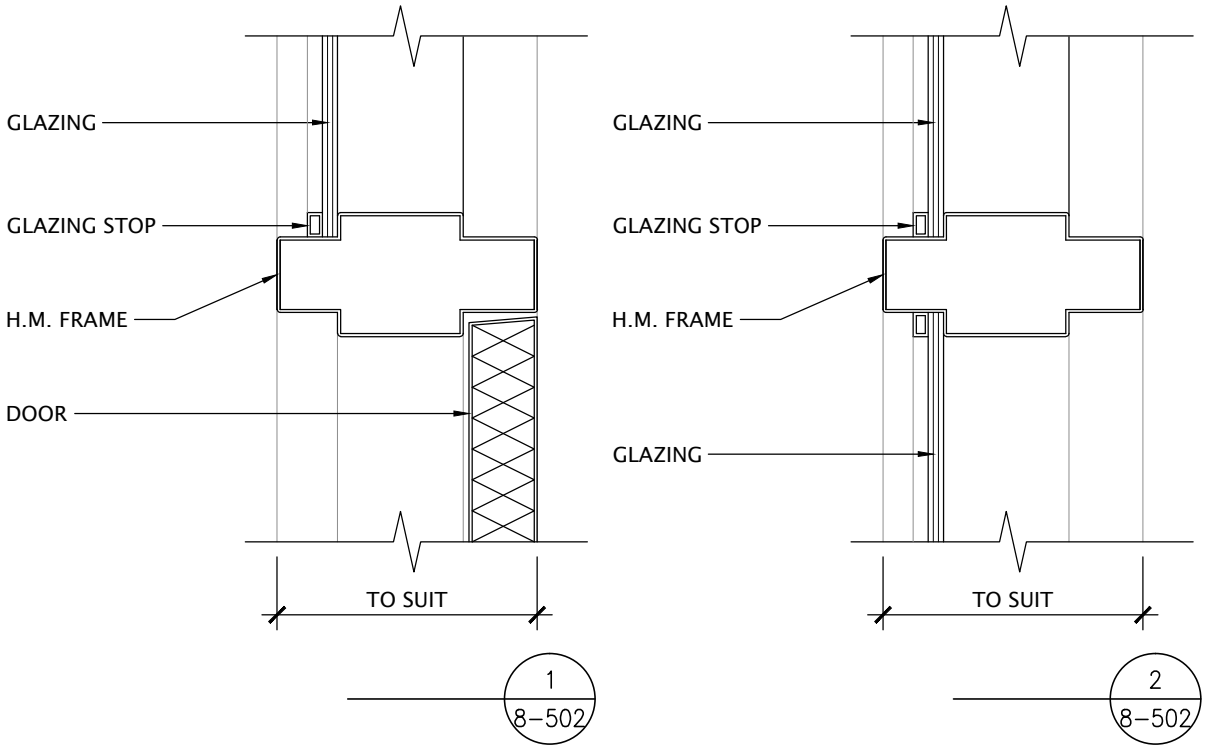
Toronto, Ontario M6K 3J1
ph 416.203.7799
fax 416.203.7763

ISSUED:	DRAWING NAME: HOLLOW METAL FRAME DETAILS	DATE: March 2024	SCALE: 1:5	
		DRAWN: K+	PROJECT NO: A23018	
	PROJECT NAME: Forest Heights C.I.	CHECKED: K+	DWG NO: 8-501	REV.



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ph 416.203.7799
fax 416.203.7763

ISSUED:	DRAWING NAME: HOLLOW METAL FRAME DETAILS	DATE: March 2024	SCALE: 1:5	
		DRAWN: K+	PROJECT NO: A23018	
	PROJECT NAME: Forest Heights C.I.	CHECKED: K+	DWG NO: 8-502	REV.

WRDSB – Details of Architectural Woodwork Standards

AW001	Elevations / Sections – Materials Legend
AW002	Fillers Details
AW003	Sample Setbacks of Panels and Shelves
AW004	Toe Tick Detail
AW051	Upper Cabinet – 400 – Elevation
AW053	Upper Cabinet – Section
AW054	Small Upper Cabinet – Elevation
AW055	Small Upper Cabinet – Section
AW102	Lower Cabinet – 800 Wide – Elevation
AW103	Lower Cabinet – Section
AW104	Lower Cabinet with Double Sink – Elevation
AW106	Lower Cabinet with Sink – Section
AW117	Lower Cabinet with Drawers – Elevation
AW118	Lower Cabinet with Drawers – Section
AW125	Lower Counter – Elevation
AW126	Lower Counter - Section
AW207	Low Bookshelf - Elevation
AW209	Low Bookshelf – Section
AW305	Teachers Closets – Type 3 – 2 Doors – Elevation
AW306	5 Shelf Storage Cabinet 800 - Section
AW333	Teachers Closets – Type 4 – 2 Doors – Elevation
AW334	Teachers Closets – Type 4 – Cabinet 800 – Section

End of Section

ELEVATIONS / SECTIONS

MATERIAL LEGEND:

MATERIALS LEGEND

1. DISPLAY CASE
2. 100 HIGH RUBBER BASE TOE KICK ON 19 VENEER CORE PLYWOOD
3. 19mm MELAMINE PANEL OPEN STORAGE c/w 5 ADJUSTABLE SHELVES
4. 19mm MELAMINE PANEL DRAWER FRONT c/w 3mm PVC EDGES. REFER TO SPEC FOR DRAWER SLIDERS AND DRAWER CONSTRUCTION (METABOX)
5. 19mm MELAMINE GABLE PANEL c/w 3mm PVC ON ALL EXPOSED EDGES AND PIN HOLES FOR 19mm ADJUSTABLE SHELVES AS SHOWN
6. 19mm MELAMINE PANEL BANK OF 4 DRAWERS
7. POST FORMED PLASTIC LAMINATE COUNTERTOP c/w 76 HIGH BACKSPLASH ON STOCK
8. GYPSUM BOARD BULKHEAD
9. 19mm MELAMINE PANEL UPPER CABINETS c/w FINISHED END GABLES WHERE REQUIRED AND ADJUSTABLE SHELVES AS SHOWN
10. 80 HIGH MELAMINE PANEL VALANCE x 19mm
11. STAINLESS STEEL SINGLE SINK
12. PLASTIC LAMINATE SEPARATE BACKSPLASH ON 19mm PLYWOOD
13. 19mm MELAMINE COUNTERTOP C/W 3mm PVC ON ALL EXPOSED EDGES AND BETWEEN BUTT JOINT EDGES
14. DISHWASHER
15. 19mm MELAMINE ADJUSTABLE SHELF WITH 3mm PVC EDGES
16. 16mm MELAMINE BACK c/w 3mm PVC EDGE WHERE EXPOSED
17. 19mm MELAMINE TOP, BOTTOM c/w 3mm PVC EDGE
18. ENAMELLED STEEL VANITY LAVATORY
19. LOCKABLE CASTERS REFER TO SPEC.
20. PLASTIC LAMINATE POST FORMED WORKSURFACE ON MELAMINE PANEL INTERMEDIATE GABLES
21. PLASTIC LAMINATE POST FORMED COUNTERTOP AND MELAMINE PANEL OPEN STORAGE c/w FINISHED GABLE END WHERE REQUIRED AND ADJUSTABLE SHELVES AS SHOWN
22. 19mm MELAMINE FIXED SHELF c/w 3mm PVC EDGE
23. 19mm MELAMINE DOOR c/w 3mm PVC EDGE ON ALL EXPOSED EDGES
24. 19mm MELAMINE PANEL c/w 3mm PVC EDGE ON ALL EXPOSED EDGES
25. 16mm MELAMINE PANEL c/w 3mm PVC EDGE ON ALL EXPOSED EDGES FRAME
26. 16mm FIXED MELAMINE PANEL/SHELF c/w 3mm PVC EDGE ON ALL EXPOSED EDGES
27. PLASTIC LAMINATE POST FORMED COUNTERTOP AND MELAMINE PANEL GABLES
28. PLASTIC LAMINATE ON 19mm PLYWOOD
29. 25mm MELAMINE WITH PVC EDGE AT FRONT FACE AND EACH FACE OF THE JOINTS IN THE COUNTER TOP
30. 38mm X 89mm SOLID HARDWOOD SUPPORT
31. SINGLE 19mm MELAMINE GABLE C/W 1/8" PVC EDGE
32. TRIPLE 19mm MELLAMINE GABLE SUPPORT C/W 3mm PVC EDGE ON FRONT AND FLOOR EDGE AT APROX. 910mm O.C. MAX. WAFER AND SCREW TOGETHER.
33. ADJUSTABLE FEET SEE SPEC.
34. 51mm X 102mm OR 19mm PLYWOOD CONTINOUS BLOCKING ON WALL, PROVIDE WOOD BLOCKING AT ALL EDGE END WAL CONDITIONS.
35. 19mm HARDWOOD SCREW STRIP BETWEEN MELLAMINE GABLES.
36. PLYWOOD PANEL FILLER 19mm
37. 19mm VENEER CORE PLYWOOD CONTINOUS JOINTS TO BE AT GABLE LOCATIONS.

GENERAL NOTES:

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW080 FOR ADDITIONAL DETAILS.

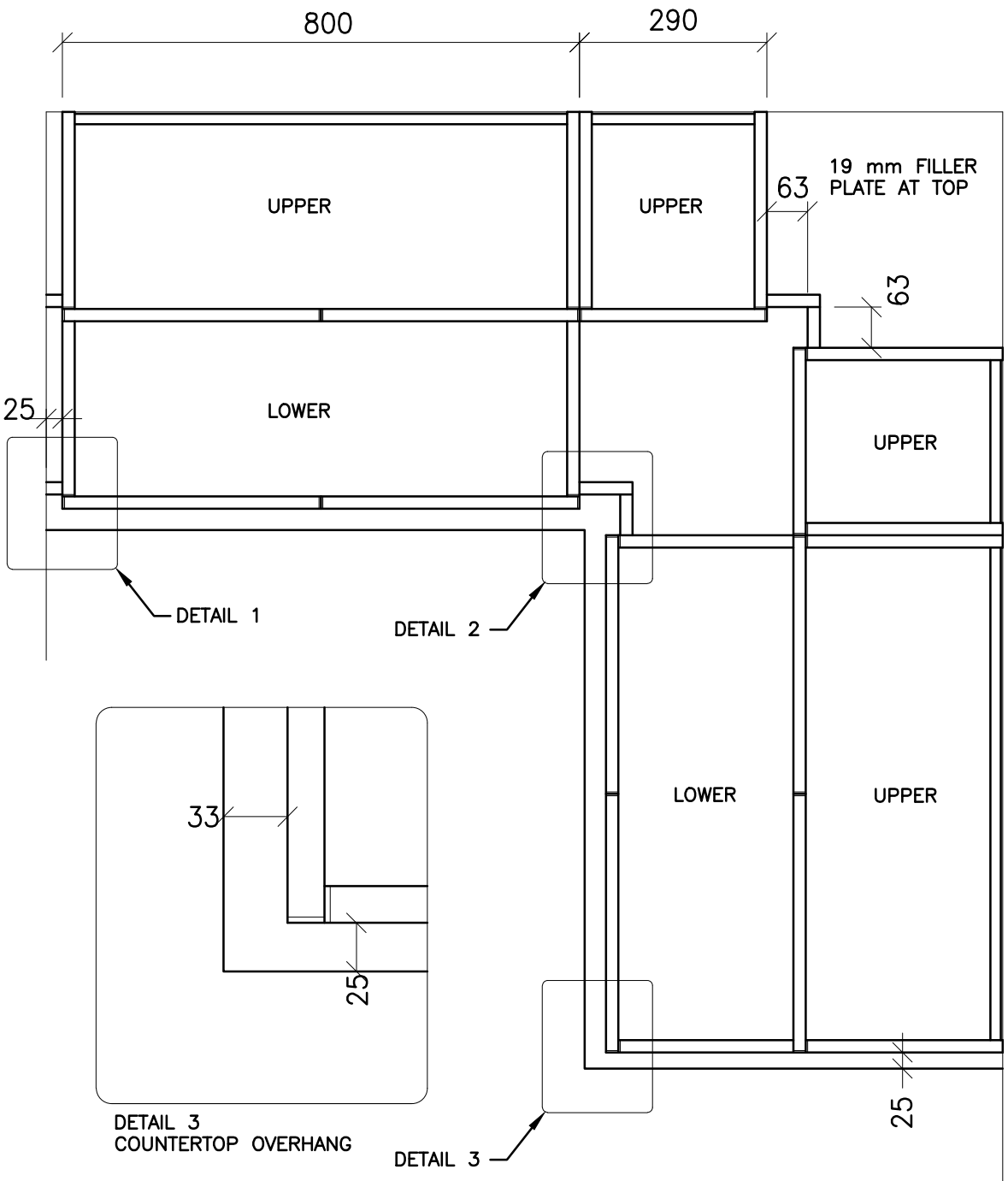
WATERLOO REGION DISTRICT SCHOOL BOARD

ARCHITECTURAL WOODWORK STANDARDS

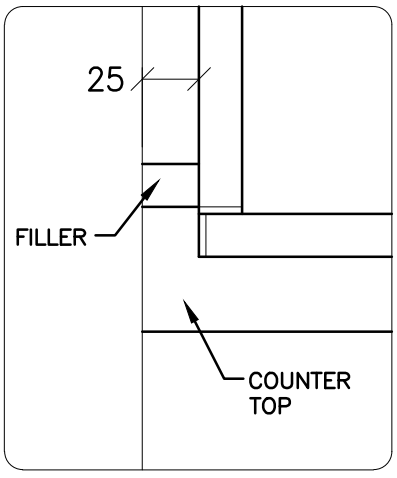
FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

LEGEND

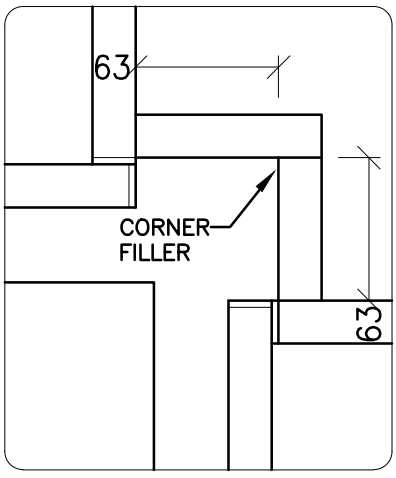
Status	–
Folder	–
File	–
Drawn By	–
Check By	–
Scale	N.T.S.
Date	March 2024
Last Plot	–
Job No.	–
Sheet No.	AW001



DETAIL 3
COUNTERTOP OVERHANG



DETAIL 1
WALL FILLERS



DETAIL 2
CORNER FILLER

THE CONTRACTOR SHALL VERIFY ALL DWGS. AGAINST THE ARCHITECTURAL WOODWORK DWGS. AND MUST REPORT ANY INCONSISTENCIES TO THE WRDSB BEFORE PROCEEDING WITH WORK.

GENERAL NOTES:

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW030 FOR ADDITIONAL DETAILS.

WATERLOO REGION DISTRICT SCHOOL BOARD

ARCHITECTURAL WOODWORK STANDARDS

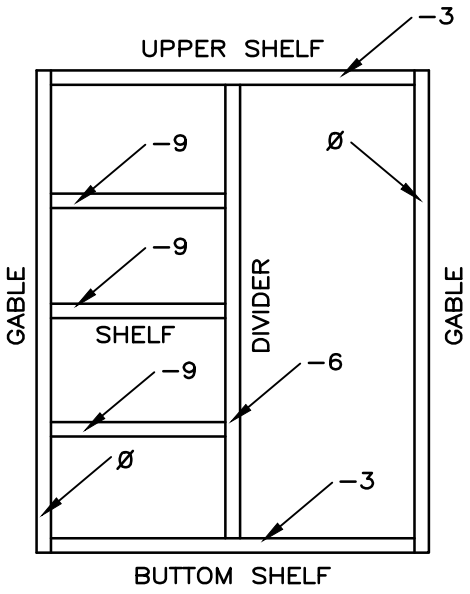
FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

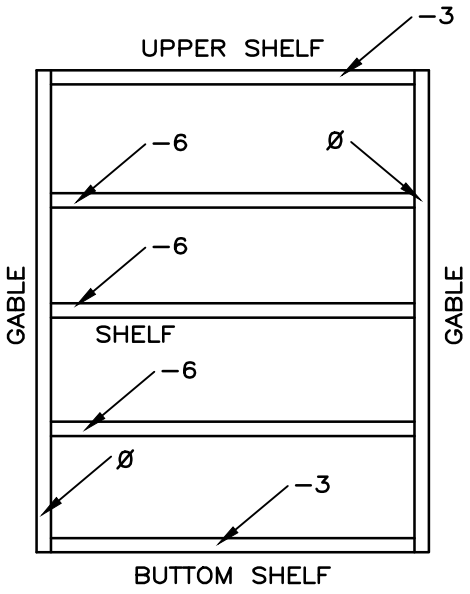
FILLERS

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW002.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	March 2024
Last Plot	1/24/2025 9:14 AM
Job No.	
Sheet No.	

AW002

SAMPLE SETBACKS OF PANELS AND SHELVES (STEPPED TO MATCH PVC EDGING)





GENERAL NOTES:

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW030 FOR ADDITIONAL DETAILS.

WATERLOO REGION DISTRICT SCHOOL BOARD

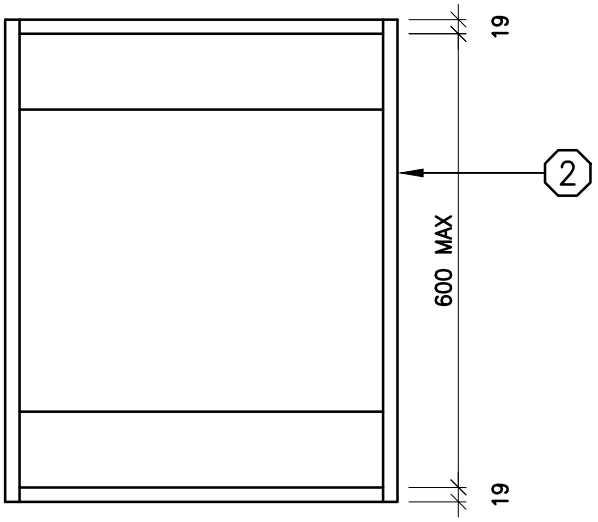
ARCHITECTURAL WOODWORK STANDARDS

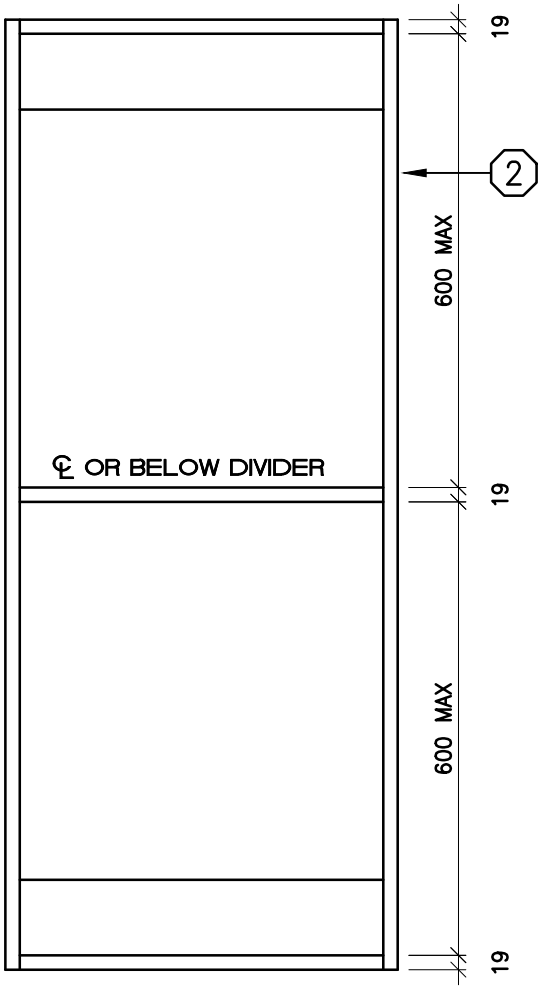
FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

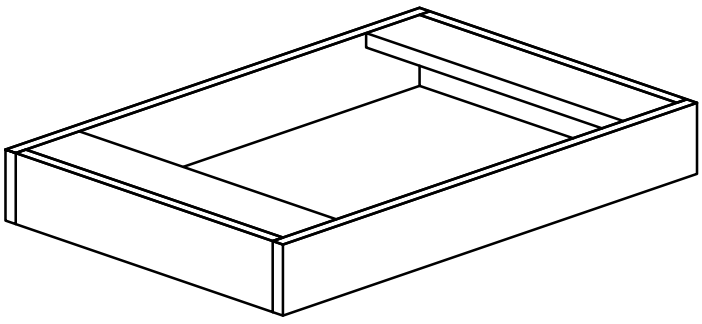
SAMPLE SETBACKS OF PANELS AND SHELVES

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW003.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	March 2024
Last Plot	1/24/2025 9:15 AM
Job No.	
Sheet No.	

AW003







GENERAL NOTES:

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW020 FOR ADDITIONAL DETAILS.

WATERLOO REGION DISTRICT SCHOOL BOARD

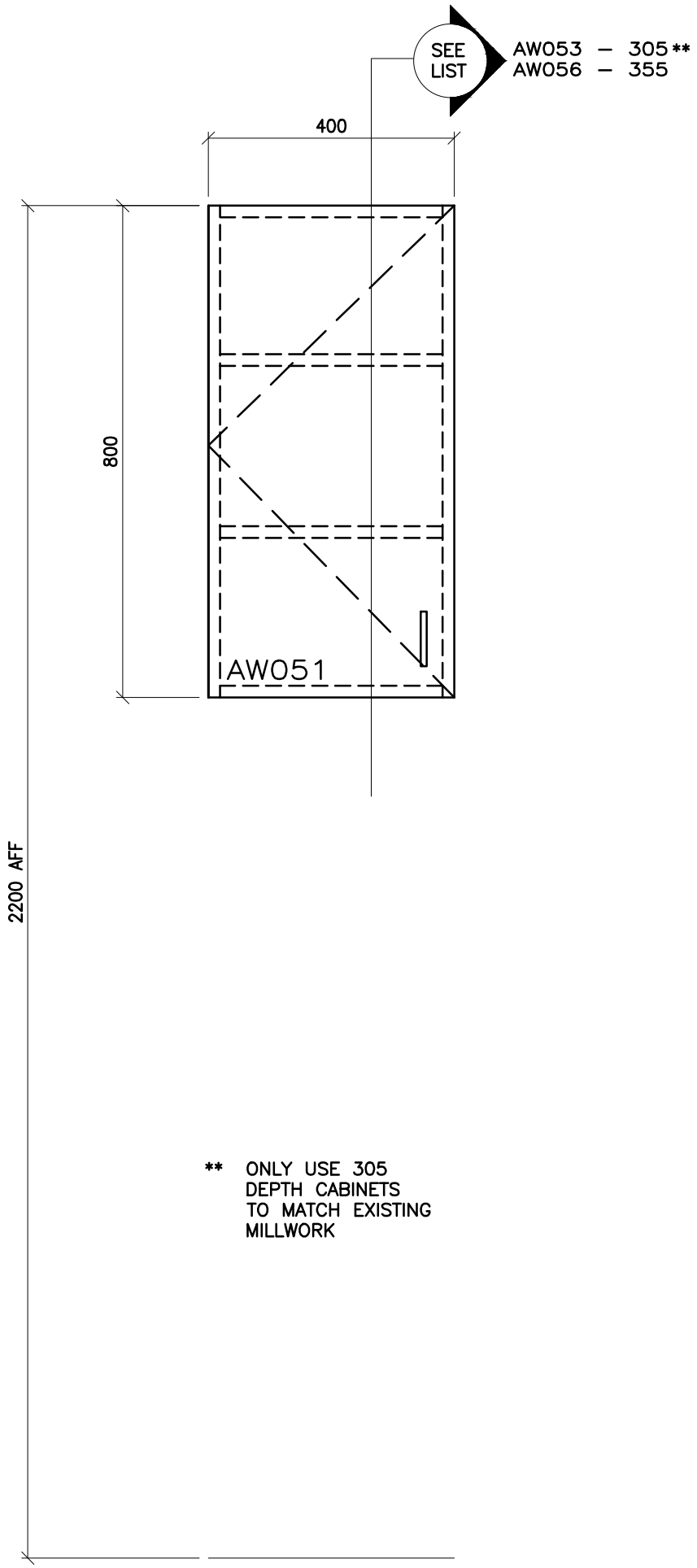
ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

TOE KICK DETAIL

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW004.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	March 2024
Last Plot	1/24/2025 9:15 AM
Job No.	
Sheet No.	

AW004



** ONLY USE 305 DEPTH CABINETS TO MATCH EXISTING MILLWORK

GENERAL NOTES:

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW030 FOR ADDITIONAL DETAILS.

STRIVE FOR EXCELLENCE
Waterloo Region District School Board

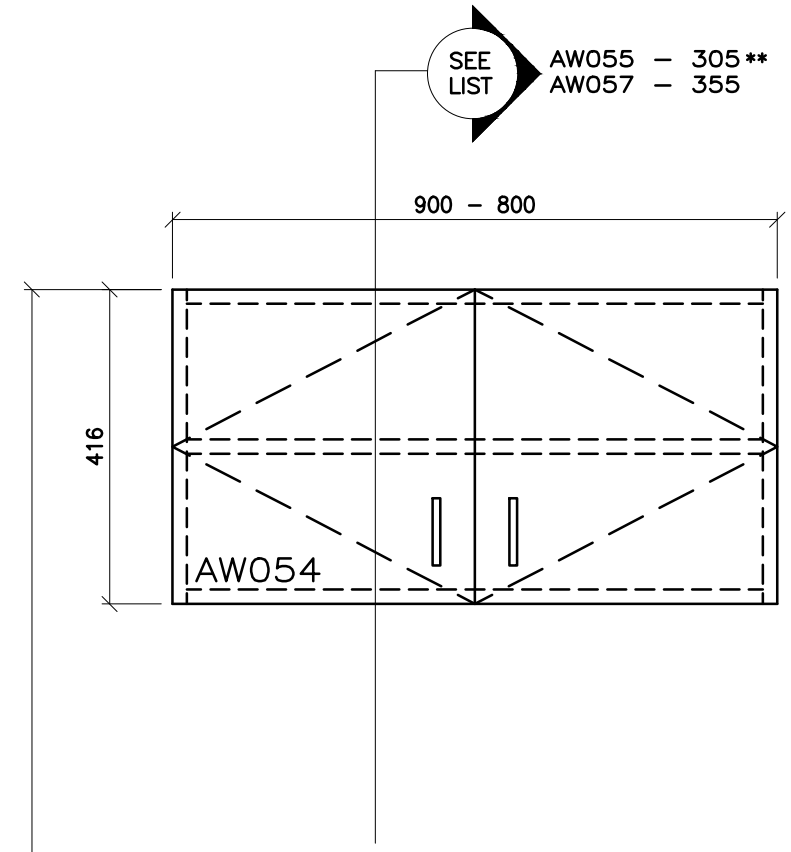
ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

UPPER CABINET - 400 - ELEVATION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW051.DWG
Drawn By	NST
Check By	SKA
Scale	1:10
Date	January 24
Last Plot	1/24/2025 9:15 AM
Job No.	
Sheet No.	

AW051



** ONLY USE 305 DEPTH CABINETS TO MATCH EXISTING MILLWORK

GENERAL NOTES:

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW030 FOR ADDITIONAL DETAILS.

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Waterloo Region District School Board

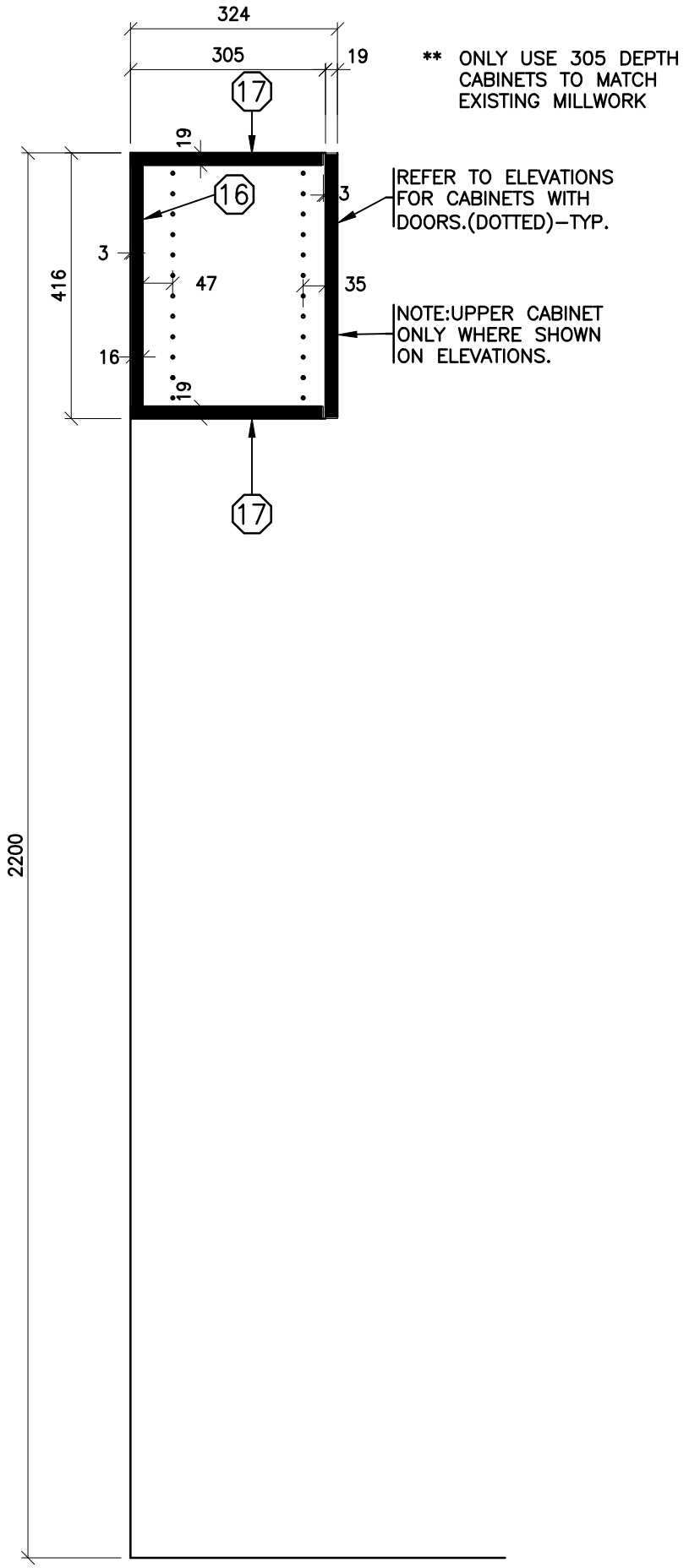
ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

SMALL UPPER CABINET - ELEVATION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW054.DWG
Drawn By	NST
Check By	SKA
Scale	1:10
Date	January 24
Last Plot	1/24/2025 9:15 AM
Job No.	
Sheet No.	

AW054



GENERAL NOTES:

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW020 FOR ADDITIONAL DETAILS.

STRIVE FOR EXCELLENCE
Waterloo Region District School Board

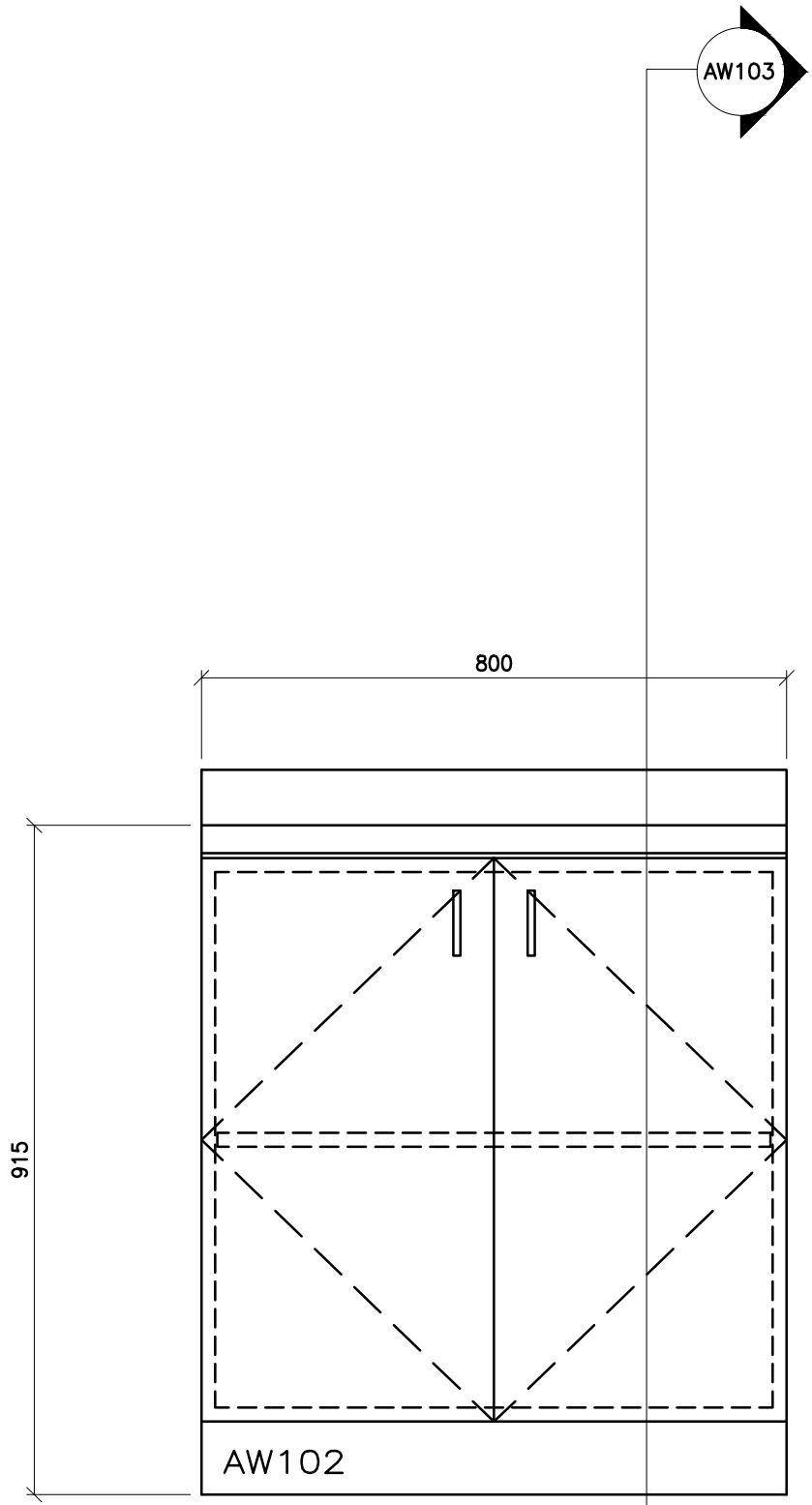
ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

SMALL UPPER CABINET - SECTION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW055.DWG
Drawn By	NST
Check By	SKA
Scale	1:10
Date	January 24
Last Plot	1/24/2025 9:15 AM
Job No.	
Sheet No.	

AW055



THE CONTRACTOR SHALL VERIFY ALL DWGS. AGAINST THE ARCHITECTURAL WOODWORK DWGS. AND MUST REPORT ANY INCONSISTENCIES TO THE WRDSB BEFORE PROCEEDING WITH WORK.

GENERAL NOTES:

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

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REFER TO AW002 TO AW080 FOR ADDITIONAL DETAILS.

WATERLOO REGION DISTRICT SCHOOL BOARD

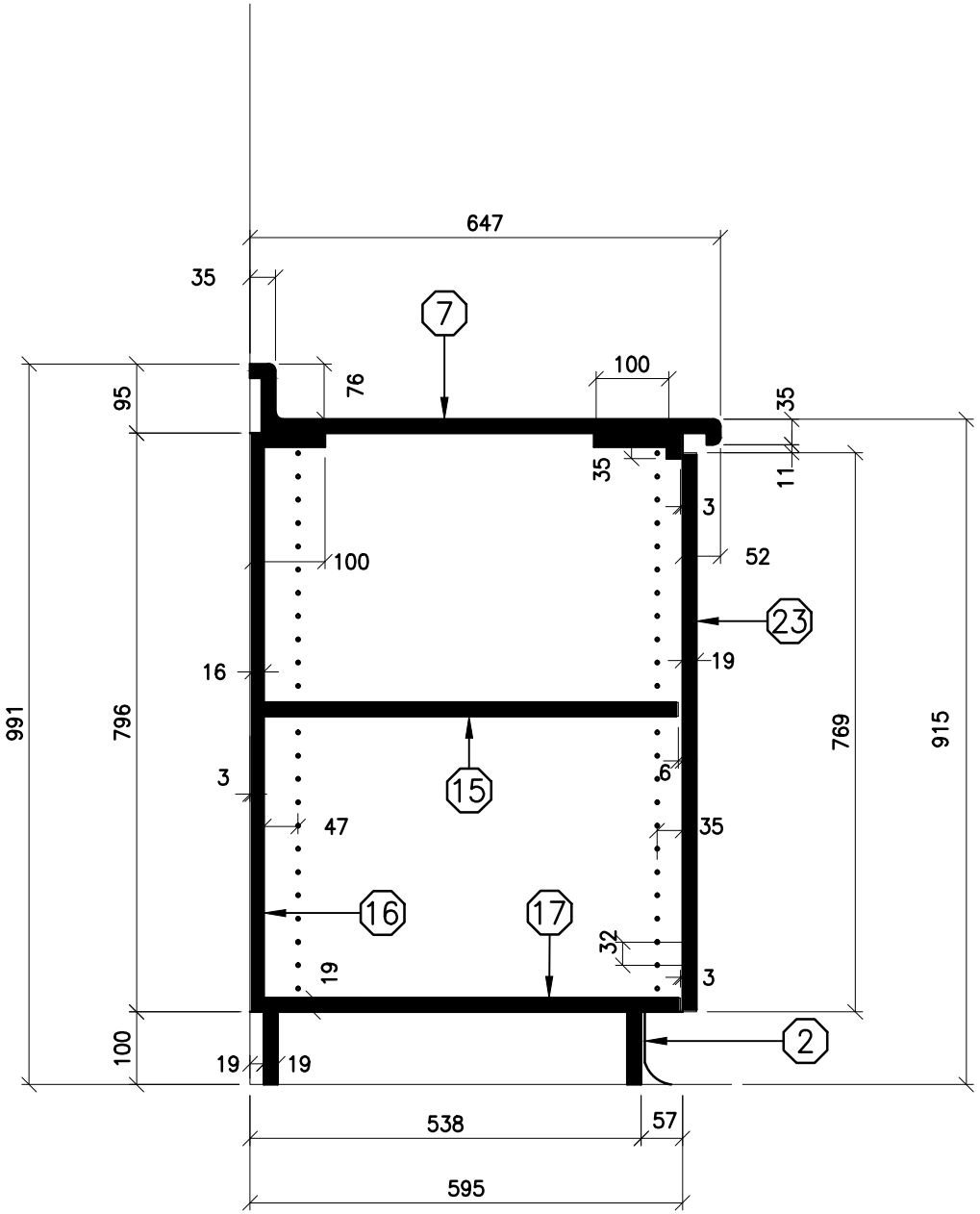
ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

LOWER CABINET-600 WIDE - ELEVATION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW102.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	January 2024
Last Plot	1/24/2025 9:15 AM
Job No.	
Sheet No.	

AW102



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GENERAL NOTES:

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REFER TO AW002 TO AW030 FOR ADDITIONAL DETAILS.

WATERLOO REGION DISTRICT SCHOOL BOARD

ARCHITECTURAL WOODWORK STANDARDS

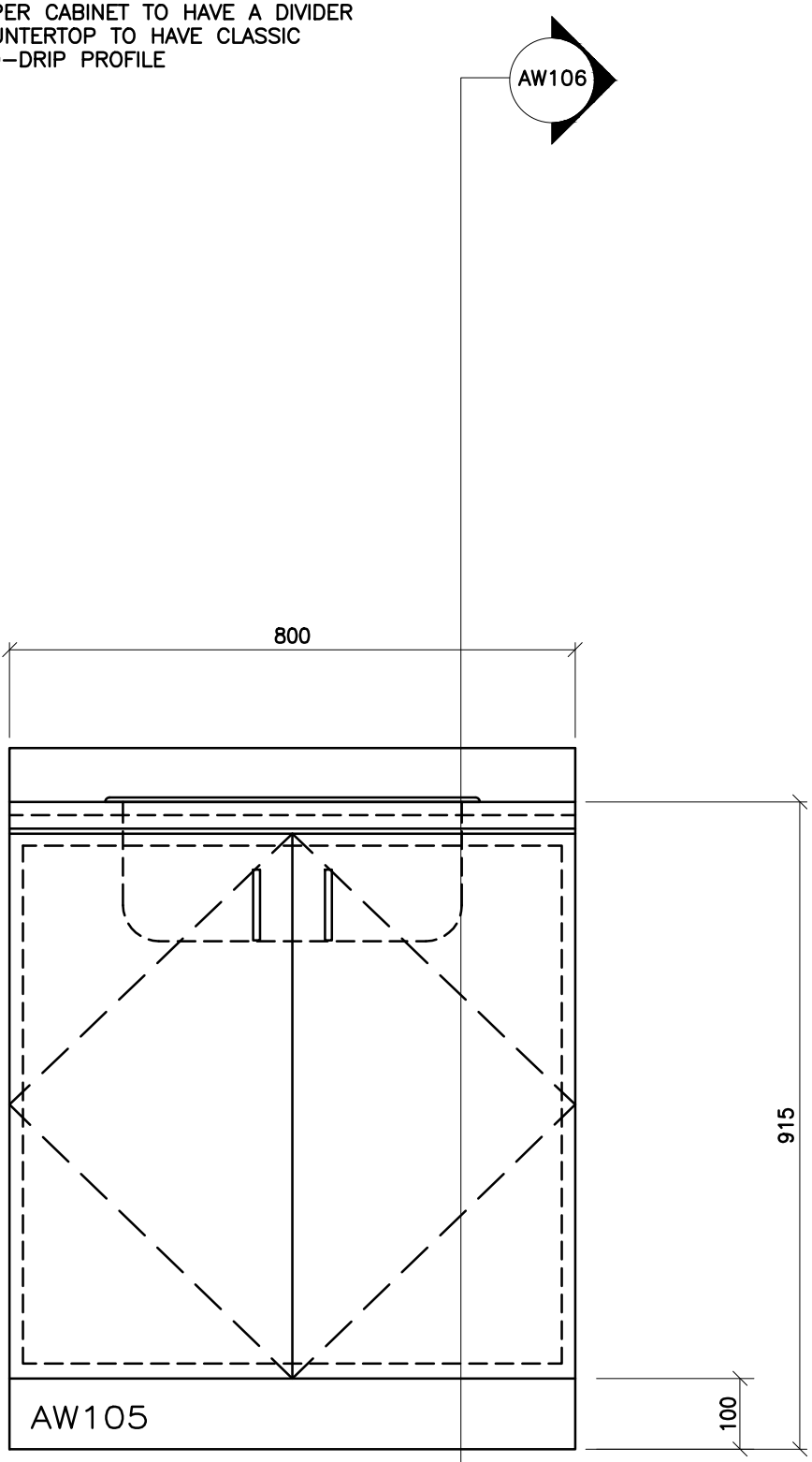
FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

LOWER CABINET - SECTION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW103.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	January 2024
Last Plot	1/24/2025 9:15 AM
Job No.	
Sheet No.	

AW103

-SINGLE SINK: 800 WIDE
-DOUBLE SINK: 863 WIDE MINIMUM,
USE 900 WIDE CABINET
-UPPER CABINET TO HAVE A DIVIDER
-COUNTERTOP TO HAVE CLASSIC
NO-DRIP PROFILE



GENERAL NOTES:

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW030 FOR ADDITIONAL DETAILS.

WATERLOO REGION DISTRICT SCHOOL BOARD

ARCHITECTURAL WOODWORK STANDARDS

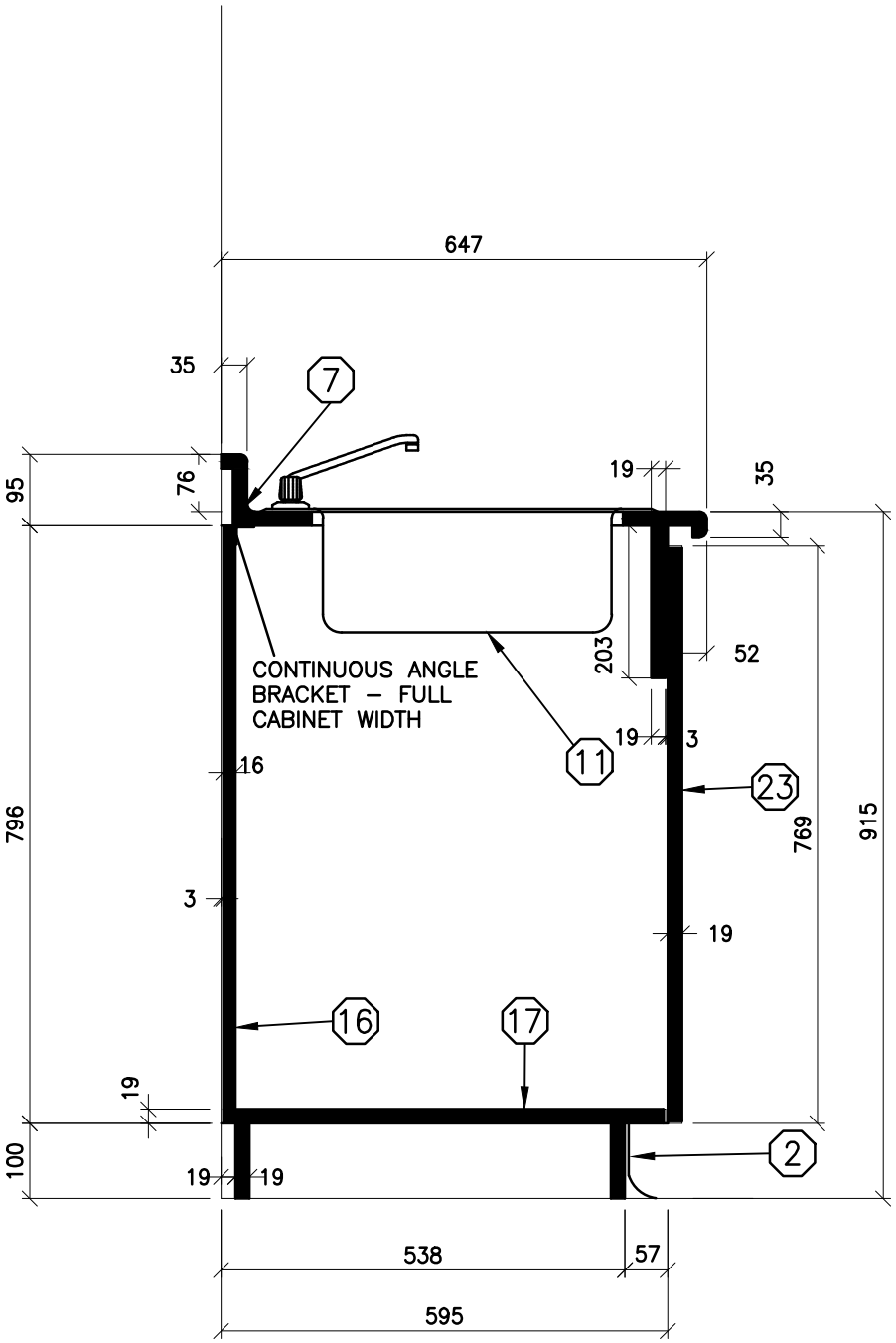
FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

LOWER CABINET WITH SINGLE SINK - ELEVATION

Status	
Folder	I:\WRDSB\A23018 - FHCI TECH SHOP REVITALIZATION -
File	AW105.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	January 2024
Last Plot	1/24/2025 9:16 AM
Job No.	
Sheet No.	

AW105

–SINGLE SINK: 800 WIDE
–DOUBLE SINK: 863 WIDE MINIMUM,
USE 900 WIDE CABINET
–UPPER CABINET TO HAVE A DIVIDER
–COUNTERTOP TO HAVE CLASSIC
NO–DRIP PROFILE



GENERAL NOTES

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW030 FOR ADDITIONAL DETAILS.

WATERLOO REGION DISTRICT SCHOOL BOARD

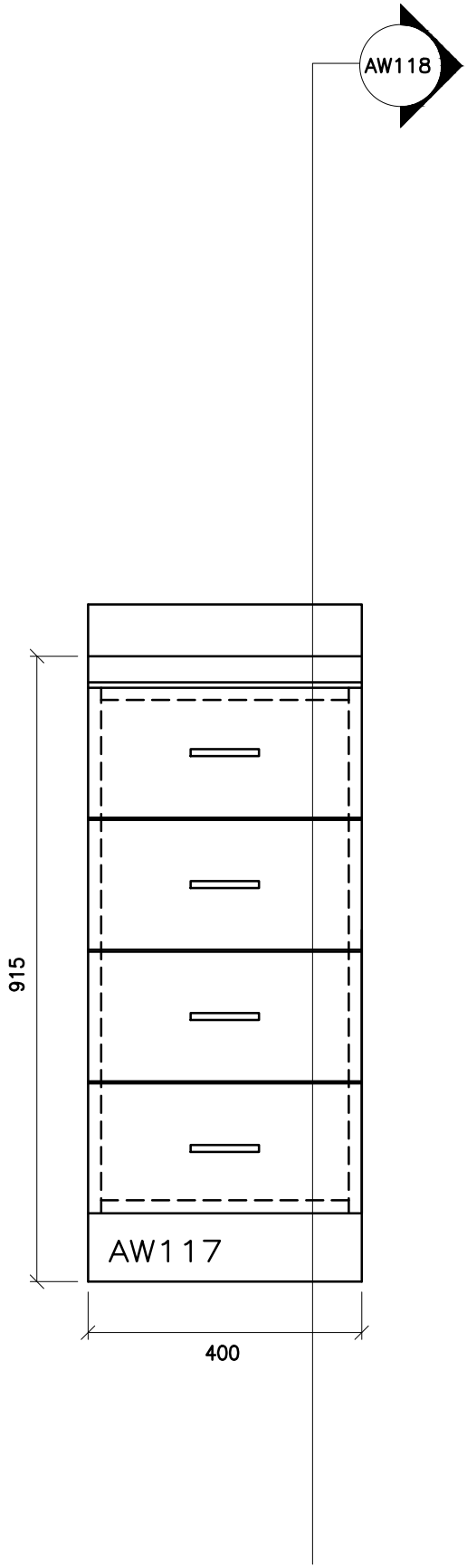
ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

LOWER CABINET WITH SINK - SECTION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW106.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	January 2024
Last Plot	1/24/2025 9:16 AM
Job No.	
Sheet No.	

AW106



THE CONTRACTOR SHALL VERIFY ALL DWGS. AGAINST THE ARCHITECTURAL WOODWORK DWGS. AND MUST REPORT ANY INCONSISTENCIES TO THE WRDSB BEFORE PROCEEDING WITH WORK.

GENERAL NOTES:

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REFER TO AW002 TO AW020 FOR ADDITIONAL DETAILS.

WATERLOO REGION DISTRICT SCHOOL BOARD

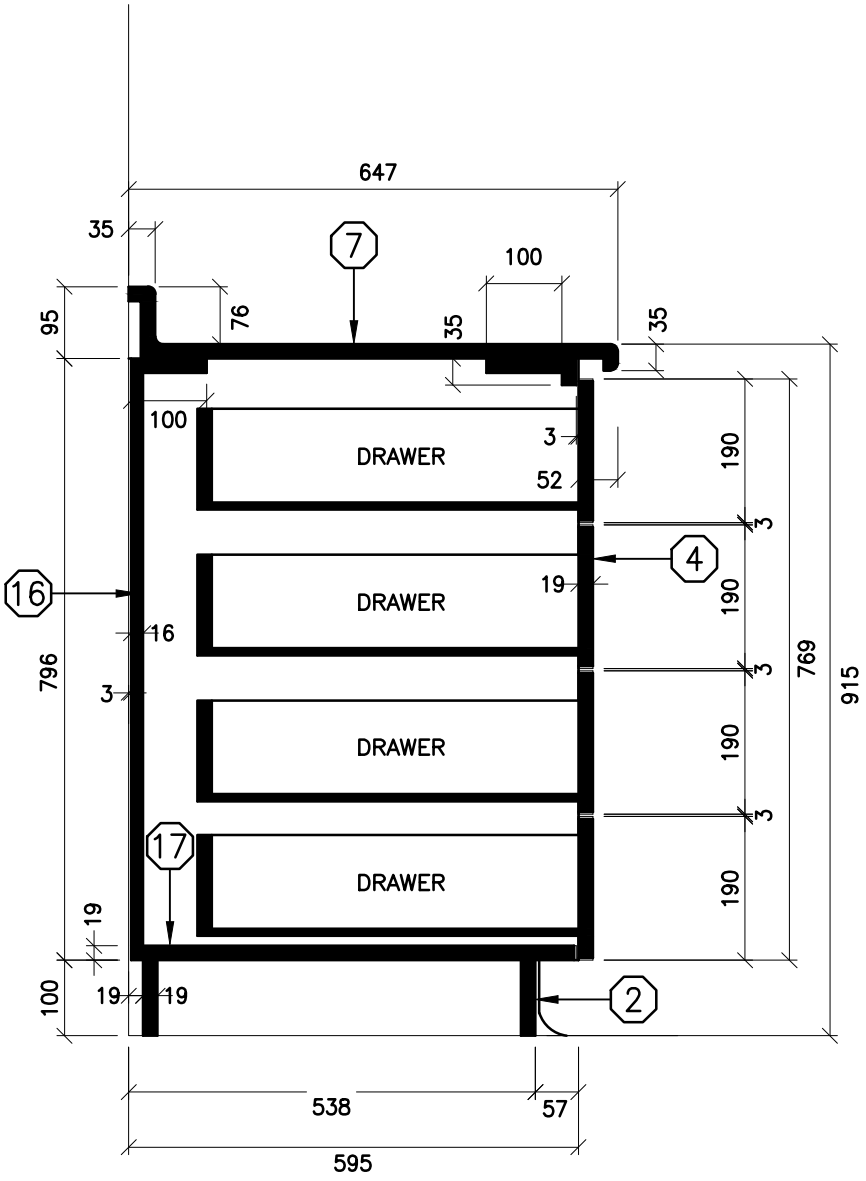
ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

LOWER CABINET WITH DRAWERS - 4D - ELEVATION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW117.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	January 2024
Last Plot	1/24/2025 9:16 AM
Job No.	
Sheet No.	

AW117



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GENERAL NOTES:

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW080 FOR ADDITIONAL DETAILS.

WATERLOO REGION DISTRICT SCHOOL BOARD

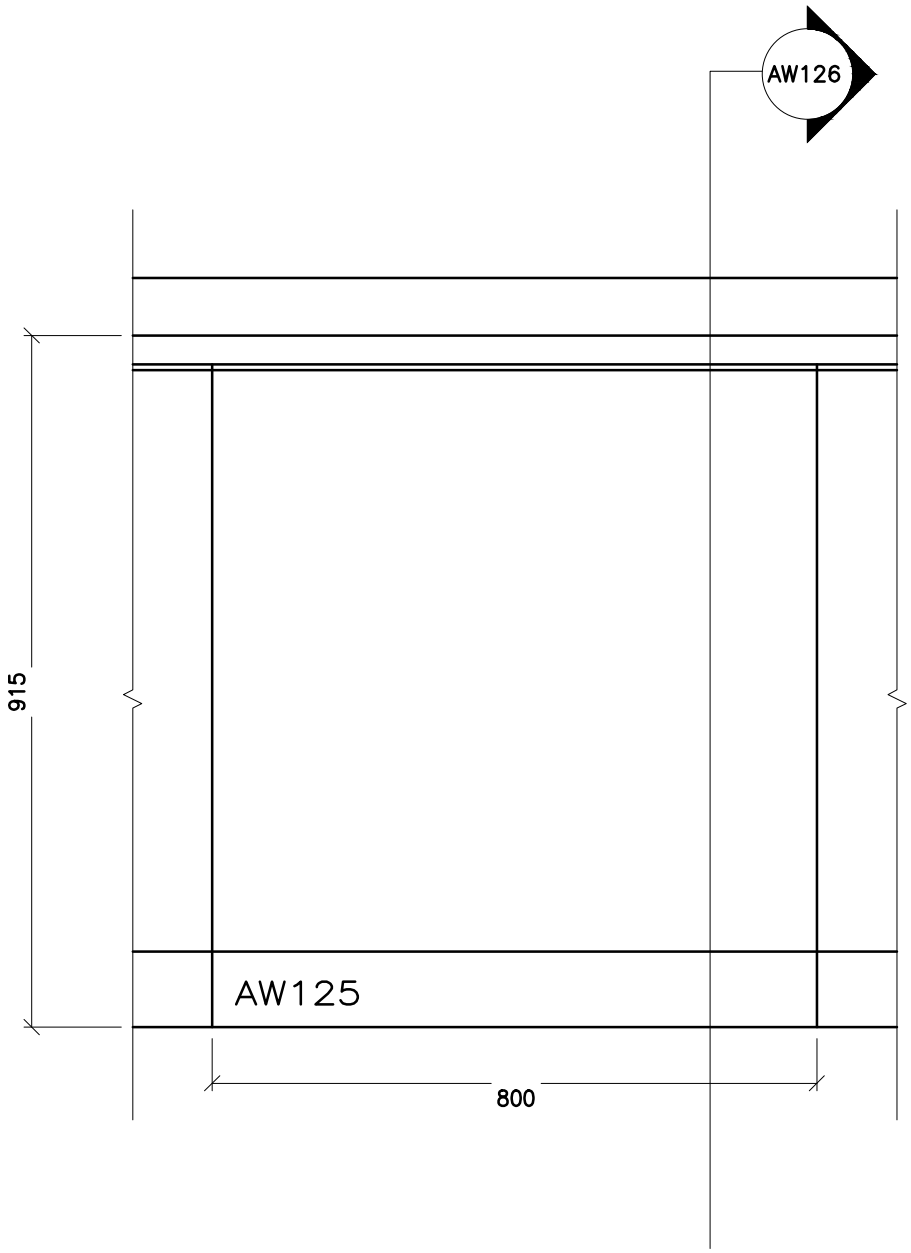
ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

LOWER CABINET WITH DRAWERS - 4D - SECTION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW118.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	January 2024
Last Plot	1/24/2025 9:16 AM
Job No.	
Sheet No.	

AW118



THE CONTRACTOR SHALL VERIFY ALL DWGS. AGAINST THE ARCHITECTURAL WOODWORK DWGS. AND MUST REPORT ANY INCONSISTENCIES TO THE WRDSB BEFORE PROCEEDING WITH WORK.

GENERAL NOTES:

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WATERLOO REGION DISTRICT SCHOOL BOARD

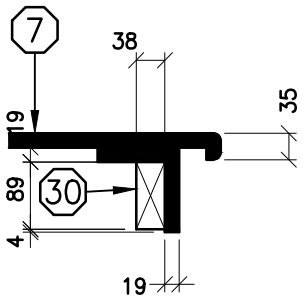
ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

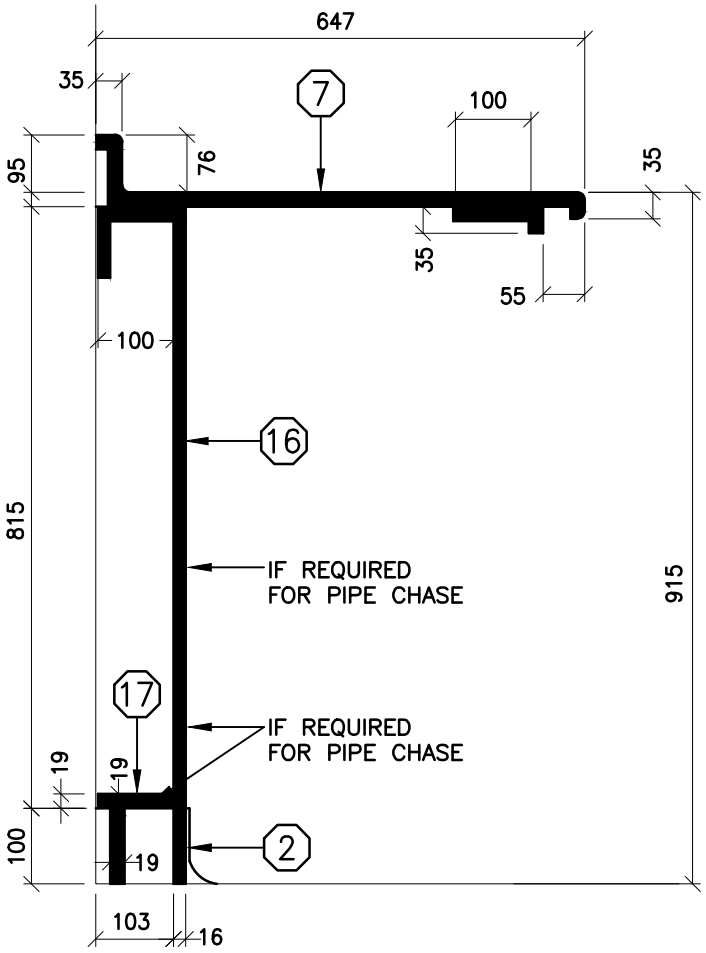
LOWER COUNTER - ELEVATION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW125.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	January 2024
Last Plot	1/24/2025 9:16 AM
Job No.	
Sheet No.	

AW125



USE THIS DETAIL WHEN SPAN OVER 800 OR FOR POSSIBLE HEAVY LOAD SITUATIONS



GENERAL NOTES:

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW030 FOR ADDITIONAL DETAILS.

WATERLOO REGION DISTRICT SCHOOL BOARD

ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

LOWER COUNTER -SECTION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW126.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	January 2024
Last Plot	1/24/2025 9:16 AM
Job No.	
Sheet No.	

AW126

GENERAL NOTES:

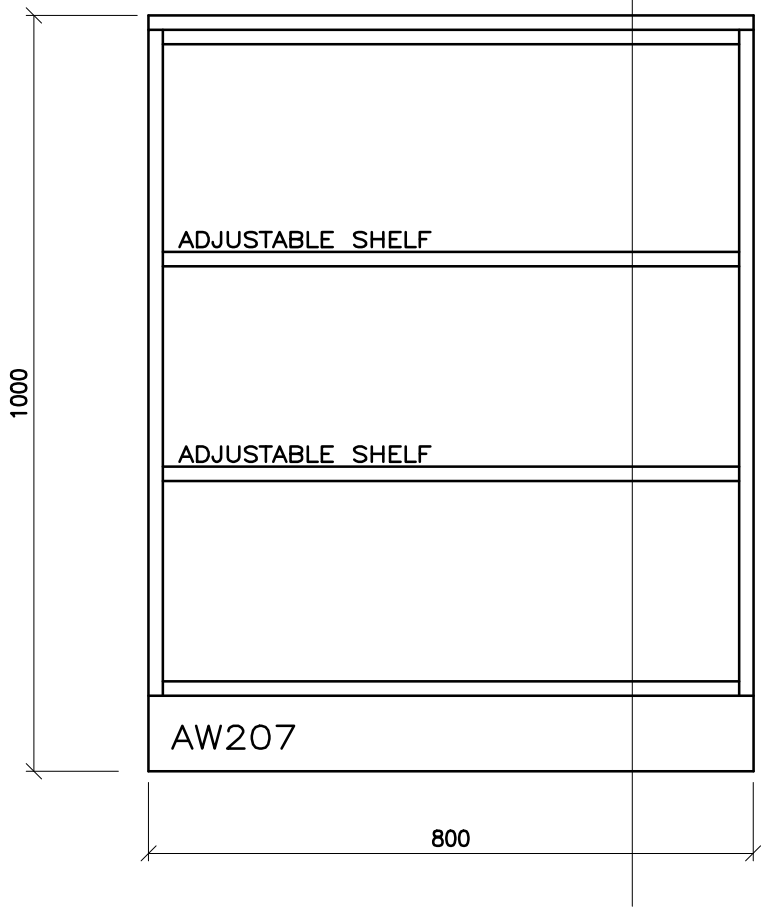
ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW020 FOR ADDITIONAL DETAILS.

SEE LIST

AW209 – 305
AW210 – 375



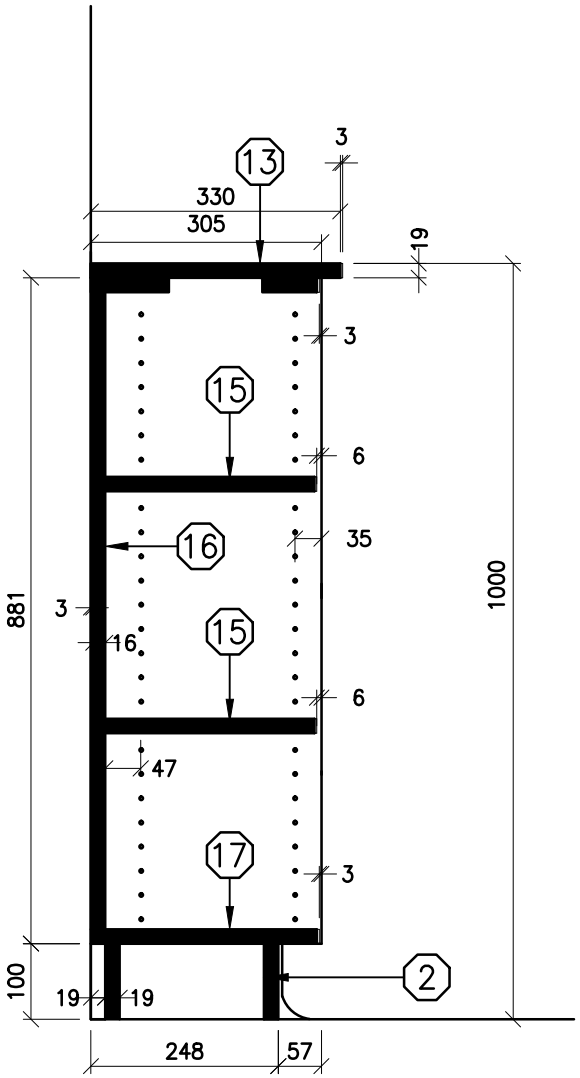
ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

LOW BOOKSHELF - 1000 - ELEVATION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW207.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	January 2024
Last Plot	1/24/2025 9:16 AM
Job No.	
Sheet No.	

AW207



GENERAL NOTES:

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW030 FOR ADDITIONAL DETAILS.

WATERLOO REGION DISTRICT SCHOOL BOARD

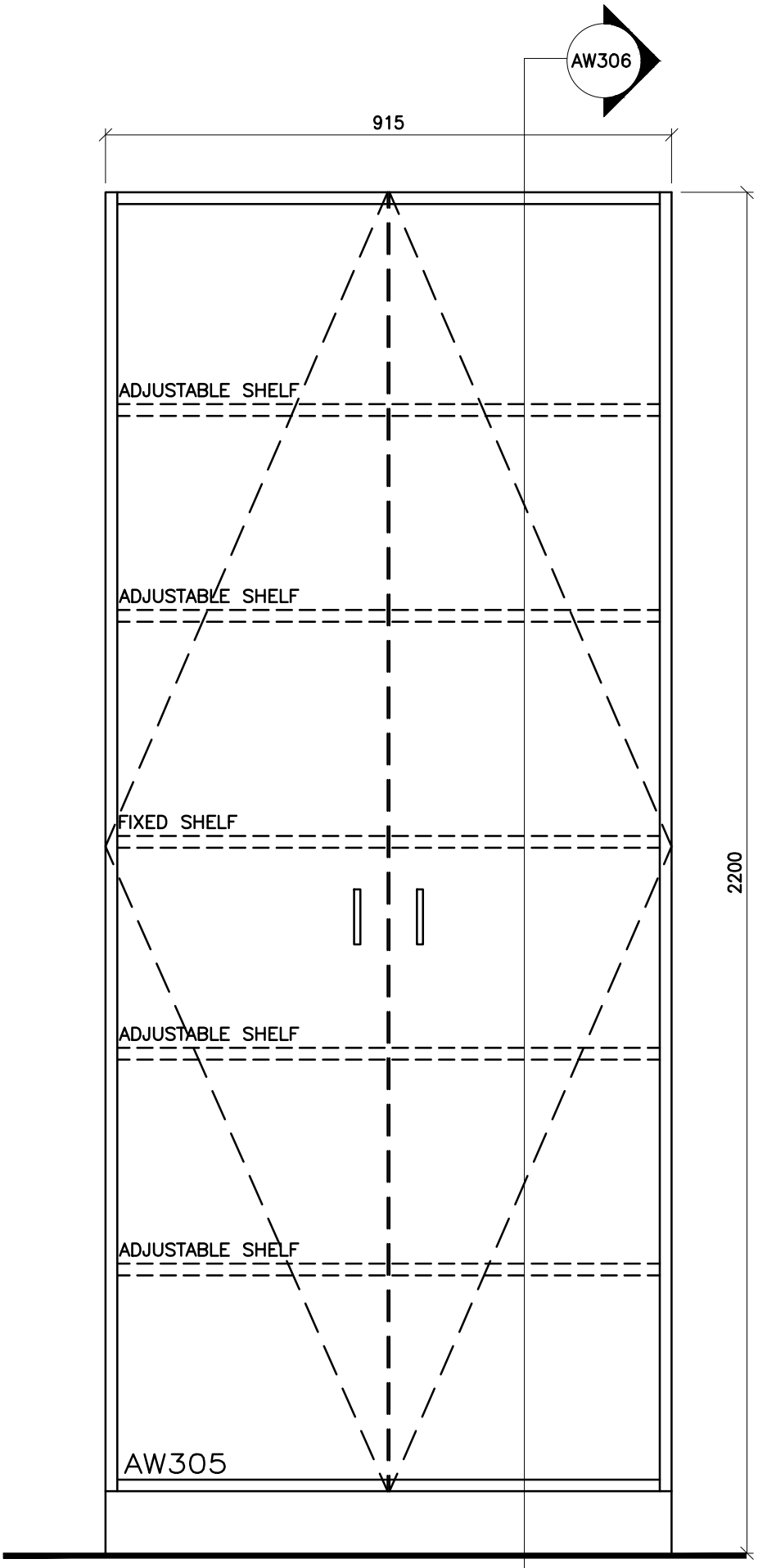
ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

LOW BOOKSHELF - 1000 - 305 DEEP - SECTION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW209.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	January 2024
Last Plot	1/24/2025 9:17 AM
Job No.	
Sheet No.	

AW209



THE CONTRACTOR SHALL VERIFY ALL DWGS. AGAINST THE ARCHITECTURAL WOODWORK DWGS. AND MUST REPORT ANY INCONSISTENCIES TO THE WRDSB BEFORE PROCEEDING WITH WORK.

GENERAL NOTES:

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW020 FOR ADDITIONAL DETAILS.

WATERLOO REGION DISTRICT SCHOOL BOARD

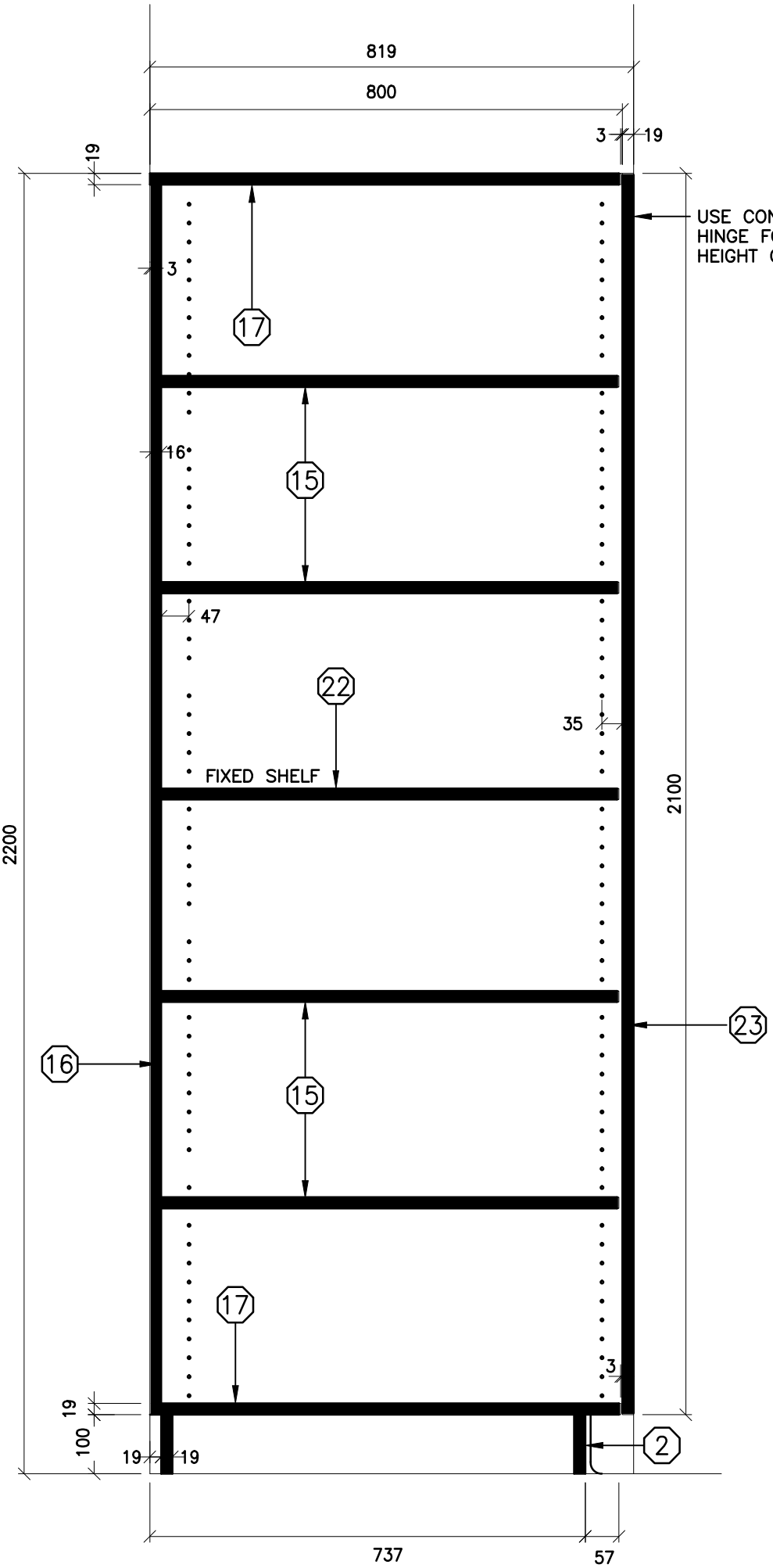
ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

TEACHERS CLOSETS - TYPE 3 - 2 DOORS - ELEVATION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW305.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	January 2024
Last Plot	1/24/2025 9:17 AM
Job No.	
Sheet No.	

AW305



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WATERLOO REGION DISTRICT SCHOOL BOARD

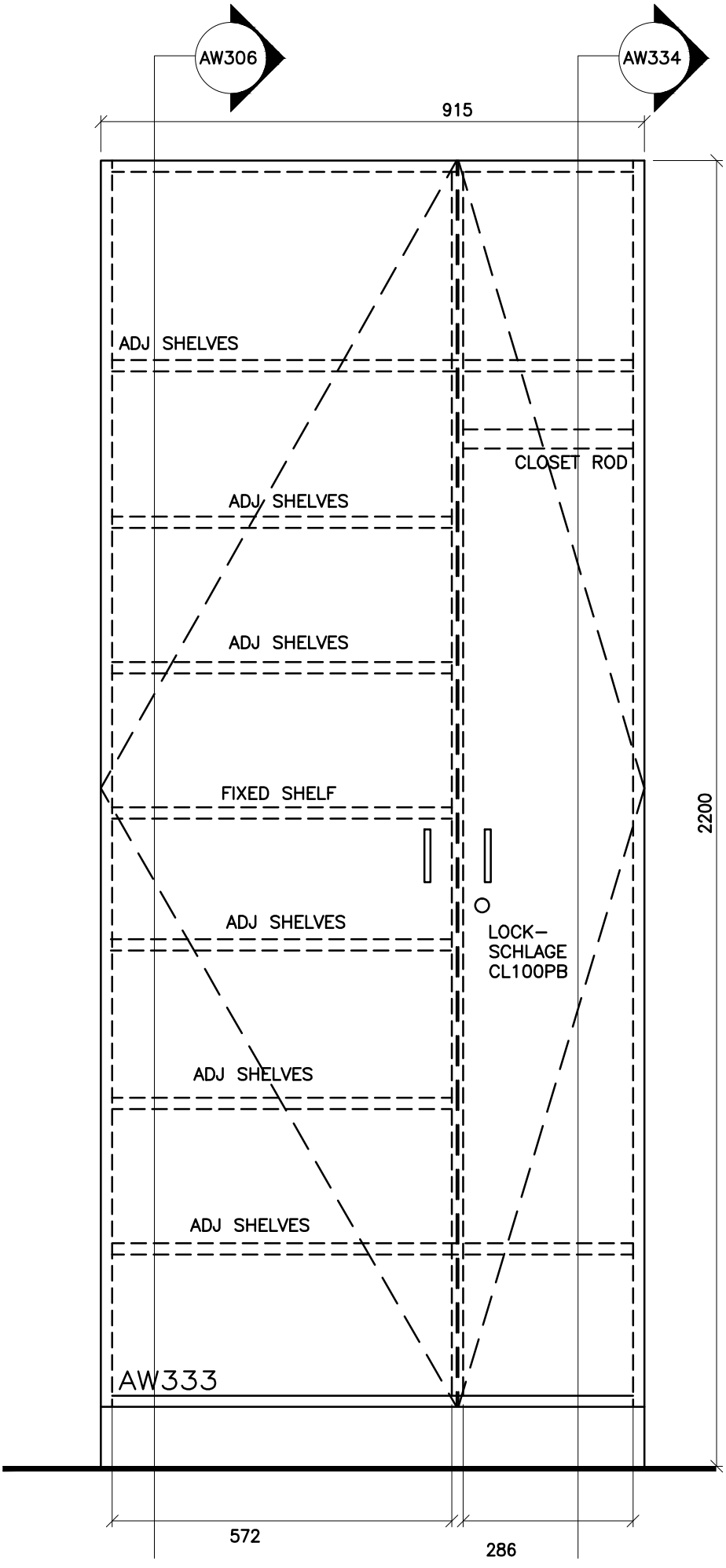
ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

5 SHELF STORAGE CABINET 800 - SECTION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW306.DWG
Drawn By	NST
Check By	SKA
Scale	
Date	January 2024
Last Plot	1/24/2025 9:17 AM
Job No.	
Sheet No.	

AW306



GENERAL NOTES:

ON ALL DWGS. AW REFERS TO ARCHITECTURAL WOODWORK.

FOR APPROPRIATE PRODUCTS REFER TO AW001 AND THE SPECIFICATIONS.

REFER TO AW002 TO AW030 FOR ADDITIONAL DETAILS.

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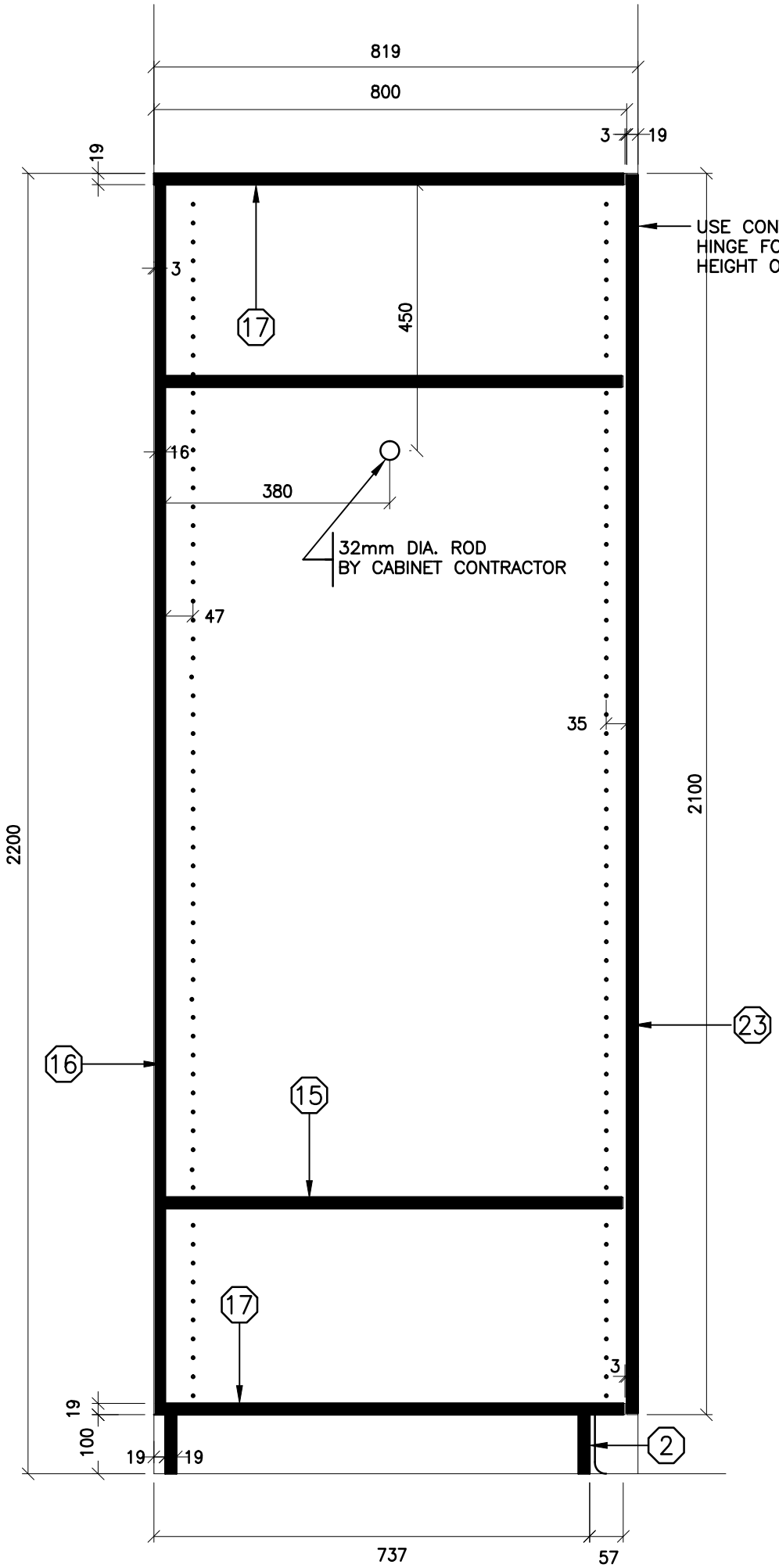
ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

TEACHERS CLOSETS - TYPE 4 - 2 DOORS - ELEVATION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW333.DWG
Drawn By	NST
Check By	SKA
Scale	1:10
Date	March 24
Last Plot	1/24/2025 9:17 AM
Job No.	
Sheet No.	

AW333



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ARCHITECTURAL WOODWORK STANDARDS

FOR THE WATERLOO REGION DISTRICT SCHOOL BOARD

TEACHERS CLOSET -TYPE 4 - CABINET 800 - SECTION

Status	
Folder	I:\WRDSB\A23018 – FHCI TECH SHOP REVITALIZATION -
File	AW334.DWG
Drawn By	NST
Check By	SKA
Scale	1:10
Date	January 24
Last Plot	1/24/2025 9:17 AM
Job No.	
Sheet No.	

AW334

25-7636-RFT - Forest Heights Collegiate Institute Tech Room Revitalization and Partial Window Replacement

Opening Date: January 31, 2025 3:20 PM

Closing Date: February 20, 2025 2:00 PM

Schedule of Prices

* Denotes a "**MANDATORY"** field

Do not enter $0.00 dollars unless you are providing the line item at zero dollars to the Board.

Bid Price Form

The amounts stipulated on the Bid Price Form(s) are intended to cover the cost of the complete Work as described in this Procurement and must remain fixed and firm for the term of the Contract unless otherwise specified in this Procurement.

All prices shall be in Canadian Funds, Free On Board (FOB) Destination, and Freight Prepaid (Board locations). and shall be exclusive of Harmonized Sales Tax (HST) but shall include all materials, labour, equipment, disbursements, expenses, insurance, bonding, customs charges, freight, shipping and handling costs, travel costs and all other charges of every kind attributable to the Work and Services provided.

Bid Price includes Cash Allowance

Line Item	Description	Unit of Measure	Quantity	Bid Price *	Total
1	25-7636-RFT Forest Heights Collegiate Institute Tech Room Revitalization and Partial Window Replacement as per scope of work	Lump Sum	1		
				Subtotal:	

Summary Table

Bid Form	Amount
Bid Price Form	
HST (13%)	$ 0.00
Total Contract Amount:	

Bid Questions

Bidder Instructions

Answer all questions that are marked Mandatory. Reference information is provided below

Question #1 Reference
Bill S-211 - This enactment enacts the Fighting Against Forced Labour and Child Labour in Supply Chains Act, which imposes an obligation on certain government institutions and entities to ensure measures are taken to prevent and reduce the risk that forced labour or child labour is used by suppliers or in their supply chains. The Board principles align with Bill S-211.

Question #2 Reference
“Ontario Business” definition as per the BOBI Act:

- is a supplier, manufacturer or distribution of any business structure;
- conducts its activities on a permanent basis in Ontario; and
- has either
  - its headquarters or main office in Ontario, or
  - at least 250 full-time employees in Ontario at the time of the applicable procurement process.

Question #4 Reference
The Board will require General Contractors on the approved Roster List to have their IHSA - Certificate of Recognition (COR®) by January 2026. Although not mandatory for this bid opportunity, the Board requests bidders to respond to the question below YES or NO.
NOTE: By responding NO, you acknowledge the deadline requirement above.

1. Confirm your organization will comply with this Act. YES or NO. If no, please explain.	
Does your company qualify as an Ontario Business under the BOBI Act? YES or NO	
If you answered NO to Question #2 above, is your company a Canadian business? YES or NO	
Does your company have a current IHSA - Certificate of Recognition (COR®)? - YES or NO	

Specifications

Bidder's Contact Information

A Site Supervisor and Project Manager, assigned to manage and supervise the Work, must be named in this form. Personnel will be subject to approval by the Board and cannot be changed without prior written approval from the Board.

A dedicated Site Supervisor is required full-time for this project. If your company is awarded more than one project/contract, a different Site Supervisor is required for each project. In the event of this situation, you have the option to name and include a resume for an alternative Site Supervisor at this time.

If providing an alternative Site Supervisor with your submission, it is understood, that the alternative Site Supervisor will only be reviewed if the first Site Supervisor has already been accepted and working on another WRDSB project.

Note: resumes are required to be uploaded in the document section. Optional for alternative Site Supervisor

.

Title	Name *	E-mail *	Cell Phone Number *	
Project Manager				*
Site Supervisor				*
Optional – Alternative Site Supervisor				

Documents

It is your responsibility to ensure the uploaded file(s) is/are not defective or corrupted and are able to be opened and viewed by the Owner. If the attached file(s) cannot be opened or viewed, your Bid Submission may be rejected.

Upload a resume for each person named in the Specification section.

- Project Manager - Resume * (mandatory)
- Site Supervisor - Resume * (mandatory)
- Optional - Alternative Site Supervisor - Resume (only if Site Supervisor #1 is assigned to another WRDSB project prior to this award) (optional)

BONDING UPLOAD SECTION

Refer to the Bonding Requirements Section of the Terms and Conditions.

Bonding is required if the project is equal to or greater than $200,000.00. Note: The Bidding System has flagged these fields as mandatory. If your bid is less than $200,000.00, please upload a pdf document stating: Not Applicable.

Bidders shall upload their electronically verifiable and enforceable (e-Bond) format for Bid Deposit Bond and Agreement to Bond separately in this section. If both Bonds are in the same pdf file, please upload it in both fields and indicate one is a “duplicate”

The date on the Bonds must be the Closing Date

Tender # and Project Title must be included on the Bonds

- Bid Deposit Bond * (mandatory)
- Agreement to Bond * (mandatory)

Addenda, Terms and Conditions

I/We have read and understand this Bid Solicitation document, and agree to perform the Work required in accordance with this Bid

Solicitation document, including all addenda, at the price(s) detailed in the Bid.

I/We confirm that:

1. The person named in this Bid is authorized to sign and electronically submit this Bid through the Bidding System.

2. I/We meet all mandatory requirements of the Bid Solicitation document.

3. The bid will remain open for a specified acceptance period after the Closing Time. The Board may, at any time within this period, accept the Bid whether or not any other Bid has previously been accepted.

4. All prices provided in the Bid will remain fixed and firm for the duration of the term of the agreement, unless specified otherwise.

5. All prices provided in my/our Bid are in Canadian funds and include all charges of every kind attributable to the Work. Harmonized Sales Tax will be extra and not shown, unless specified otherwise.

6. To the best of my/our knowledge and belief:

a) the information provided in the Bid is correct; and

b) the Bid is made without any comparison of figures or arrangement with any other individual, corporation or person submitting a Bid for the same Work and is in all respects fair and without collusion or fraud.

7. I/We comply with the all applicable Board policies, provincial, and federal laws, and are aware of the Board's "Principles of Business Conduct" and will comply.

8. I/We agree and understand that the recommendation to award the Work may be subject to the approval from the Board as well as availability of funds.

9. I/We agree to be bound by the terms and conditions of the Bid Solicitation document and submit this Bid on behalf of the Bidder.

☐ I have the authority to bind the Bidder.

The Bidder/Proponent is to declare any actual, potential or perceived conflict of interest that could arise from submitting the Bid/Proposal.

Do you have a potential conflict of interest?

○ **Yes** ○ **No**

The Bidder acknowledges and agrees that the addendum/addenda below form part of the Bid Solicitation Document.

Please check the box in the column "**I have reviewed this addendum"** below to acknowledge each of the addenda.

File Name	I have reviewed the below addendum and attachments (if applicable)	Pages
There have not been any addenda issued for this bid.		