Waterloo Region District School Board

REQUEST FOR TENDER

Southwood Secondary School RAAC Phase 1

PROJECT NO. 26-7841-RFT

ISSUE DATE: March 12, 2026

The Bidding System will receive ELECTRONIC SUBMISSIONS, no later than **2:00:00 p.m. local time, on April 2, 2026**

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Not Used

00 01 00 Consultant/Professional Seals

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

1.1.1 Architect

1.1.2 Structural

1.1.3 Mechanical

1.1.4 Electrical

END OF SECTION

DIVISION 00 – BIDDING AND CONTRACT DOCUMENTS

00 21 13 - Instructions to Bidders

1.1 Designated Representative

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

The Designated Representative for this procurement process is:

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

1.2 Consultant

The WRDSB has hired the following consultant to assist in the preparation of this Procurement: Martin Simmons Sweer

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

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

1.3 Blackout Period

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

1.4 Doing Business with the Waterloo Region District School Board

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

Bid opportunities above $10,001 CAD will be solicited through an electronic bidding system (bids&tenders) or the WRDSB may also utilize Supplier roster lists awarded through a competitive process, participate in cooperative procurements with various

public entities, or buying groups. These may include, but are not limited to, Ontario Education Collaborative Marketspace, Supply Ontario, and other Cooperative Group(s).

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

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

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

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

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

1.6 Communication and Question Protocol

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

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

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

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

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

1.7 Anticipated Project Schedule

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

DESCRIPTION	DATE
Issue Date of Tender	Thursday, March 12, 2026
Non-Mandatory Pre-Bid Site Examination	Date: Tuesday, March 17, 2026 Time: 12:00 noon 30 Southwood Dr, Cambridge, ON N1S 4K2 Front Entrance
Deadline for Questions	Tuesday, March 31, 2026
Closing Date and Time	Thursday, April 2, 2026 **2:00:00 pm local time**
Anticipated Contract Start / Work begins	June 1, 2026
Substantial Completion Date	August 25, 2026
Ready for Takeover	September 4, 2026
Deemed Complete Date	September 30th, 2026

1.8 Site Pre-Bid Examination

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

i. Bidders shall attend site meetings at their own risk and hold the WRDSB harmless for any issues or damage arising out of their attendance at the site meeting.
ii. The WRDSB will not consider any claims for additional payments during the execution of the Work for extra work or difficulties encountered resulting from

conditions which were either visible or could be reasonably inferred from an examination of the Place of the Work and the available project information prior to the submission of Bids

iii. Bidders are solely responsible for making their own assessment of the site.

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

1.9 Secondary Site Examinations

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

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

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

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

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

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

1.10 Examination of Bid Documents and Work and Submitting Questions

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

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

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

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

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

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

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

1.11 Electronic Bid Submission Only / Electronic Bidding System

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

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

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

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

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

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

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

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

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

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

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

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

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

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

There will be no public opening for this Bid.

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

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

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

1.12 Bid Prices

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

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

Exclusive of the HST, or other similar taxes.

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

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

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

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

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

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

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

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

1.13 References

1.13.1 References are NOT required. This Section does not apply to this Project

1.14 Addenda

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

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

Prior to bid closing any discrepancies, omissions, questions, or clarifications regarding the

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

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

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

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

Addenda cannot be acknowledged after the Closing Date and Time.

1.15 Edit and Withdrawal of Bid Submission

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

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

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

1.16 Irrevocable Period

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

1.17 Tie Bids

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

1.18 Bid Irregularities

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

i. Bids that do not comply strictly with all terms and conditions of the Procurement Document.

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

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

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

v. Bids received from any Bidder deemed to be unskilled or inexperienced in the work contemplated, or those who have defaulted on, or failed to satisfactorily complete other similar work in the past.

vi. Bids submitted by Bidders that are not prequalified, where applicable.

1.19 Bid Review

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

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

iii. It is the Bidder's responsibility to satisfy the WRDSB that they can comply with the requirements contained within this Procurement document and that they possess the necessary inventory, equipment, facilities, resources, and staff to perform the work specified in this Procurement document. Bidders may be required to submit evidence of above in a form acceptable to the WRDSB. Substitution of materials, equipment, or methods different from those outlined in the terms of reference will not be accepted unless provided for within this Procurement document or with the written approval of the WRDSB.

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

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

vi. The WRDSB may, in its sole discretion, check references, conduct credit checks, review the litigation history and history of professional liability or other insurance claims, and obtain any other type of information that might aid the WRDSB in its selection. The WRDSB reserves the right to consider all, or any information received from all available sources, whether internally or externally obtained. The WRDSB may disqualify any Bid from further consideration based on results of reference or credit checks or review of litigation or claim history. The foregoing may include the WRDSB's own experiences with the respective Bidder(s) or any of the subcontractors and subconsultants proposed in their Bid.

1.20 Intent to Award

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

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

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

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

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

to a Stipulated Sum" (CCDC 2 – 2020) including amendments thereto as set out in this Procurement.

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

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

1.21 Post- Closing/Pre-Award Meeting

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

1.22 Award

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

1.23 Post-Award Meeting (Kick off Meeting)

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

1.24 Post Award

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

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

1.25 Award Posting Notification

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

END OF SECTION

00 21 14– General Contractors, Subcontractors, Prequalified Rosters

1.1 General Contractors

1.1.1 Only invited prequalified General Contractors, by award through a competitive prequalification process, 7430-RFPQ, may submit a bid for this opportunity.

1.1.2 Invitations are based on awarded Project Size Categories. Only approved GCs (on the Roster) may bid on the project size categories based on their award.

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

1.1.4 Refer to COR Certification Requirements, Clause 1.5.

1.2 Subcontractors/Subconsultants

1.2.1 Refer to specifications for products and suppliers that will be required.

1.2.2 The subcontractor/subconsultant list is not required at time of bid submission.

1.2.3 The subcontractor/subconsultant list is mandatory after the bid closing date from the Recommended Bidder within twenty-four (24) hours of receiving a request or intent to award from the WRDSB.

1.2.4 In the event the WRDSB has a Prequalified Roster List for a Trade Category required for this project, the General Contractors will select from the list below in *3.0 WRDSB Prequalified Roster Lists*. General Contractor's subcontracting other than the companies listed below or identified by Addendum will have their Bid ruled informal.

1.2.5 The Bidder (the "Recommended Bidder") shall provide a list of subcontractor/subconsultant that it proposes to use for all Work described in this Procurement including the specification sections, as per the following:

i. Bidders shall select experienced and qualified subcontractor/subconsultant or Suppliers in their field to perform or supply an item of Work indicated in this Procurement.

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

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

iv. The WRDSB reserves the right to obtain information from the Bidder and from third parties respecting the qualifications and experience of the Bidder's nominated list of subcontractor/subconsultant for such item of the Work.

v. The WRDSB reserves the right to examine Bidder's facilities, equipment and visit the subcontractor/subconsultant's proposed.

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

vii. Where a bidder lists "own forces" in place of a subcontractor/subconsultant, the bidder shall conduct such item of the Work with its own forces.

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

1.3 WRDSB Prequalified Roster Lists

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

Roofing Contractors

Contractor Name	Email	Number
Atlas Apex Roofing Inc.	jmcdowell@atlas-apex.com	(416) 421-6244
Eileen Roofing Inc	dianne@eileenroofing.com	(416) 684-6153
Flynn Canada Inc	sean.wormsbecker@flynncompanies.com	(416) 814-0440
Lafleche Roofing (1992) Ltd.	chris@laflecheroofing.com	(519) 681-7610
Nedlaw Roofing Ltd.	andrew@nedlawroofing.com	(519) 648-2218
Nortex Roofing Ltd.	sandra@nortexroofing.com	(416) 236-6090
Provincial Industrial Roofing & Sheet Metal Co. Ltd.	duglow@provincialroofing.com	(905) 669-2569
Semple Gooder Roofing Corp	jouellette@semplegooder.com	(416) 743-5370
Trio Roofing Systems Inc.	paulo@trioroofing.ca	(905) 456-1688

END OF SECTION

00 21 15 – Scope of Work

Roof Replacement and Renovations to an existing, occupied secondary school in three locations including the following:

1. Demolition & Roof replacement to a section of the school, including both roof structural deck and roof membrane system, including insulation. As part of this work:

    .1 Special Protection of the interior facility to allow for the roof removals

    .2 Temporary Protection to the roof to keep the roof watertight during the removal and reinstallation work.

2. Addition of new garage door to Machine Shop and updates to the two existing garage doors in the Autoshop.
3. Cosmetic upgrades to ceilings, walls, including painting and some flooring upgrades in the area of roof removals.
4. Minor Exterior works to peripheral areas.

END OF SECTION

00 31 34 – Subsurface Investigation Report – Not Applicable

END OF SECTION

Appendix 00 31 34A – Soil Report – Not Applicable

END OF SECTION

Appendix 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 – WRDSB Standard Terms and Condition

1. Applicable Terms and Conditions

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

2. Bankruptcy

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

3. Basis of Award (Price factor)

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

4. Bonding Requirements

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

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

i. Bid Amount

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

ii. Bid Deposit Bond & Agreement to Bond

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

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

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

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

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

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

iii. Performance and Labour & Materials Bonds

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

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

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

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

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

5. Business Code of Conduct for Board Employees

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

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

6. Code of Conduct for Suppliers

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

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

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

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

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

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

vi. Appearance: Suppliers and their employees, where applicable, are required to wear appropriate Personal Protective Equipment (PPE), work wear, hard hats and safety footwear high-visibility clothing, while on WRDSB property. Articles of clothing must be neat and tidy in appearance, and cannot display offensive or inappropriate language, symbols, or graphics. WRDSB has the right to decide if such clothing is inappropriate.

vii. Identification: contracted suppliers and their employees are required to wear branded attire of the company they work for when on WRDSB property.

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

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

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

7. Compliance with Laws, Acts and Regulations

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

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

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

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

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

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

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

8. Confidential Information, MFIPPA, and PIPEDA

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

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

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

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

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

9. Confirmation to Proceed

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

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

10. Conflict of Interest

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

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

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

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

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

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

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

11. Construction Act Guidelines

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

12. Criminal Background Checks and Collection of Personal Information

The WRDSB 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 WRDSB, the Supplier will provide to the WRDSB, 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 WRDSB-approved form for every employee of the Supplier who may come in direct contact with WRDSB staff and/or students on a regular basis at any WRDSB 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 WRDSB 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 WRDSB from and against all claims, demands, loss, costs, damages, actions suits or other proceedings by whomsoever made, brought, or prosecuted in any manner based upon, occasioned by, or attributed to any such damage, injury, or infringement.

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

14. Damage Reporting

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

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

15. Debriefing Requests

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

16. Default

If the Supplier fails to properly, promptly, and fully carry out the Work required by these documents, the WRDSB reserves the right to notify the Supplier to discontinue all Work

under this Contract, to advertise for new Bids or carry out the Work in any way as the WRDSB may, in their sole discretion, deem best.

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

17. Delay Claims

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

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

18. Delivery and Transportation Charges

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

19. Designated Substances

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

i. Asbestos

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

handled and disposed of in accordance with the procedures prescribed by O. Reg. 278/05.

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

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

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

ii. Lead

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

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

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

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

for extra cost will be accepted for lead-containing paint or coatings in identified areas.

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

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

iii. Mercury

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

iv. Silica

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

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

v. Other Designated Substance

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

20. Dispute Resolution

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

21. Duty to Disclose Change of Control

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

22. Electrical Safety Requirements

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

23. Emergency and Maintenance

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

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

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

24. Equivalents and Alternatives

24.1 Equivalents or Brands Names

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

24.1.2 No reference to the brand name of a particular manufacturer shall be construed to restrict Bidders to that manufacturer. Bidders are invited to Bid equivalent and comparable equipment or items of any manufacturer, pending approval from the WRDSB in the form of an Addendum. It is the Bidder's responsibility to demonstrate that the item meets the specifications.

24.1.3 Bidders shall request through the Bidding System by clicking on the “Submit a Question” button found within the bid details page of that Procurement that a proposed product be considered an approved equivalent prior to the Deadline for Questions in the Anticipated Project Schedule. Upon receipt of a request, the WRDSB will respond by providing further instructions where you may submit documentation.

24.1.4 The response must include enough detail to determine equivalency by comparing the WRDSB’s specifications to the equivalent product. It will not be the WRDSB’s responsibility to make this comparison.

24.1.5 The WRDSB/ Consultant may, depending on the nature of the product request site visits within a reasonable distance (preferable within 100 km of the WRDSB) showing product and installation based on a certain age, minimum 18 months in use, room use, room size, etc. based on same or similar purpose as described in this Procurement.

24.1.6 The WRDSB/Consultant will endeavor to complete a review and decide prior to the Closing Date, and, if required, the WRDSB reserves the right to extend the Closing Date to complete its review. However, in the event additional time is required beyond a suitable extension to the Closing Date, the request will be pending until the product is thoroughly vetted, therefore, it may not be approved for this Procurement.

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

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

24.2 Alternatives and Substitutions

24.2.1 After Contract Award, the Contractor may submit an alternate material or piece of equipment to the Consultant and Owner for review. An Alternate will only be evaluated and considered acceptable if it meets the intent of the original design and specifications, and where there is a credit or no additional cost to the Owner. The Specification Sections contain pertinent performance criteria, quality, function and requirements for materials and methods to achieve work described.

24.2.2 Material or equipment of equal or better performance and quality may be offered in substitution for those specified. Requests for review of substitute items of material and equipment will not be accepted by the Consultant from anyone other than the Contractor. All requests for substitution must be accompanied by a detailed listing of the expected cost savings to the Owner.

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

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

A request for substitution constitutes a representation that the Contractor:

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

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

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

Include redesign and cost of claims of any other contract affected by the resulting change.

ix. Guaranteed credit or cost reduction offered if the proposed substitution is accepted and a waiver of claims for additional expenses which may subsequently become apparent.

x. Recommended maintenance requirements and availability of spare parts and service.

xi. Written confirmation from subcontractors and suppliers on cost, schedule, and technical requirements if requested by the Consultant.

24.2.6 Consultant will evaluate each proposed substitution. Consultant will be the sole judge of acceptability, and no substitute will be ordered, installed, or utilized without the Consultant's prior written acceptance by either a Change Order or a reviewed shop drawing. The burden of proof is on the Contractor.

24.2.7 Pay the Consultant's cost for evaluating the requested substitution even though the request may be denied, or for additional redesign work required because of any substitution. Costs will be charged on a time and expense basis and will be deducted from progress payments due to the Contractor.

25. Evidence of Quality

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

26. Force Majeure

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

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

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

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

27. Hold Back or Set Off

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

28. Hot Work Procedure

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

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

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

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

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

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

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

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

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

28.2 Hot Work Permit

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

ii. The contractor must obtain Hot Work Permits from the WRDSB's representative prior to the start of work.

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

iv. Return each completed form to the WRDSB's representative on the date of expiration.

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

29. Incurred Costs

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

30. Indemnification

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

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

31. Inspection of Supplier's Work and Equipment.

i. The WRDSB reserves the right to inspect and/or have demonstration of the products/equipment/services offered prior to award of this Procurement.

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

32. Insurance Requirements

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

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

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

ii. **Automobile Liability Insurance** in respect of licensed vehicles with limits of not less than $2 Million inclusive per occurrence for bodily injury, death and damage to property, covering all licensed vehicles owned or leased by the Supplier, and endorsed to provide the Owner with not less than 30 days' notice, in writing, in advance of any cancellation, change or amendment restricting coverage. Where the

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

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

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

v. **Professional Liability Insurance (Errors and Omissions):** If applicable/requested, Contractors and/or Consultants shall ensure its professional consultants, architects, landscape architects, planners, engineers, including IT providing a professional service in connection with the contract, maintain until three (3) years after the Agreement, Professional Liability Insurance to a limit not less than $1 Million per claim providing coverage for acts, errors and omissions arising from their professional services performed under this Agreement including but not limited to . design errors, project management mistakes, failure to perform etc. The policy SIR/deductible shall not exceed $100,000 per claim and if the policy has an aggregate limit, the amount of the aggregate shall be double the required per claim limit. Certificates evidencing such coverage shall be supplied to the WRDSB prior to the completion of the project and in accordance with the provisions stated above.

vi. **Pollution Liability:** If applicable, (i.e., for projects with environmental liability concerns) the General Contractor shall take out and keep in force Contractor's Pollution Liability (CPL) coverage to ensure that its work does not exacerbate any pre-existing environmental conditions during construction. Coverage shall be in an amount of not less than $5 Million per claim or per occurrence, or such greater amount as the WRDSB may from time to time require, naming the WRDSB as an additional insured, whose coverage shall be maintained in force for 1 year following the termination of the Contract. The policy SIR/deductible shall not exceed $100,000 per claim and if the policy has an aggregate limit, the amount of the aggregate shall be double the required per occurrence limit.

vii. **Cyber Insurance**: If applicable/requested: In addition to the insurance required under the Agreement, the Contractor shall procure and maintain cyber and network

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

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

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

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

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

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

ix. Third Party Claims Process:

a. The WRDSB's claims process for Third Party claims is to refer the claimant directly to the Supplier and to leave the resolution of the claim with the Supplier. This applies regardless of whether it is an insured loss.

b. As WRDSB has a responsibility to the taxpayers, we must ensure that claimants are dealt with in a fair and efficient manner. Claims reported to the Supplier, either directly by a third party or through the WRDSB shall be promptly investigated by the Supplier. The Supplier shall contact the third party claimant within 48 hours of receipt of notice of a claim. The Supplier shall initiate an investigation of the claim immediately upon notice, and advise the third party claimant in writing, with a copy to the WRDSB, of its position regarding the claim within 21 calendar days of the notice. The Supplier shall include in its response the reasons for its position.

c. Should this position not resolve the claim and be accepted by the third party claimant, the Supplier shall immediately report the claim to its Insurer for further review. (Insurer for this purpose is defined as either the Claims Department of the Supplier's Insurance Company or the Claims Administrator at the Supplier's Insurance Broker.) The Supplier's Insurer upon receipt of this claim shall advise the third party claimant by letter, with a copy to the WRDSB, that it is now investigating the claim. When a final position on the claim has been determined, the Supplier's Insurer shall advise the third party claimant by letter, with a copy to the WRDSB. Failure to follow this procedure shall permit the WRDSB to investigate and resolve any such claims.

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

e. The WRDSB may, without breaching this contract, retain from the funds owing to the Supplier an amount that, as between the WRDSB and the Supplier, is equal to the balance in the WRDSB's favour of all outstanding debts, claims or damages, whether related to this contract.

33. Invoicing and Payment Terms

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

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

33.3 New Account, in advance of invoicing, upon request, Suppliers will provide:

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

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

33.5 Invoices must contain the following information, where applicable, to be deemed complete:

i. Purchase Order Number
ii. Invoice Date
iii. Unique Invoice Number
iv. Supplier name and address
v. Quantity, Unit Price, Unit of Measure and Extended Price
vi. Description for each line item
vii. Date of Service Call, if applicable
viii. HST
ix. Payment Terms
x. Work Order Number, if applicable
xi. Name of WRDSB Project Lead, if known, and

33.6 Payment terms shall be net thirty days (30) days after receipt of invoice, unless otherwise agreed by the WRDSB in writing. An early payment discount, if offered, may be considered on a mutual agreement basis. Payment may be delayed if the invoice is incorrect or the goods, equipment and/or services are not acceptable to the WRDSB. The WRDSB will not pay any interest, penalty, or late fee for delayed payments. The WRDSB preferred payment method is Credit Card or EFT, however alternate payment methods may be approved. Suppliers are required to invoice promptly, without delay. For Work that falls under the Construction Act, refer to 34 Construction Act – Proper Invoice.

34. Construction Act – Proper Invoice

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

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

that were supplied during the payment period.

v. the amount payable for the services or materials that were supplied during the payment period, with a clear identification of the portions of the amount that are holdbacks, and HST.

vi. the name, title, telephone number, and mailing address of the person to whom payment is to be sent.

vii. the payment terms as specified by the WRDSB in the Contract.

viii. the invoice number and if applicable, the revision number.

ix. the Supplier's HST number.

x. invoices and time sheets from all subtrades whose work is included in the Proper Invoice, if required in the Contract.

xi. backup documentation to support any cash allowances and extra work claimed in the Proper Invoice.

xii. a schedule of values indicating:

a. for lump sum contracts, the percentage of work completed per division with each division further subdivided to show the percentage of work completed for each subtrade,

b. for unit price contracts, the tender quantity, unit of measure, previous quantity, current quantity, to-date quantity,

c. an updated list of change orders, showing the percentage of work completed under each change order, and

d. an updated cash allowance list, showing the percentage of work completed in respect of each cash allowance, if required by the Contract.

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

35. Interpretive Value of Headings

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

36. Licenses and Permits

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

37. Locates

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

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

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

38. Log Reports

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

39. Materials - Specifications

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

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

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

41. Mathematical Errors (Unit Prices Prevail)

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

42. No Branding

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

43. No Collusion

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

44. No Lobbying

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

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

45. No Smoking and Scent-Free Environment

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

46. Non-Assignment

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

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

47. Non-Disclosure Agreement (NDA)

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

48. Ownership of Work

For the purposes of this paragraph:

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

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

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

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

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

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

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

49. Patent, Copyright and Other Proprietary Rights

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

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

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

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

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

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

50. Performance

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

ii. If the deficiency is not corrected within the time specified, or there is a further instance of deficient performance, the WRDSB may issue a written notice to the Supplier, identifying the deficiency in performance and setting a final date or period for its correction.

iii. If corrective steps are not taken by the final date or within that time, the WRDSB may terminate the Contract and take corrective action.

iv. Termination of any Contract can be immediate depending on the severity of the default.

v. The Supplier shall have no right to perform the services contemplated under this agreement beyond the time when such services become unsatisfactory to the WRDSB; and in the event that Supplier shall be discharged before all the services contemplated hereunder have been completed, or the services are for any reason terminated, stopped or discontinued because of the inability of the Supplier to serve under this agreement they shall be paid only for that portion of the Work which shall have been satisfactorily completed at the time of termination.

vi. Where deemed appropriate, a performance evaluation shall be completed by the WRDSB. The evaluation report shall be reviewed with Procurement Services, and a copy of the completed evaluation forwarded to the Supplier for their records. Dependent on the evaluation scoring, the WRDSB may request a corrective action plan and/or project size/value may be affected on future bid opportunities for your company.

51. Permits and Licenses

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

52. Proceedings Against the WRDSB

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

53. Protection of WRDSB Assets

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

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

54. Records, Inspection, Audits

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

55. Reserved Rights of the WRDSB

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

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

c. other relevant information that arises during the procurement process.

xiv. choose to reject a Bid if only a single Bid is received and cancel the bidding process or enter direct negotiations with the sole Bidder.

xv. accept a Bid other than the lowest or highest scoring and/or to not accept any Bid for any reason whatsoever.

xvi. award the contract as split-order, lump sum or individual-item basis, or such combination as shall best serve the interests of the WRDSB.

xvii. negotiate in circumstances permitted for in the Bid document or by relevant policies, or directives, and include additional terms and conditions during the process of negotiations.

xviii. no longer consider a Bidder if a satisfactory outcome is not reached as part of negotiation, as determined by the WRDSB in their sole discretion and move to the next highest ranked Bid in such event.

xix. select a Bidder other than the Bidder whose Bid reflects the lowest cost to the WRDSB and/or award the Contract to any Bidder.

xx. award any business/Work described in this Procurement to more than one (1) Bidder.

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

xxii. if the WRDSB receives a bid from a Supplier with Rates that are abnormally lower than the Rates in other Bids, the WRDSB may verify with the Bidder that the Bidder satisfies the conditions for participation and can fulfill the Agreement.

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

56. Responsibilities of the Supplier

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

The Supplier shall:

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

ii. act in a professional manner always when dealing with WRDSB staff, with the public, and while working on site.

iii. not, except with the consent of the WRDSB in writing, release information relating to any subsequent order for advertising, promotional or technical purposes or otherwise give it publicly in any fashion, nor shall the name of either of the WRDSB

be used for, or in connection with, any advertising or promotional purpose of the Supplier.

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

v. submit to Finance – Accounts Payable, an invoice for payment at the completion of the Work, unless otherwise stated. All applicable taxes, including HST, are to be itemized separately on invoices. Include the purchase order number on each invoice; and

vi. provide necessary information if they wish to receive payment by Electronic Funds Transfer (EFT).

57. Site and Work Examination

i. Bidders will accept the site conditions, and the requirements of the Work, as is. No modifications to the Bid will be accepted after the Closing Time.

ii. No claim for extras will be allowed for Work or difficulties encountered due to conditions of the site which were visible, knowable, or reasonably inferable, prior to the time of submission of Bid. Bidders shall accept sole responsibility for any error or neglect on their part in this regard.

iii. Before submitting a Bid, each Bidder shall:
   a. carefully examine this entire Procurement Document to determine the extent of the Work, and various provisions including the maps, drawings, reports and specifications.
   b. immediately report all discrepancies between the various documents and site conditions.
   c. provide the names of Subcontractors, subconsultants, and suppliers to whom the Bidder intends to sublet a portion or portions of the Work with complete information as to the requirements of the Work. This is to include maps, drawings, reports, specifications, and all requirements of the Procurement Document including any addenda.

iv. In the event of discrepancies between the maps, drawings, reports, and the specifications regarding quantity or quantities of materials or items, and in the absence of Addenda in clarification of said discrepancies, the Bidder is to include for the larger quantity or quantities.

v. No additional payments will be made for any costs incurred through failure of the Bidder to abide by provisions stipulated in all the articles and sub-articles of this item.

vi. Any soils investigation, environmental, geotechnical, or other reports prepared or obtained with respect to the Place of the Work (collectively the “Reports”) are available from the Consultant. Where the Work involves existing buildings, structures, facilities, plant or equipment, any reports, data, or as-built drawings

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

vii. Each Bidder is solely responsible, at its own cost and expense, to conduct its own independent research and due diligence, or to perform any other investigations considered necessary by the Bidder to satisfy itself as to all existing conditions. The Bidders' obligations set out in this paragraph apply irrespective of any Reports, Data or any information contained in the Bid Documents.

viii. No allowances will be made for additional costs, and no claims will be entertained in connection with conditions which could reasonably have been ascertained by investigation or other due diligence undertaken prior to the Submission Deadline, and/or in connection with Work which is required and which is reasonably inferable from the Bid Documents, the Reports and/or Data as being necessary.

58. Site Existing Services, if applicable

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

Before starting work, the Supplier shall familiarize themselves of the exact location of all such utilities and structures and shall assume all liability for damage to them. Where extra measures are required to support utility poles during construction either by the utility involved or the Supplier 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.

59. Site Inspection and Control

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

60. Site Investigation

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

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

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

61. Site Safety and Clean Up

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

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

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

62. Suspension of Bidders

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

63. Sustainable Purchasing

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

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

64. Termination

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

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

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

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

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

65. Termination for Convenience

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

66. Termination for Lack of Funding

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

67. Tools and Equipment

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

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

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

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

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

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

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

68. Traffic/Pedestrian Safety

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

69. Traffic Control and Site use

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

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

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

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

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

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

70. Usage Reports

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

71. Variation of Bid Prices

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

72. Volume and Exclusivity

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

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

73. Waiver

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

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

74. Warranty and Maintenance

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

75. Work Continuity

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

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

76. Work Requirements

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

77. Workplace Safety Insurance Board (WSIB) Certificate

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

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

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

END OF SECTION

00 73 00 "The Supplementary Conditions"

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

(the "Supplementary Conditions")

AGREEMENT, DEFINITIONS, AND

GENERAL CONDITIONS

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

AGREEMENT BETWEEN OWNER AND CONTRACTOR

ARTICLE A-1 – THE WORK

SC17.1	A-1.3	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 25th day of August in the year 2026. .2 (if applicable) *Occupancy* by the 25th day of August in the year 2026, and .3 *Ready-for-Takeover* by the 4th day of September in the year 2026."
SC1.1		

ARTICLE A-3 – CONTRACT DOCUMENTS

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

ARTICLE A-4 – CONTRACT PRICE

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

ARTICLE A-5 – PAYMENT

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

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

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

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

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

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

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

DEFINITIONS

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

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

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

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

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

GENERAL CONDITIONS OF THE STIPULATED PRICE CONTRACT

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

PART 1 GENERAL PROVISIONS

GC 1.1 CONTRACT DOCUMENTS

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

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

GC 1.3 RIGHTS AND REMEDIES

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

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

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

PART 2 ADMINISTRATION OF THE CONTRACT

GC 2.2 ROLE OF THE CONSULTANT

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

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

GC 2.3 REVIEW AND INSPECTION OF THE WORK

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

GC 2.4 DEFECTIVE WORK

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

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

PART 3 EXECUTION OF THE WORK

GC 3.1 CONTROL OF THE WORK

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

GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

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

GC 3.3 TEMPORARY WORK

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

GC 3.4 CONSTRUCTION SCHEDULE

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

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

GC 3.5 SUPERVISION

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

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

GC 3.6 SUBCONTRACTORS AND SUPPLIERS

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

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

GC 3.7 LABOUR AND PRODUCTS

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

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

GC 3.8 SHOP DRAWINGS

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

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

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

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

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

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

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

***NEW* GC 3.11 CLEAN UP**

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

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

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

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

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

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

PART 4 ALLOWANCES

GC 4.1 CASH ALLOWANCES

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

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

PART 5 PAYMENT

GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

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

GC 5.2 APPLICATIONS FOR PAYMENT

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

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

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

GC 5.3 PAYMENT

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

GC 5.5 FINAL PAYMENT

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

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

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

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

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

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

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

.1 the *Consultant* will either:

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

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

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

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

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

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

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

GC 5.6 DEFERRED WORK

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

***NEW* GC 5.8 DEFICIENCY HOLDBACK**

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

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

PART 6 CHANGES IN THE WORK

GC 6.1 OWNER'S RIGHT TO MAKE CHANGES

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

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

GC 6.2 CHANGE ORDER

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

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

GC 6.3 CHANGE DIRECTIVE

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

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

GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

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

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

GC 6.5 DELAYS

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

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

PART 7 DEFAULT NOTICE

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

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

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

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

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

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

PART 8 DISPUTE RESOLUTION

GC 8.1 AUTHORITY OF THE CONSULTANT

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

GC 8.2 ADJUDICATION

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

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

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

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

.4 there shall not be any oral communications with respect to issues in dispute that are the subject of an *Adjudication* between a party and the adjudicator unless it is made in the presence of both parties or their legal representatives; and

.5 a copy of all written communications between the adjudicator and a party shall be given to the other party at the same time.

8.2.5 Any documents or information disclosed by the parties during an *Adjudication* are confidential and the parties shall not use such documents or information for any purpose other than the *Adjudication* in which they are disclosed and shall not disclose such documents and information to any third party, unless otherwise required by law, save and except the for the adjudicator.

8.2.6 If the *Contractor* fails to comply with any of the notice requirements set out in the *Contract*, including the time limits set out in any of the following:

.1 GC 6.4 – CONCEALED OR UNKNOWN CONDITIONS;

.2 GC 6.5 – DELAYS;

.3 GC 6.6 – CLAIMS FOR A CHANGE IN CONTRACT PRICE;

.4 PART 8 DISPUTE RESOLUTION

.5 GC 9.2 – TOXIC AND HAZARDOUS SUBSTANCES

.6 GC 9.3 – ARTIFACTS AND FOSSILS; or

.7 GC 9.5 - MOULD

in respect of any claim or dispute, the *Contractor* shall have no entitlement whatsoever (including to an increase in the *Contract Price*, or an extension of *Contract Time*) in the context of an *Adjudication* under the *Construction Act* and waives the right to make any such claims or disputes in an *Adjudication*. This GC 8.2.6 shall operate conclusively as an estoppel and bar in the event such claims or disputes are brought in an *Adjudication* and the *Owner* may rely on this GC 8.2.6 as a complete defence to any such claims or disputes.

8.2.7 The parties hereby acknowledge and agree,

.1 that counterclaims, claims of set-off or the exercise or use of other contractual rights that permit the *Owner* to withhold, deduct or retain from monies otherwise owed to the *Contractor* under the *Contract* may be referred to, and included as part of, *Adjudications* under the *Construction Act*;

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

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

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

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

GC 8.3 NEGOTIATION, MEDIATION AND ARBITRATION

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

PART 9 PROTECTION OF PERSONS AND PROPERTY

GC 9.1 PROTECTION OF WORK AND PROPERTY

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

GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

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

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

GC 9.4 CONSTRUCTION SAFETY

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

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

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

PART 10 GOVERNING REGULATIONS

GC 10.1 TAXES AND DUTIES

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

GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

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

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

GC 10.4 WORKERS' COMPENSATION

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

GC 11.1 INSURANCE

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

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

.2 **Automobile Liability Insurance**

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

.3 **Aircraft and Watercraft Liability Insurance**

Intentional Deleted. Not Applicable

.4 Property and Boiler and Machinery Insurance

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

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

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

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

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

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

.5 Contractors' Equipment Insurance

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

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

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

***NEW* GC 11.2 CONTRACT SECURITY**

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

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

PART 12 OWNER TAKEOVER

GC 12.1 READY-FOR-TAKEOVER

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

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

GC 12.2 EARLY OCCUPANCY

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

GC 12.3 WARRANTY

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

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

PART 13 INDEMNIFICATION AND WAIVER

GC 13.1 INDEMNIFICATION

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

GC 13.2 WAIVER OF CLAIMS

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

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

***NEW* PART 14 OTHER PROVISIONS**

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

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

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

APPENDIX 1
to the Supplementary Conditions

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

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

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

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

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

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

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

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

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

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

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

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

.11 a current Workplace Safety Insurance Board clearance certificate;

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

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

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

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

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

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

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

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

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

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

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

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

END OF AMENDMENTS TO CCDC 2 - 2020

DIVISION 01 - GENERAL REQUIREMENTS

01 14 00 – Work Restrictions

1.0 GENERAL

1.1. SECTION INCLUDES

.1 Connecting to existing services

.2 Special scheduling requirements

1.2. RELATED SECTIONS

.1 Section 01 53 00 - Temporary Construction.

.2 Section 01 33 00 - Submittal Procedures.

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

1.3. EXISTING SERVICES

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

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

.1 Keep duration of interruptions minimum.

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

.2 Provide for vehicular, pedestrian and personnel traffic.

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

1.2. AFTER HOURS WORK

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

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

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

.4 Bidders are cautioned that the Board will be compensated by the Contractor for false alarms. Any costs associated with each false alarm will be levied against the

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

.1 Fines or penalties imposed by the local Fire Services,

.2 Fines or penalties imposed by the local Police Services,

.3 Overtime costs borne by the Board.

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

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

1.3. SPECIAL REQUIREMENTS

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

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

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

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

END OF SECTION

01 19 00 – Specifications and Documents

1.0 GENERAL

1.1. RELATED DOCUMENTS

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

1.2. WORDS AND TERMS

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

1.3. COMPLEMENTARY DOCUMENTS

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

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

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

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

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

1.4. PRECEDENCE OF DOCUMENTS

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

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

.2 the Defined Terms, Definitions;

.3 Supplementary Conditions;

.4 the General Conditions;

.5 Sections of Division 01 of the specifications;

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

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

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

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

1.5. SPECIFICATION GRAMMAR

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

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

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

END OF SECTION

01 21 00 – Allowances

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 45 00 – Quality Control.

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

1.2. GENERAL

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

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

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

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

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

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

1.3. CASH ALLOWANCES

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

.2 Supply only allowances shall include:

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

.3 Supply and install allowances shall include:

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

.5 Applicable taxes and duties, excluding HST.

.4 Inspection and testing allowances shall include:

.1 Net cost of inspection and testing services.

.2 Applicable taxes and duties, excluding HST.

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

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

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

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

1.4. ALLOWANCES SCHEDULE

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

1	Designated Substance Removal. (Additional removal not already identified in the ACM Summary report)	$5,000.00
2	Independent Testing & Inspection (soil, concrete, mortar, structural steel, air barrier, paving, painting) (As directed by the Consultant)	$5,000.00
3	Window coverings (Additional window coverings not addressed elsewhere in the specification)	$5,000.00
4	Data / Security / PA	$20,000.00
5	Aluminum Ramp	$6,000.00
6	Storage 20’ Containers	$15,000.00
7	Power door operators and Barrier Free Ramp (not shown on drawings)	$60,000.00
8	Furniture	$40,000.00
9	Remedial work (work not included in the contract in the areas of painting, acoustic ceilings or flooring)	$10,000.00
	Total of All Allowances:	**$166,000.00**

END OF SECTION

01 31 00 – Project Managing And Coordination

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 32 00 - Construction Progress Documentation.

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 01 53 00 – Temporary Construction Facilities

.4 Section 01 61 00 – Product Requirements

.5 Section 01 78 00 – 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 00.
- .10 Maintenance material and data as specified in Section 01 78 00.
- .11 Take-over procedures, acceptance, and warranties as specified in Section 01 78 00.
- .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 00.

.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 00

.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 00 - 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 01 35 17-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)

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01 35 23 – Health And Safety

1.0 GENERAL

1.1. RELATED SECTIONS

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

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 01 35 17 – Fire Safety Requirements

.4 Section 01 35 43 –Designated Substances

.5 Section 01 41 00 – Regulatory Requirements

.6 Section 01 53 00 – Temporary Construction Facilities

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

1.2. REFERENCES

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

1.3. SAFETY PLAN

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

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

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

1.4. TEMPORARY WORK

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

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

1.5. RESPONSIBILITY

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

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

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

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

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

1.6. SUBMITTALS

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

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

.1 Results of site specific safety hazard assessment.

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

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

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

.5 Submit copies of incident and accident reports.

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

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

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

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

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

1.7. SAFETY ACTIVITIES

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

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

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

1.8. HEALTH AND SAFETY COORDINATOR

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

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

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

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

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

.5 be on site during execution of Work.

1.9. POSTING OF DOCUMENTS

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

1.10. CORRECTION OF NON-COMPLIANCE

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

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

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

1.11. PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:

.1 Refer to Section 01 35 43 **Designated Substances**

1.12. HAZARDOUS WORK

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

1.13. WORK STOPPAGE

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

1.14. LOCKOUT PROCEDURES

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

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

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

1.15. OVERHEAD LIFTING

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

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

1.16. WARNING SIGNS AND NOTICES

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

1.17. FIRE PROTECTION

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

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

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

1.18. SCENT-FREE ENVIRONMENT

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

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

END OF SECTION

01 35 43 –Designated Substances

1.0 GENERAL

1.1. RELATED SECTIONS

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

.2 Section 01 41 00 – Regulatory Requirements.

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

1.2. REFERENCES

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

1.3. ASBESTOS and OTHER REGULATED SUBSTANCES

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

.2 A Project Specific Designated Substance / Lead Report, as prepared by WRDSB retained consultants or Environmental Officer for this facility, is attached under Appendix 013543 B.

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

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

1.4. PROTOCOL FOR ABATEMENT WORK

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

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

.2 Asbestos Abatement Contractors must maintain appropriate insurance coverage and WSIB certification and provide proof upon request.

.3 Asbestos Abatement Contractors shall only use personnel certified by the Ontario College of Trades and must provide the Board with proof of asbestos certification (AAS and AAW) for all supervisors and all staff involved.

.4 School Access: During regular school hours, all abatement contractors are to report to the school office upon arrival. They must sign in all personnel and identify to a person of authority, preferably the Principal, their purpose for being there as well as the area of work. After school hours, ensure card-in/card-out procedures are followed and building security is maintained. Contractor staff shall NOT prop doors open, and ensure that doors are locked.

.5 Communication:

.1 Asbestos Abatement Contractor will contact the school's Principal and/or Vice Principal (phone numbers are available on the WRDSB website) to set up a firm date and time for the abatement (removal/repair). This communication shall allow at least 72 hours notice ahead of the proposed work unless it is emergency work.

.2 Confirmation of the date shall be via email to the following:

.1 Principal / Vice-principal

.2 Facility Manager

.3 Environmental Officers (environmental@wrdsb.ca)

.3 When working under a general contractor, also notify:

.1 Project manager for the General Contractor

.2 Architect/Consultant for the project

.3 The Board's Project Coordinator

.4 This communication shall indicate the date, the start time, the anticipated completion time (including any required air clearances and teardowns), the asbestos abatement type, and the areas of work within the school or building. It should also identify any mechanical equipment that is required to be disabled for the duration of the operations.

.5 For emergency work where requested by Area Supervisors, Facility Managers, On-Call Manager/Supervisor, or Environmental Officers, no notification to the school is required by the abatement contractor. Notification to the Principal

or Vice-Principal will be managed by the Area Supervisor, Facility Manager, On-Call Manager/Supervisor, or Environmental Officers.

.6 For **Type 2 Removals**, also notify: the Ministry of Labour, Immigration, Training and Skills Development (MLITSD) where required by Regulation.

.7 For Type 3 Removals, also notify: Manager of Health, Safety & Security, (healthandsafety@wrdsb.ca); and, the MLITSD where required by Regulation.

.8 Discussions related to the work, whether with media, school staff, or any others, is NOT permitted. Questions or enquiries shall be directed to the Board's Communication Officer (comms-team@wrdsb.ca) by the person(s) seeking information, where warranted.

.6 Asbestos Removal Assessment

.1 When working directly with the Board to undertake non-emergency abatement, the contractor is to assess the work on site and provide a cost estimate to the Environmental Officer. Some work will require discussion with the Facility Manager or Environmental Officer to determine if additional work should be done to completely remove all additional ACM material from the area or similar.

.2 When abatement is to be done under a General Contractor, the proposed work is to be quoted directly to the General Contractor. Additional abatement not already within the original scope of work or tender is to be quoted to the General Contractor for approval by the Project Coordinator or Architect.

.7 Asbestos Operations

.1 Asbestos operations shall be conducted according to Type, where each Type will require special timing and considerations as follows:

.2 **Type 1:** Any time behind a secured door or enclosure.

.3 **Type 2:** Any time when students and teaching staff are NOT present in the building, and behind a secured door or enclosure. During the school year, the work shall be performed outside of the regular program hours, Monday to Friday, anytime on weekends, when no regular programs are scheduled.

.4 The work shall be performed anytime during March Break, Winter Break, and Summer Break, when teaching staff are NOT present in the building.

.5 **Type 3:** Outside of school regular program hours, during unoccupied times, and behind a secured door or enclosure. During the school year, the work shall be performed outside of the regular program hours, Monday or Friday, anytime on weekends, provided all rentals are cancelled and card access is restricted for teaching staff entering the facility.

.6 The work shall be performed anytime during March Break, Winter Break, and Summer Break, provided all rentals are cancelled and card access is restricted for teaching staff entering the facility

.7 Facility Services personnel and Office staff may be present in the building due to training in Asbestos Awareness.

.8 All Type 3 work must consider one (1) additional day in case the clearance sampling fail.

.9 Emergency work shall be carried out the same day (evening/night) or under exceptional conditions the following day/evening/night. Contractors shall exercise discretion when working in the school to minimize the potential for health and safety concerns by the staff, students, and school community. Where warranted, contact Area Supervisor, Facility Manager, On-Call Manager/Supervisor, or Environmental Officer to obtain further direction.

.10 Before beginning any Type 1, Type 2, or Type 3 Operations, the work area must be secured, all doors locked, WHITE poly and caution tape used in open areas/corridors and “construction” warning signs added to all access points to keep school staff and students clear of all work areas.

.11 If the work area is in use by Board staff, contact the Area Supervisor to assist in vacating the area. If unable, contact the Area Supervisor, Facility Manager, On-Call Manager/Supervisor, Environmental Officer, or Project Coordinator to reschedule the work.

.12 Board preference is to use “construction” warning signs at all areas accessible to school staff and students. Behind those secured areas, a sufficient number of “asbestos” signs, posted in compliance with O. Reg. 278/05.

.13 The Asbestos Abatement Contractor is responsible to disable the air handling unit/fan serving the work area (school wing, floor, or multiple floors if air handling unit/fan serve more than one floor) and prevent operation using Lock-out/Tag-out devices for each air handling unit/fan. Exercise caution during the heating season to ensure areas of the building are maintained above freezing and ensure equipment is turned back on after abatement/air clearance completed.

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

.15 All dust and waste is to be cleaned up and removed at frequent/regular intervals as the work proceeds and immediately upon completion, but no later than the end of the work day. No waste bags or similar are to be left behind. No additional construction work shall be performed by an Asbestos Abatement Contractor.

1.5. SUBMITTALS

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

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

.2 For those projects requiring air clearance, ensure this info is sent without delay but in all cases no later than 24 hours after sampling. All Type 3 work must take into account that the initial samples may not pass and the contractor must allow one (1) additional day to re-clean and re-sample before school is to resume operations. For those projects not under the direct supervision of an Environmental Consultant, the contractor is to expedite the air clearance sampling with the lab of their choice and carry these costs.

.3 Forward Air Clearance results to:

- .1 Principal/Vice-principal (contact info sent with Work Request)
- .2 Facility Manager (contact info sent with Work Request)
- .3 Environmental Officers (environmental@wrdsb.ca)
- .4 Manager of Mechanical, Electrical and Environmental Services (lou_lima@wrdsb.ca)
- .5 Manager of Health, Safety & Security (healthandsafety@wrdsb.ca)
- .6 Project team when working under a General Contractor

1.6. ACKNOWLEDGEMENT

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

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

END OF SECTION

Appendix 01 35 43A Asbestos Audit Report

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.

Southwood Secondary School

2024 Asbestos Audit Update Report

Project Location:
30 Southwood Drive, Cambridge, ON

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

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

January 18, 2024

MTE File No.: C34532-944

For Tender Purposes

Engineers, Scientists, Surveyors.

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

January 18, 2024
MTE File No.: C34532-944

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

RE: 2024 Asbestos Audit Update – Southwood Secondary School
30 Southwood Drive, Cambridge, Ontario

For Tender Purposes

1.0 INTRODUCTION

MTE Consultants Inc. (MTE) was authorized by the Waterloo Region District School Board (WRDSB) to conduct the 2024 Asbestos Audit Update for the subject building.

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

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

2.0 SCOPE OF WORK

The Scope of Work for this assessment was completed by MTE and included the following activities:

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

3.0 METHODOLOGY AND ASSESSMENT CRITERIA

This inspection was conducted by visual and laboratory identification methods for the assessment of ACM and their corresponding location, use, condition, and friability. The areas outlined in Section 2.0 were inspected limited to building components, materials and service connections. Notwithstanding that reasonable attempts were made to identify all ACMs, the possibility of concealed material exists and may not become visible until substantial demolition has occurred and therefore are currently undocumented and did not include the following.

- The following rooms:
  - WRDSB Room 57 - Hydro One electrical room and school staff do not have access keys.
  - WRDSB Room 001, 93A & 93B – Not accessible with on keys on site and school staff did not have access keys.
- Locations that may be hazardous to the surveyor, such as electrical equipment.
- Where invasive inspection could cause consequential damage to the property or impair the integrity of the equipment, such as roof systems, underground services or components of mechanical equipment.
- Locations concealed by building finishes that require substantial demolition or removal for access or determination of quantities.
- Materials that is present in such an inconsistent fashion that without complete removal of finishes, the extent cannot be determined.
- Non-permanent items or personal contents, furnishings.
- Settled dust or airborne agents unless otherwise stated.

3.1 Condition of ACM

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

Monitor Annually

These are items which display minor isolated damage; however, do not pose an immediate risk to workers from exposure to asbestos fibres due to the current condition of the material and/or location. No remediation is required at this time; however, these items should be monitored on a yearly basis for evidence of continued degradation. Should the condition of the material change, an evaluation should be completed by a competent person to determine remedial action.

Abatement Action Required

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

4.0 FINDINGS

An inspection of the building was conducted by MTE on January 4, 2024 and March 26, 2024. The two-storey school was constructed in 1962 with additions in 1965, 1981 and 1984. 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**.

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4.1 Analytical Results

As part of this inspection, a total of 9 bulk samples of suspect ACM were submitted for asbestos analysis with a total of 10 analyses being performed. The difference between the number of samples submitted and the number of samples analysed can be a function of either the stop-positive method or the requirement of analyzing multiple layers, performed by the laboratory, from a single sample reported as additional samples or subsets of a sample.

Bulk samples were submitted for asbestos analysis to Paracel Laboratories Ltd. (Paracel), in Mississauga, Ontario. Paracel is certified under the Canadian Association of Laboratory Accreditation to perform asbestos analysis of bulk samples (accreditation number A3762). Laboratory analysis was conducted in accordance with the United States Environmental Protection Agency (USEPA), Test Method EPA/600-R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, June, 1993 by Polarized Light Microscopy (PLM) as prescribed by O. Reg. 278/05.

Refer to Appendix C, Table 3 for a detailed summary of the analytical results for each sampled material. Laboratory certificates of analysis are included in **Appendix D**.

4.2 Removed ACM

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

WRDSB Room 48B

- 2 parged pipe fittings.

WRDSB Room 134A

- 4 parged pipe fittings.

WRDSB Room 134C & D

- 9” x 9” Grey vinyl floor tile.

WRDSB Room 114

- 12” x 12” Blue oatmeal vinyl floor tile.

WRDSB Room 116

- 12” x 12” Tan with brown fleck vinyl floor tile.

WRDSB Room 116B

- 10 parged pipe fittings.

WRDSB Room 116B

- 9” x 9” beige with brown and white streak vinyl floor tile.

WRDSB Room 202A

- 1’ x 1’ large and medium pinhole ceiling tile.

WRDSB Room 211A

- Pipe insulation.

WRDSB Room 250

- 20 parged pipe fittings.

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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.

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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 2.0. 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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For Tender Purposes

Appendix A

Asbestos Management Database

For Tender Purposes

School Name	Legend:	Notes:
Southwood Secondary School	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - Material Sampled VC - Visually Confirmed - Material not sampled, deemed ACM NF - Non-Friable F- Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
Original: 1962		
Addition(s): 1965, 1981, 1984		

WRDSB Fixed Reference Number	Functional Space Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
Structure/Additions											
		Original Building	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
		Original Building	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-
		Original Building	Façade	Concrete	Concrete	-	Non ACM	-	-	-	-
		Original Building	Deck	Concrete	-	-	Non ACM	-	-	-	-
		Original Building	Not Inspected	Not Inspected	Roofing Materials	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
		Original Building	Window	Interior/Exterior Frame	Silicon	-	Non ACM	-	-	-	-
		Original Building	Door	Interior/Exterior Frame	Silicon	-	Non ACM	-	-	-	-
		Original Building	Floor	Mastic	Black Mastic	NF	ACM	SL	S01/2ABC	8-Jul-19	4% Chrysotile
		1965 Addition	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
		1965 Addition	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-
		1965 Addition	Façade	Concrete	Concrete	-	Non ACM	-	-	-	-
		1965 Addition	Deck	Concrete	-	-	Non ACM	-	-	-	-
		1965 Addition	Not Inspected	Not Inspected	Roofing Materials	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
		1965 Addition	Window	Interior Frame	White Sealant	NF	ACM	SL	S03ABC	21-Sep-20	1% Chrysotile
		1965 Addition	Window	Exterior Frame	Silicon	-	Non ACM	-	-	-	-
		1965 Addition	Door	Interior/Exterior Frame	Silicon	-	Non ACM	-	-	-	-
		1965 Addition	Floor	Mastic	Black Mastic	NF	ACM	SL	S03ABC	21-Sep-20	1% Chrysotile
		1965 Addition	Ceiling Tile 1'x1'	Mastic	Brown Mastic	-	ACM	SL	S25ABC	15-Sep-08	ND
		1981 Addition	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
		1981 Addition	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-
		1981 Addition	Façade	Concrete	Concrete	-	Non ACM	-	-	-	-
		1981 Addition	Deck	Metal Pan	-	-	Non ACM	-	-	-	-
		1981 Addition	Not Inspected	Not Inspected	Roofing Materials	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
		1981 Addition	Window	Interior/Exterior Frame	Silicon	-	Non ACM	-	-	-	-
		1981 Addition	Door	Interior/Exterior Frame	Silicon	-	Non ACM	-	-	-	-
		1984 Addition	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
		1984 Addition	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-
		1984 Addition	Façade	Concrete	Concrete	-	Non ACM	-	-	-	-
		1984 Addition	Deck	Metal Pan	-	-	Non ACM	-	-	-	-
		1984 Addition	Not Inspected	Not Inspected	Roofing Materials	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
Level 1											
26A	1172	Storage	Floor	Carpet	-	-	Non ACM	-	-	-	-
26A	1172	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
26A	1172	Storage	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
26B	1173	Storage	Floor	Carpet	-	-	Non ACM	-	-	-	-

For Tender Purposes

School Name	Legend:	Notes:
Southwood Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **NF** - Non-Friable **F**- Friable	**All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.**
Date Built:		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**
Original: 1962		
Addition(s): 1965, 1981, 1984		

WRDSB Fixed Reference Number	Functional Space Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
26B	1173	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
26B	1173	Storage	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
26C	1174	Storage	Floor	Carpet	-	-	Non ACM	-	-	-	-
26C	1174	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
26C	1174	Storage	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
26D	1175	Storage	Floor	Vinyl Floor Tile 12"x12"	Grey Dense Fleck (New)	-	Non ACM	-	-	-	-
26D	1175	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
26D	1175	Storage	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
46	1097	Boiler Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
46	1097	Boiler Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
46	1097	Boiler Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
46	1097	Boiler Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
46A	1096	Boiler Room	Piping	Pipe Insulation	Mag Block	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
46A	1096	Boiler Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
46A	1096	Boiler Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
46A	1096	Boiler Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
46B	1170	Mechanical Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
46B	1170	Mechanical Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
46B	1170	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
46B	1170	Mechanical Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
47	1098	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
47	1098	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
47	1098	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
47	1098	Storage	Wall	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
47	1098	Storage	Ducting	Flex Joint	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
47A	1099	Janitors Closet	Floor	Vinyl Floor Tile 9"x 9"	Olive with Brown and White	NF	ACM	HM	S26	15-Sep-08	2.5% Chrysotile
47A	1099	Janitors Closet	Wall	Concrete	-	-	Non ACM	-	-	-	-
47A	1099	Janitors Closet	Wall	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
47A	1099	Janitors Closet	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
48	1092	Washroom	Floor	Vinyl Floor Tile 12"x 12"	Brown Dense Fleck (New)	-	Non ACM	-	-	-	-
48	1092	Washroom	Wall	Ceramic Tile	-	-	-	-	-	-	-
48	1092	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
48A	1093	Storage	Floor	Vinyl Floor Tile 12"x 12"	Brown Oatmeal	-	Non ACM	-	S07	15-Sep-08	ND
48A	1093	Storage	Wall	Ceramic Tile	-	-	-	-	-	-	-
48A	1093	Storage	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
48B	1094	Washroom	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
48B	1094	Washroom	Wall	Ceramic Tile	-	-	-	-	-	-	-
48B	1094	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
48C	1095	Custodial	Floor	Vinyl Floor Tile 9"x 9"	Grey with White Fleck	NF	ACM	HM	S10	15-Sep-08	2.1% Chrysotile
48C	1095	Custodial	Wall	Concrete	-	-	Non ACM	-	-	-	-

For Tender Purposes

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48C	1095	Custodial	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
50	1100	Janitors Closet	Floor	Concrete	-	-	Non ACM	-	-	-	-
50	1100	Janitors Closet	Wall	Concrete	-	-	Non ACM	-	-	-	-
50	1100	Janitors Closet	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
51	1091	Office	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
51	1091	Office	Floor	Laminate	-	-	Non ACM	-	-	-	-
51	1091	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
51	1091	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	-	-	-
51	1091	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
51	1091	Office	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
51A	1090	Closet	Floor	Vinyl Sheet Flooring	Grey (New)	-	Non ACM	-	-	-	-
51A	1090	Closet	Wall	Concrete	-	-	Non ACM	-	-	-	-
51A	1090	Closet	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
51A	1090	Closet	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
51B	1090	Closet	Floor	Vinyl Floor Tile 12"x 12"	Brown Oatmeal	-	Non ACM	-	S07	15-Sep-08	ND
51B	1090	Closet	Wall	Concrete	-	-	Non ACM	-	-	-	-
51B	1090	Closet	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
51B	1090	Closet	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
57	1065	Machine Room	No-Access								
58	1067	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
58	1067	Washroom	Wall	Ceramic	-	-	Non ACM	-	-	-	-
58	1067	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
59	1066	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
59	1066	Washroom	Wall	Ceramic	-	-	Non ACM	-	-	-	-
59	1066	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
60	1068	AV Room	Ceiling	Ceiling Tile 2'x4'	Fibreglass Ceiling Tile	-	Non ACM	-	-	-	-
60	1068	AV Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
60	1068	AV Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
60	1068	AV Room	Ceiling	Metal Pan	-	-	Non ACM	-	-	-	-
61	1070	Basement Mechanical	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
61	1070	Basement Mechanical	Floor	Concrete	-	-	Non ACM	-	-	-	-
61	1070	Basement Mechanical	Wall	Concrete	-	-	Non ACM	-	-	-	-
61	1070	Basement Mechanical	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
63	1071	PA Room	Floor	Vinyl Floor Tile 12"x12"	Green Oatmeal (New)	-	Non ACM	-	-	-	-
63	1071	PA Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
63	1071	PA Room	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
65	1072	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
65	1072	Office	Wall	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
65	1072	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
67	1073	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-

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67	1073	Office	Wall	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
67	1073	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
68	1074	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
68	1074	Office	Wall	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
68	1074	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
69/A	1075	General Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
69/A	1075	General Office	Floor	Vinyl Floor Tile 12"x12"	Rose Oatmeal (New)	-	Non ACM	-	-	-	-
69/A	1075	General Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
69/A	1075	General Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
70	1077	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
70	1077	Office	Wall	Wood	-	-	Non ACM	-	-	-	-
70	1077	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
71	1076	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
71	1076	Office	Wall	Wood	-	-	Non ACM	-	-	-	-
71	1076	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
71	1076	Office	Wall	Wood	-	-	Non ACM	-	-	-	-
71	1076	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
72	1078	Washroom	Floor	Vinyl Floor Tile 12"x 12"	Brown Oatmeal	-	Non ACM	-	S07	15-Sep-08	ND
72	1078	Washroom	Wall	Ceramic Tile	-	-	-	-	-	-	-
72	1078	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
73	1079	Washroom	Floor	Vinyl Floor Tile 12"x 12"	Brown Oatmeal	-	Non ACM	-	S07	15-Sep-08	ND
73	1079	Washroom	Wall	Ceramic Tile	-	-	-	-	-	-	-
73	1079	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
74	1080	Kitchen	Floor	Vinyl Floor Tile 9"x 9"	Brown with White Fleck	NF	ACM	HM	S11	15-Sep-08	2.4% Chrysotile
74	1080	Kitchen	Wall	Concrete	-	-	Non ACM	-	-	-	-
74	1080	Kitchen	Wall	Plaster	-	-	Non ACM	SL	S01A	21-Sep-20	ND
74	1080	Kitchen	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
75	1081	Staff Room	Floor	Vinyl Floor Tile 9"x 9"	Brown with White Fleck	NF	ACM	HM	S11	15-Sep-08	2.4% Chrysotile
75	1081	Staff Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
75	1081	Staff Room	Wall	Plaster	-	-	Non ACM	SL	S01C	21-Sep-20	ND
75	1081	Staff Room	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
91	1114	Kitchen	Floor	Vinyl Floor Tile 12"x12"	White/Grey Oatmeal	-	Non ACM	-	S27abc	15-Sep-08	ND
91	1114	Kitchen	Wall	Concrete	-	-	Non ACM	-	-	-	-
91	1114	Kitchen	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
92	1115	Cafeteria	Floor	Concrete	-	-	Non ACM	-	-	-	-
92	1115	Cafeteria	Wall	Concrete	-	-	Non ACM	-	-	-	-
92	1115	Cafeteria	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
92A	1127	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
92A	1127	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
92A	1127	Storage	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
93	1123	Storage	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
93	1123	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-

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93	1123	Storage	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
93A	1125	Tuck Shop Storge	No-Access								
93B	1126	Tuck Shop	No-Access								
101	1053	Office	Floor	Vinyl Floor Tile 12"x12"	Blue Oatmeal	NF	ACM	SL	S14abc	15-Sep-08	1.2% Chrysotile
101	1053	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
101	1053	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
101	1053	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
101	1053	Office	Piping	Pipe Insulation	Air Cell	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
102	1111	Classroom 102	Floor	Vinyl Floor Tile 9"x 9"	Brown with Blue and White Fleck	NF	ACM	HM	S08	15-Sep-08	2.5% Chrysotile
102	1111	Classroom 102	Wall	Concrete	-	-	Non ACM	-	-	-	-
102	1111	Classroom 102	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
102	1111	Classroom 102	Ceiling	Ceiling Tile 1'x1'	Large and Small Pinhole (Cellulose)	-	Non ACM	SL	S01ABC	26-Mar-24	-
103	1050	Special Ed	Floor	Vinyl Floor Tile 12"x12"	Blue Oatmeal	NF	ACM	HM	S14	15-Sep-08	1.2% Chrysotile
103	1049	Kitchen	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
103	1049	Kitchen	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
103	1050	Special Ed	Wall	Concrete	-	-	Non ACM	-	-	-	-
103	1050	Special Ed	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15ab	15-Sep-08	ND
103	1050	Special Ed	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2006)	-	Non ACM	-	-	-	-
103	1050	Special Ed	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
103A	1052	Storage	Floor	Vinyl Floor Tile 12"x12"	Blue Oatmeal	NF	ACM	HM	S14	15-Sep-08	1.2% Chrysotile
103A	1052	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
103A	1052	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15ab	15-Sep-08	ND
103A	1052	Storage	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2006)	-	Non ACM	-	-	-	-
103A	1052	Storage	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
103B	1051	Washroom	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
103B	1051	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
103B	1051	Washroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
103B	1051	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2006)	-	Non ACM	-	-	-	-
104	1110	Classroom 104	Floor	Vinyl Floor Tile 9"x9"	Grey with White Fleck	NF	ACM	HM	S10	15-Sep-08	2.1% Chrysotile
104	1110	Classroom 104	Wall	Concrete	-	-	Non ACM	-	-	-	-
104	1110	Classroom 104	Ceiling	Ceiling Tile 1'x1'	Large and Small Pinhole (Cellulose)	-	Non ACM	HM	-	26-Mar-24	-
104	1110	Classroom 104	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
104	1110	Classroom 104	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
105	1046	Science Lab	Floor	Vinyl Floor Tile 12"x12"	Blue Oatmeal	NF	ACM	HM	S14	15-Sep-08	1.2% Chrysotile
105	1046	Science Lab	Wall	Drywall	Drywall Joint Compound	-	Non ACM	SL	S02A	21-Sep-20	ND
105	1046	Science Lab	Wall	Concrete	-	-	Non ACM	-	-	-	-
105	1046	Science Lab	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
105	1046	Science Lab	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
105A	1047	Prep Room	Floor	Vinyl Floor Tile 12"x12"	Blue Oatmeal	NF	ACM	HM	S14	15-Sep-08	1.2% Chrysotile
105A	1047	Prep Room	Wall	Concrete	-	-	Non ACM	-	-	-	-

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105A	1047	Prep Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
105A	1047	Prep Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
105A	1047	Prep Room	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
105B	1048	Science Office	Floor	Vinyl Floor Tile 12"x12"	Blue Oatmeal	NF	ACM	HM	S14	15-Sep-08	1.2% Chrysotile
105B	1048	Science Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
105B	1048	Science Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
105B	1048	Science Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
105B	1048	Science Office	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
106	1109	Classroom 106	Floor	Vinyl Floor Tile 12"x12"	Salmon with Black Speck	NF	ACM	SL	S16abc	15-Sep-08	3.5% Chrysotile
106	1109	Classroom 106	Wall	Concrete	-	-	Non ACM	-	-	-	-
106	1109	Classroom 106	Ceiling	Ceiling Tile 1'x1'	Large and Small Pinhole (Cellulose)	-	Non ACM	HM	-	26-Mar-24	-
106	1109	Classroom 106	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
107	1045	Classroom 107	Floor	Vinyl Floor Tile 9"x9"	Brown with Blue and White Fleck	NF	ACM	HM	S08	15-Sep-08	2.5% Chrysotile
107	1045	Classroom 107	Wall	Concrete	-	-	Non ACM	-	-	-	-
107	1045	Classroom 107	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
107	1045	Classroom 107	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
107	1045	Classroom 107	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
108	1108	Classroom 108	Floor	Vinyl Floor Tile 12"x12"	Beige Oatmeal	-	Non ACM	-	S17abc	15-Sep-08	ND
108	1108	Classroom 108	Wall	Concrete	-	-	Non ACM	-	-	-	-
108	1108	Classroom 108	Ceiling	Ceiling Tile 1'x1'	Large and Small Pinhole (Cellulose)	-	Non ACM	HM	-	26-Mar-24	-
109	1038	Science Room 109	Floor	Vinyl Floor Tile 12"x 12"	Salmon with Black Speck	NF	ACM	HM	S16	15-Sep-08	3.5% Chrysotile
109	1038	Science Room 109	Wall	Concrete	-	-	Non ACM	-	-	-	-
109	1038	Science Room 109	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
109	1038	Science Room 109	Counter	Counter Top	Bakelite	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
109D	1040	Storage	No-Accress								
110	1106	Classroom 110	Floor	Vinyl Floor Tile 9"x9"	Green with Dark Green and White Fleck	NF	ACM	HM	S06	15-Sep-08	3.5% Chrysotile
110	1106	Classroom 110	Wall	Concrete	-	-	Non ACM	-	-	-	-
110	1106	Classroom 110	Ceiling	Ceiling Tile 1'x1'	Large and Small Pinhole (Cellulose)	-	Non ACM	HM	-	26-Mar-24	-
110	1106	Classroom 110	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
110A	1107	Office	Floor	Vinyl Floor Tile 12"x12"	Brown Oatmeal	-	Non ACM	-	S07	15-Sep-08	ND
110A	1107	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
110A	1107	Office	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
111	1037	Science Room 111	Floor	Vinyl Floor Tile 12"x 12"	Beige Oatmeal	-	Non ACM	HM	S17	15-Sep-08	ND
111	1037	Science Room 111	Wall	Concrete	-	-	Non ACM	-	-	-	-
111	1037	Science Room 111	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
111	1037	Science Room 111	Counter	Counter Top	Bakelite	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
111A	1036	Lab Storage	Floor	Vinyl Floor Tile 12"x 12"	Salmon with Black Speck	NF	ACM	HM	S16	15-Sep-08	3.5% Chrysotile
111A	1036	Lab Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
111A	1036	Lab Storage	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
111A	1036	Lab Storage	Counter	Counter Top	Bakelite	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-

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112	1105	Classroom 112	Floor	Vinyl Floor Tile 12"x12"	Salmon with Black Speck	NF	ACM	HM	S16	15-Sep-08	3.5% Chrysotile
112	1105	Classroom 112	Wall	Concrete	-	-	Non ACM	-	-	-	-
112	1105	Classroom 112	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
113	1035	Science Room 114	Floor	Vinyl Floor Tile 12"x 12"	Tan with Brown Fleck	NF	ACM	HM	S02	15-Sep-08	1.5% Chrysotile
113	1035	Science Room 114	Wall	Concrete	-	-	Non ACM	-	-	-	-
113	1035	Science Room 114	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
114	1104	Classroom 114	Floor	Vinyl Sheet Flooring	Grey	-	Non ACM	-	-	-	-
114	1104	Classroom 114	Wall	Concrete	-	-	Non ACM	-	-	-	-
114	1104	Classroom 114	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
114	1104	Classroom 114	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
114A	1030	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
114A	1030	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
114A	1030	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
114B	1034	Washroom	Floor	Vinyl Floor Tile 12"x12"	Brown Oatmeal (New)	-	Non ACM	HM	S07	15-Sep-08	ND
114B	1034	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
114B	1034	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
115	1044	Art Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
115	1044	Art Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
115	1044	Art Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	SL	S04B	21-Sep-20	ND
115	1044	Art Room	Ceiling	Ceiling Tile 1'x1'	Long Fissure Random Pinhole	-	Non ACM	SL	S18abc	15-Sep-08	ND
115A	1043	Work Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
115A	1043	Work Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
115A	1043	Work Room	Ceiling	Ceiling Tile 1'x1'	Long Fissure Random Pinhole	-	Non ACM	HM	S18	15-Sep-08	ND
115A	1044	Art Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	SL	S04C	21-Sep-20	ND
115B	1041	Office	Floor	Vinyl Floor Tile 9"x 9"	Olive with Dark Green and White Fleck	NF	ACM	SL	S19abc	15-Sep-08	2.1% Chrysotile
115B	1041	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
115B	1041	Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
115C	1042	Kiln Room	Ceiling	Panelling	Transite	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
115C	1042	Kiln Room	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
115C	1042	Kiln Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
115C	1042	Kiln Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
115C	1042	Kiln Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
115D	1039	Storage Room	Floor	Vinyl Floor Tile 12"x 12"	Salmon with Black Speck	NF	ACM	HM	S16	15-Sep-08	3.5% Chrysotile
115D	1039	Storage Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
115D	1039	Storage Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
115D	1039	Storage Room	Counter	Counter Top	Bakelite	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
116	1032	Classroom 116	Floor	Vinyl Sheet Flooring	Beige	-	Non ACM	-	-	-	-
116	1032	Classroom 116	Wall	Concrete	-	-	Non ACM	-	-	-	-
116	1032	Classroom 116	Wall	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
116	1032	Classroom 116	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-

For Tender Purposes

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WRDSB Fixed Reference Number	Functional Space Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
116A	1031	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
116A	1031	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
116A	1031	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
116A	1031	Washroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
116B	1033	Washroom	Floor	Vinyl Floor Tile 9"x 9"	Light Beige with Brown and White Streak	NF	ACM	SL	S20abc	15-Sep-08	3.1% Chrysotile
116B	1033	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
116B	1033	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
116C	1033	Pipe Chase	Floor	Concrete	-	-	Non ACM	-	-	-	-
116C	1033	Pipe Chase	Wall	Concrete	-	-	Non ACM	-	-	-	-
116C	1033	Pipe Chase	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
117	1028	AV Office	Floor	Vinyl Sheet Flooring	Brown Pebble	NF	ACM	HM	S13	15-Sep-08	30% Chrysotile
117	1028	AV Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
117	1028	AV Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
117	1028	AV Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
117A	1029	AV Storage	Floor	Vinyl Sheet Flooring	Brown Pebble	NF	ACM	HM	S13	15-Sep-08	30% Chrysotile
117A	1029	AV Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
117A	1029	AV Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
117A	1029	AV Storage	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
118	1027	Library	Floor	Wood	-	-	Non ACM	-	-	-	-
118	1027	Library	Floor	Carpet	-	-	Non ACM	-	-	-	-
118	1027	Library	Wall	Concrete	-	-	Non ACM	-	-	-	-
118	1027	Library	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	-
118	1027	Library	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	HM	S09	15-Sep-08	ND
118	1027	Library	Ceiling	Texture Coat	Plaster	-	Non ACM	SL	S28abc	3-Feb-14	ND
118	1027	Library	Piping	Pipe	Transite	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
118A	1022	Work Room	Floor	Wood	-	-	Non ACM	-	-	-	-
118A	1022	Work Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
118A	1022	Work Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	-
118A	1022	Work Room	Ceiling	Texture Coat	Plaster	-	Non ACM	HM	S28	3-Feb-14	ND
118A	1022	Work Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	HM	S09	15-Sep-08	ND
118B	1024	Seminar Room	Floor	Wood	-	-	Non ACM	-	-	-	-
118B	1024	Seminar Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
118B	1024	Seminar Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	-
118B	1024	Seminar Room	Ceiling	Texture Coat	Plaster	-	Non ACM	HM	S28	3-Feb-14	ND
118B	1024	Seminar Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	HM	S09	15-Sep-08	ND
119	1011	Gym	Floor	Hardwood	-	-	Non ACM	-	-	-	-
119	1011	Gym	Wall	Concrete	-	-	Non ACM	-	-	-	-
119	1011	Gym	Deck	Metal Pan	-	-	Non ACM	-	-	-	-
119A	1026	Fitness Room	Floor	Rubber	-	-	Non ACM	-	-	-	-
119A	1026	Fitness Room	Wall	Concrete	-	-	Non ACM	-	-	-	-

For Tender Purposes

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119A	1026	Fitness Room	Deck	Metal Pan	-	-	Non ACM	-	-	-	-
119B	1020	Equipment Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
119B	1020	Equipment Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
119B	1020	Equipment Room	Deck	Metal Pan	-	-	Non ACM	-	-	-	-
119B	1020	Equipment Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
119C	1016	Change Room	Floor	Vinyl Sheet Flooring	Brown Pebble	NF	ACM	HM	S13	15-Sep-08	30% Chrysotile
119C	1016	Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
119C	1016	Change Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
119D	1018	Hallway	Floor	Vinyl Sheet Flooring	Brown Pebble	NF	ACM	HM	S13	15-Sep-08	30% Chrysotile
119D	1018	Hallway	Wall	Concrete	-	-	Non ACM	-	-	-	-
119D	1018	Hallway	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
119E	1017	Showers	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
119E	1017	Showers	Wall	Concrete	-	-	Non ACM	-	-	-	-
119E	1017	Showers	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
119F	1014	Staff Room	Floor	Vinyl Sheet Flooring	Brown Pebble	NF	ACM	HM	S13	15-Sep-08	30% Chrysotile
119F	1014	Staff Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
119F	1014	Staff Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	HM	S09	15-Sep-08	ND
119G	1015	Storage	Floor	Vinyl Sheet Flooring	Brown Pebble	NF	ACM	HM	S13	15-Sep-08	30% Chrysotile
119G	1015	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
119G	1015	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
119H	1012	Storage	Floor	Vinyl Sheet Flooring	Brown Pebble	NF	ACM	HM	S13	15-Sep-08	30% Chrysotile
119H	1012	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
119H	1012	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
119H	1012	Storage	Piping	Transite	Asbestos Cement Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
119I	1013	Closet	Floor	Vinyl Floor Tile 12"x12"	Brown Dense Fleck (2014)	-	-	-	-	-	-
119I	1013	Closet	Wall	Concrete	-	-	Non ACM	-	-	-	-
119I	1013	Closet	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	HM	S09	15-Sep-08	ND
119J	1010	Change Room	Floor	Vinyl Sheet Flooring	Brown Pebble	NF	ACM	HM	S13	15-Sep-08	30% Chrysotile
119J	1010	Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
119J	1010	Change Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
119K	1008	Change Room	Floor	Vinyl Sheet Flooring	Brown Pebble	NF	ACM	HM	S13	15-Sep-08	30% Chrysotile
119K	1008	Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
119K	1008	Change Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
119L	1009	Showers	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
119L	1009	Showers	Wall	Concrete	-	-	Non ACM	-	-	-	-
119L	1009	Showers	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
120	1118	Office	Floor	Vinyl Floor Tile 12"x12"	White/Grey Oatmeal	-	Non ACM	-	S27abc	15-Sep-08	ND
120	1118	Office	Wall	Wood	-	-	Non ACM	-	-	-	-
120	1118	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
120	1118	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-

For Tender Purposes

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120	1118	Office	Ceiling	Ceiling Tile 2'x4'	Thick Fissure Random Pinhole	-	Non ACM	HM	S22	15-Sep-08	ND
120A	1121	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
120A	1121	Office	Floor	Vinyl Floor Tile 12"x12"	Rose Oatmeal (New)	-	Non ACM	-	-	-	-
120A	1121	Office	Wall	Wood	-	-	Non ACM	-	-	-	-
120A	1121	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
120A	1121	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
120A	1121	Office	Ceiling	Ceiling Tile 2'x4'	Thick Fissure Random Pinhole	-	Non ACM	HM	S22	15-Sep-08	ND
120B	1120	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
120B	1120	Office	Floor	Vinyl Floor Tile 12"x12"	Rose Oatmeal (New)	-	Non ACM	-	-	-	-
120B	1120	Office	Wall	Wood	-	-	Non ACM	-	-	-	-
120B	1120	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
120B	1120	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
120B	1120	Office	Ceiling	Ceiling Tile 2'x4'	Thick Fissure Random Pinhole	-	Non ACM	HM	S22	15-Sep-08	ND
120C	1119	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
120B	1120	Office	Ceiling	Ceiling Tile 2'x4'	Thick Fissure Random Pinhole	-	Non ACM	HM	S22	15-Sep-08	ND
120C	1119	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
120C	1119	Office	Floor	Vinyl Floor Tile 12"x12"	Rose Oatmeal (New)	-	Non ACM	-	-	-	-
120C	1119	Office	Wall	Wood	-	-	Non ACM	-	-	-	-
120C	1119	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
120C	1119	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
120C	1119	Office	Ceiling	Ceiling Tile 2'x4'	Thick Fissure Random Pinhole	-	Non ACM	HM	S22	15-Sep-08	ND
120D	1117	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
120D	1117	Office	Floor	Vinyl Floor Tile 12"x12"	Rose Oatmeal (New)	-	Non ACM	-	-	-	-
120D	1117	Office	Wall	Wood	-	-	Non ACM	-	-	-	-
120D	1117	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
120D	1117	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
120D	1117	Office	Ceiling	Ceiling Tile 2'x4'	Thick Fissure Random Pinhole	-	Non ACM	HM	S22	15-Sep-08	ND
120E	1116	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
120E	1116	Office	Floor	Vinyl Floor Tile 12"x12"	Rose Oatmeal (New)	-	Non ACM	-	-	-	-
120E	1116	Office	Wall	Wood	-	-	Non ACM	-	-	-	-
120E	1116	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
120E	1116	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
120E	1116	Office	Ceiling	Ceiling Tile 2'x4'	Thick Fissure Random Pinhole	-	Non ACM	HM	S22	15-Sep-08	ND
121	1082	Health Room	Floor	Vinyl Floor Tile 12"x 12"	Black Dense Fleck (2019)	-	Non ACM	-	-	-	-
121	1082	Health Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
121	1082	Health Room	Wall	Plaster	-	-	Non ACM	SL	S01B	21-Sep-20	ND
121	1082	Health Room	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
122	1083	Machine Shop	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
122	1083	Machine Shop	Floor	Concrete	-	-	Non ACM	-	-	-	-
122	1083	Machine Shop	Wall	Concrete	-	-	Non ACM	-	-	-	-
122	1083	Machine Shop	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
122	1083	Machine Shop	Ducting	Flex Joint	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-

For Tender Purposes

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124	1084	Mechanical Shop	Floor	Concrete	-	-	Non ACM	-	-	-	-
124	1084	Mechanical Shop	Wall	Concrete	-	-	Non ACM	-	-	-	-
124	1084	Mechanical Shop	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
124	1084	Mechanical Shop	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
124	1084	Mechanical Shop	Ducting	Flex Joint	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
124A	1086	Office	Floor	Concrete	-	-	Non ACM	-	-	-	-
124A	1086	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
124A	1086	Office	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
124B	1087	Office	Floor	Concrete	-	-	Non ACM	-	-	-	-
124B	1087	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
124B	1087	Office	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
124C	1088	Office	Floor	Concrete	-	-	Non ACM	-	-	-	-
124C	1088	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
124C	1088	Office	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
124D	1089	Office	Floor	Concrete	-	-	Non ACM	-	-	-	-
124D	1089	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
124D	1089	Office	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
125	1148	Music Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
125	1148	Music Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
125	1148	Music Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
125	1148	Music Room	Wall	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
125	1148	Music Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
125	1148	Music Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
125A	1147	Practice Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
125A	1147	Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
125A	1147	Practice Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
125B	1149	Practice Room	Floor	Wood	-	-	Non ACM	-	-	-	-
125B	1149	Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
125B	1149	Practice Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
126	1176	Music Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
126	1176	Music Room	Floor	Vinyl Floor Tile 12"x12"	Grey Dense Fleck (New)	-	Non ACM	-	-	-	-
126	1176	Music Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
126	1176	Music Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
126	1176	Music Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
126	1176	Music Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
127	1178	Science Lab	Floor	Vinyl Floor Tile 12"x12"	Brown Oatmeal	-	Non ACM	-	S07	15-Sep-08	ND
127	1178	Science Lab	Wall	Concrete	-	-	Non ACM	-	-	-	-
127	1178	Science Lab	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
127	1178	Science Lab	Wall	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
127	1178	Science Lab	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-

For Tender Purposes

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WRDSB Fixed Reference Number	Functional Space Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
127	1178	Science Lab	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
127A	1180	Storage	Floor	Vinyl Floor Tile 12"x12"	Brown Oatmeal	-	Non ACM	-	S07	15-Sep-08	ND
127A	1180	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
127A	1180	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
127A	1180	Storage	Wall	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
127A	1180	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
127B	1177	Science Lab	Floor	Vinyl Floor Tile 12"x12"	Brown Oatmeal	-	Non ACM	-	S07	15-Sep-08	ND
127B	1177	Science Lab	Wall	Concrete	-	-	Non ACM	-	-	-	-
127B	1177	Science Lab	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
127B	1177	Science Lab	Wall	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
127B	1177	Science Lab	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
127C	1181	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
127C	1181	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
127C	1181	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
127D	1180	Storage	Floor	Vinyl Floor Tile 12"x12"	Brown Oatmeal	-	Non ACM	-	S07	15-Sep-08	ND
127D	1180	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
127D	1180	Storage	Wall	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
127D	1180	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
128/A/C	1113	Fitness Room	Floor	Rubber	-	-	Non ACM	-	-	-	-
128/A/C	1113	Fitness Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
128/A/C	1113	Fitness Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
128/A/C	1113	Fitness Room	Wall	Plaster	-	-	Non ACM	SL	S03e	15-Sep-08	ND
128/A/C	1113	Fitness Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
128B	1179	Storage	Floor	Vinyl Floor Tile 12"x12"	Grey Dense Fleck (New)	-	Non ACM	-	-	-	-
128B	1179	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
128B	1179	Storage	Wall	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
128B	1179	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
128B	1179	Storage	Ducting	Flex Joint	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
129	1102	Tech Room 129	Floor	Vinyl Floor Tile 9"x9"	Olive with Brown and White	NF	ACM	SL	S26abc	18-Sep-08	2.5% Chrysotile
129	1102	Tech Room 129	Wall	Concrete	-	-	Non ACM	-	-	-	-
129	1102	Tech Room 129	Deck	Concrete	-	-	Non ACM	-	-	-	-
129	1102	Tech Room 129	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
129	1102	Tech Room 129	Deck	Ceiling Tile Mastic	Mastic	-	Non ACM	SL	S25abc	18-Sep-08	ND
129A	1103	Director Technical	Floor	Vinyl Floor Tile 12"x12"	Beige with Brown Fleck	NF	ACM	HM	S02	15-Sep-08	1.5% Chrysotile
129A	1103	Director Technical	Wall	Concrete	-	-	Non ACM	-	-	-	-
129A	1103	Director Technical	Wall	Plaster	-	-	Non ACM	SL	S03e	15-Sep-08	ND
129A	1103	Director Technical	Deck	Concrete	-	-	Non ACM	-	-	-	-
129A	1103	Director Technical	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
130	1004	Music Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
130	1004	Music Room	Floor	Concrete	-	-	Non ACM	-	-	-	-

For Tender Purposes

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130	1004	Music Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
130	1004	Music Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
130	1004	Music Room	Deck	Concrete	-	-	Non ACM	-	-	-	-
130A	1005	Practice Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
130A	1005	Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
130A	1005	Practice Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
130B	1007	Practice Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
130B	1007	Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
130B	1007	Practice Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S15	15-Sep-08	ND
131	1003	Weight Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
131	1003	Weight Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
131	1003	Weight Room	Wall	Plaster	Plaster	-	Non ACM	HM	S03	15-Sep-08	ND
131	1003	Weight Room	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
131	1003	Weight Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
131	1003	Weight Room	Piping	Pipe	Transite	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
131A	1002	Lecture Area	Floor	Vinyl Floor Tile 12"x12"	Brown Dense Fleck (2014)	-	-	-	-	-	-
131A	1002	Lecture Area	Wall	Concrete	-	-	Non ACM	-	-	-	-
131A	1002	Lecture Area	Wall	Plaster	Plaster	-	Non ACM	HM	S03	15-Sep-08	ND
131A	1002	Lecture Area	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
131B	1000	Paint Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
131B	1000	Paint Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
131B	1000	Paint Room	Wall	Plaster	Plaster	-	Non ACM	HM	S03	15-Sep-08	ND
131B	1000	Paint Room	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
131B	1000	Paint Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
131B	1000	Paint Room	Ducting	Flex Joint	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
132	1101	Drama Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
132	1101	Drama Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
132	1101	Drama Room	Ceiling	Panelling	Transite	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
133	1130	Gym	Floor	Hardwood	-	-	Non ACM	-	-	-	-
133	1130	Gym	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
133	1130	Gym	Ceiling	Wood	-	-	Non ACM	-	-	-	-
133C	1124	Storage	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
133C	1124	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
133C	1124	Storage	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
134	1129	Gym	Floor	Hardwood	-	-	Non ACM	-	-	-	-
134	1129	Gym	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
134	1129	Gym	Ceiling	Wood	-	-	Non ACM	-	-	-	-
134A	1128	Stage	Floor	Hardwood	-	-	Non ACM	-	-	-	-
134A	1128	Stage	Wall	Concrete	-	-	Non ACM	-	-	-	-
134A	1128	Stage	Ceiling	Metal Pan	-	-	Non ACM	-	-	-	-

For Tender Purposes

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134A	1128	Stage	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
134C	1146	Corridor	Floor	Vinyl Floor Tile 9"x9"	Grey with White Fleck	NF	ACM	HM	S10	15-Sep-08	2.1% Chrysotile
134C	1146	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
134C	1146	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
134D	1144	Office	Floor	Vinyl Floor Tile 9"x9"	Grey with White Fleck	NF	ACM	HM	S10	15-Sep-08	2.1% Chrysotile
134D	1144	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
134D	1144	Office	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
134E	1136	Storage	Floor	Hardwood	-	-	Non ACM	-	-	-	-
134E	1136	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
134E	1136	Storage	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
135	1134	Corridor	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
135	1134	Corridor	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
135	1134	Corridor	Ceiling	Textured Concrete	-	-	Non ACM	-	-	-	-
135A	1132	Office	Floor	Vinyl Floor Tile 9"x9"	Grey with White Fleck	NF	ACM	HM	S10	15-Sep-08	2.1% Chrysotile
135A	1132	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
135A	1132	Office	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
135B	1135	Change Room	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
135B	1135	Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
135B	1135	Change Room	Ceiling	Textured Concrete	-	-	Non ACM	-	-	-	-
135C	1137	Showers	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
135C	1137	Showers	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
135C	1137	Showers	Ceiling	Textured Concrete	-	-	Non ACM	-	-	-	-
135D	1138	Showers	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
135D	1138	Showers	Wall	Concrete	-	-	Non ACM	-	-	-	-
135D	1138	Showers	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
136	1139	Washroom	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
136	1139	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
136	1139	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
137	1142	Change Room	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
137	1142	Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
137	1142	Change Room	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
137A	1140	Change Room	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
137A	1140	Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
137A	1140	Change Room	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
137B	1141	Showers	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
137B	1141	Showers	Wall	Concrete	-	-	Non ACM	-	-	-	-
137B	1141	Showers	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
811	1152	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
811	1152	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
811	1152	Corridor	Wall	Wood	-	-	Non ACM	-	-	-	-

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811	1152	Corridor	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
812A	1151	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
812A	1151	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
812A	1151	Corridor	Wall	Wood	-	-	Non ACM	-	-	-	-
812A	1151	Corridor	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
812A	1151	Corridor	Ceiling	Ceiling Tile 1x1	Medium and Small Pinhole	-	Non ACM	HM	S05	26-Mar-24	ND
812A	1151	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
812B	1152	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
812B	1152	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
812B	1152	Corridor	Wall	Wood	-	-	Non ACM	-	-	-	-
812B	1152	Corridor	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
812B	1152	Corridor	Piping	Pipe Insulation	Air Cell	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
812B	1152	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
812C	1153	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
812C	1153	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
812C	1153	Corridor	Wall	Wood	-	-	Non ACM	-	-	-	-
812C	1153	Corridor	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
813B	1154	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
813B	1154	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
813B	1154	Corridor	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
813B	1154	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
814A	1158	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
814A	1158	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
814A	1158	Corridor	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
814A	1158	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
814B	-	AV Corridor	Floor	Vinyl Floor Tile 12"x12"	Brown Oatmeal	-	Non ACM	HM	S07	15-Sep-08	ND
814B	-	AV Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
814B	-	AV Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
814B	-	AV Corridor	Ceiling	Ceiling Tile 2' x 4'	Thick Fissure Random Pinhole	-	Non ACM	-	S22abc	15-Sep-08	ND
814B	-	AV Corridor	Firespray	Firespray	-	-	Non ACM	SL	S21abc	15-Sep-08	ND
814C	1019	Hallway	Floor	Concrete	-	-	Non ACM	-	-	-	-
814C	1019	Hallway	Wall	Concrete	-	-	Non ACM	-	-	-	-
814C	1019	Hallway	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
814C	1019	Hallway	Deck	Metal Pan	-	-	Non ACM	-	-	-	-
815A	1156	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
815A	1156	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
815A	1156	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
815A	1156	Corridor	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
815B	1085	Office	Floor	Concrete	-	-	Non ACM	-	-	-	-
815B	1155	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-

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815B	1085	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
815B	1155	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
815B	1085	Office	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
815B	1155	Corridor	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
815B	1085	Office	Piping	Pipe	Cementitious Pipe (Transite)	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
815B	1155	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
816A	1159	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
816A	1159	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
816A	1159	Corridor	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
816A	1159	Corridor	Piping	Pipe Insulation	Air Cell	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
816A	1159	Corridor	Piping	Pipe	Cementitious Pipe (Transite)	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
816A	1159	Corridor	Piping	Pipe Insulation	Mag Block	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
816A	1159	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
817A	1160	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
817A	1160	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
817A	1160	Corridor	Wall	Drywall	Drywall Joint Compound	-	Non ACM	SL	S04A	21-Sep-20	ND
817A	1160	Corridor	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
819A	-	Entrance	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
819A	-	Entrance	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
819A	-	Entrance	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
819A	-	Entrance	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
819A	-	Entrance	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
819A	-	Entrance	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
901	-	Stairwell	Floor	Terrazzo		-	Non ACM	-	-	-	-
901	-	Stairwell	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
901	-	Stairwell	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
902	-	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
902	`	Stairwell	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
902	-	Stairwell	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
903	-	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
903	-	Stairwell	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
903	-	Stairwell	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
904	1143	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
904	1143	Stairwell	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
904	1143	Stairwell	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
OFF	1169	Practice Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
OFF	1169	Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
OFF	1169	Practice Room	Ceiling	Ceiling Tile 2' x 4'	Thick Fissure Random Pinhole	-	Non ACM	-	S22	15-Sep-08	ND
PR	1165	Practice Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
PR	1166	Practice Room	Floor	Carpet	-	-	Non ACM	-	-	-	-

For Tender Purposes

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WRDSB Fixed Reference Number	Functional Space Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
PR	1167	Practice Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
PR	1168	Practice Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
PR	1165	Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
PR	1166	Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
PR	1167	Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
PR	1168	Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	-	S15	15-Sep-08	ND
PR	1165	Practice Room	Ceiling	Ceiling Tile 2' x 4'	Thick Fissure Random Pinhole	-	Non ACM	-	S22	15-Sep-08	ND
PR	1166	Practice Room	Ceiling	Ceiling Tile 2' x 4'	Thick Fissure Random Pinhole	-	Non ACM	-	S22	15-Sep-08	ND
PR	1167	Practice Room	Ceiling	Ceiling Tile 2' x 4'	Thick Fissure Random Pinhole	-	Non ACM	-	S22	15-Sep-08	ND
PR	1168	Practice Room	Ceiling	Ceiling Tile 2' x 4'	Thick Fissure Random Pinhole	-	Non ACM	-	S22	15-Sep-08	ND
-	1122	Hallway	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
-	1122	Hallway	Wall	Concrete	-	-	Non ACM	-	-	-	-
-	1122	Hallway	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
Level 2											
151A	2010	Office	Floor	Vinyl Floor Tile 9"x9"	Beige with Purple and Orange	NF	ACM	HM	S01	15-Sep-08	5.1% Chrysotile
151A	2010	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
151A	2010	Office	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
151A	2010	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
201	2021	Family Studies	Floor	Vinyl Sheet Flooring	Grey (New)	-	Non ACM	-	-	-	-
201	2021	Family Studies	Wall	Concrete	-	-	Non ACM	-	-	-	-
201	2021	Family Studies	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
201	2021	Family Studies	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
201A	2022	Office	Floor	Vinyl Sheet Flooring	Grey (New)	-	Non ACM	-	-	-	-
201A	2022	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
201A	2022	Office	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
201A	2022	Office	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
201B	2023	Closet	Floor	Vinyl Sheet Flooring	Grey (New)	-	Non ACM	-	-	-	-
201B	2023	Closet	Floor	Concrete	-	-	Non ACM	-	-	-	-
201B	2022	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
201B	2023	Closet	Wall	Concrete	-	-	Non ACM	-	-	-	-
201B	2022	Office	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
201B	2023	Closet	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
201B	2023	Closet	Ducting	Flex Joint	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
202	2029	Media Classroom	Floor	Vinyl Floor Tile 9"x9"	Brown with Blue and Yellow	NF	ACM	HM	S08	15-Sep-08	2.5% Chrysotile
202	2029	Media Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
202	2029	Media Classroom	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	HM	S09	15-Sep-08	ND
202	2029	Media Classroom	Ceiling	Ceiling Tile 1'x1'	Medium and Small Pinhole	-	Non ACM	HM	S02	26-Mar-24	ND
202	2029	Media Classroom	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-

For Tender Purposes

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202A	2028	Office	Floor	Vinyl Floor Tile 12"x12"	Grey Dense Fleck (New)	-	Non ACM	-	-	-	-
202A	2028	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
202A	2028	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	HM	S09	15-Sep-08	ND
202B/C	2027	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
202B/C	2027	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
202B/C	2027	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
202B/C	2027	Washroom	Ceiling	Ceiling Tile 1'x1'	Medium and Small Pinhole	-	Non ACM	HM	S02	26-Mar-24	ND
202D	2026	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
202D	2026	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
202D	2026	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
202D	2026	Washroom	Ceiling	Ceiling Tile 1'x1'	Medium and Small Pinhole	-	Non ACM	HM	S02	26-Mar-24	ND
203	2020	Life skills 203	Floor	Vinyl Floor Tile 9"x9"	Brown with White Fleck	NF	ACM	SL	S11abc	15-Sep-08	2.4% Chrysotile
203	2020	Life skills 203	Wall	Concrete	-	-	Non ACM	-	-	-	-
203	2020	Life skills 203	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
204	2030	Computer Room 204	Floor	Vinyl Floor Tile 9"x9"	Green with Dark Green and White	NF	ACM	HM	S06	15-Sep-08	3.5% Chrysotile
204	2030	Computer Room 204	Wall	Concrete	-	-	Non ACM	-	-	-	-
204	2030	Computer Room 204	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	HM	S09	15-Sep-08	ND
204	2030	Computer Room 204	Ceiling	Ceiling Tile 1'x1'	Medium and Small Pinhole	-	Non ACM	SL	S02abc	26-Mar-24	ND
204	2030	Computer Room 204	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
204A	2031	Office	Floor	Vinyl Floor Tile 9"x9"	Green with Dark Green and White	NF	ACM	HM	S06	15-Sep-08	3.5% Chrysotile
204A	2031	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
204A	2031	Office	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
204A	2031	Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	HM	S09	15-Sep-08	ND
204A	2031	Office	Ceiling	Ceiling Tile 1'x1'	Large and Small Pinhole (Cellulose)	-	Non ACM	HM	S01	26-Mar-24	ND
204A	2031	Office	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
205	2019	Classroom 205	Floor	Vinyl Sheet Flooring	Grey (New)	-	Non ACM	-	-	-	-
205	2019	Classroom 205	Wall	Concrete	-	-	Non ACM	-	-	-	-
205	2019	Classroom 205	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
206	2032	Computer Room 208	Floor	Vinyl Floor Tile 9"x9"	Green with Dark Green and White	NF	ACM	HM	S06	15-Sep-08	3.5% Chrysotile
206	2032	Computer Room 208	Wall	Concrete	-	-	Non ACM	-	-	-	-
206	2032	Computer Room 208	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	SL	S09abc	15-Sep-08	ND
206	2032	Computer Room 208	Ceiling	Ceiling Tile 1'x1'	Large and Small Pinhole (Cellulose)	-	Non ACM	HM	S01	26-Mar-24	ND
206	2032	Computer Room 208	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
206A	2033	Mechanical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
206A	2033	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
206A	2033	Mechanical Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
206A	2033	Mechanical Room	Ducting	Flex Joint	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
206A	2033	Mechanical Room	Ceiling	Ceiling Tile 1'x1'	Large and Small Pinhole (Cellulose)	-	Non ACM	HM	S01	26-Mar-24	ND
207	2018	Classroom 207	Floor	Vinyl Floor Tile 9"x9"	Grey with White Fleck	NF	ACM	SL	S10abc	15-Sep-08	2.1% Chrysotile
207	2018	Classroom 207	Wall	Concrete	-	-	Non ACM	-	-	-	-

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207	2018	Classroom 207	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
209	2017	Classroom 209	Ceiling	Ceiling Tile 1'x1'	Large and Small Pinhole (Cellulose)	-	Non ACM	HM	S01	26-Mar-24	ND
208	2034	Classroom 208	Floor	Vinyl Floor Tile 9"x9"	Brown with Blue and Yellow	NF	ACM	SL	S08abc	15-Sep-08	2.5% Chrysotile
208	2034	Classroom 208	Floor	Concrete	-	-	Non ACM	-	-	-	-
208	2034	Classroom 208	Wall	Concrete	-	-	Non ACM	-	-	-	-
208	2034	Classroom 208	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
209	2017	Classroom 209	Floor	Vinyl Floor Tile 9"x9"	Brown with Blue and Yellow	NF	ACM	HM	S08	15-Sep-08	2.5% Chrysotile
209	2017	Classroom 209	Wall	Concrete	-	-	Non ACM	-	-	-	-
209	2017	Classroom 209	Ceiling	Ceiling Tile 1'x1'	Large and Small Pinhole (Cellulose)	-	Non ACM	HM	S01	26-Mar-24	ND
209	2017	Classroom 209	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
210	2035	Classroom 210	Floor	Vinyl Floor Tile 12"x12"	Brown Oatmeal	-	Non ACM	-	S07abc	15-Sep-08	ND
210	2035	Classroom 210	Wall	Concrete	-	-	Non ACM	-	-	-	-
210	2035	Classroom 210	Wall	Plaster	-	-	Non ACM	SL	S03cd	15-Sep-08	ND
210	2035	Classroom 210	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
210	2035	Classroom 210	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
211	2014	Classroom 211	Floor	Vinyl Floor Tile 12"x12"	Beige with Brown Fleck	NF	ACM	HM	S02	15-Sep-08	1.5% Chrysotile
211	2014	Classroom 211	Wall	Concrete	-	-	Non ACM	-	-	-	-
211	2014	Classroom 211	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
211	2014	Classroom 211	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
211A	2015	Mechanical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
211A	2015	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
211A	2015	Mechanical Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
211A	2015	Mechanical Room	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
211A	2015	Mechanical Room	Ducting	Flex Joint	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
212	2036	Classroom 212	Floor	Vinyl Floor Tile 9"x9"	White w Orange Fleck (2014)	-	-	-	-	-	-
212	2036	Classroom 212	Wall	Concrete	-	-	Non ACM	-	-	-	-
212	2036	Classroom 212	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
212	2036	Classroom 212	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
212A	2037	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
212A	2037	Washroom	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
212A	2037	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
212A	2037	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
212B	2039	Custodial Closet	Floor	Concrete	-	-	Non ACM	-	-	-	-
212B	2039	Custodial Closet	Wall	Concrete	-	-	Non ACM	-	-	-	-
212B	2039	Custodial Closet	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
212C	2040	Washroom	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
212C	2040	Washroom	Floor	Epoxy	-	-	Non ACM	-	-	-	-
212C	2040	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
212C	2040	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
212D	2038	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-

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212D	2038	Washroom	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
212D	2038	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
212D	2038	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
213	2013	Business Office	Floor	Vinyl Floor Tile 9"x9"	Beige with Purple and Orange	NF	ACM	HM	S01	15-Sep-08	5.1% Chrysotile
213	2013	Business Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
213	2013	Business Office	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
213	2013	Business Office	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
213	2013	Business Office	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
214	2043	Classroom 214	Floor	Vinyl Floor Tile 12"x12"	Beige with Brown Fleck	NF	ACM	SL	S02abc	15-Sep-08	1.5% Chrysotile
214	2043	Classroom 214	Wall	Concrete	-	-	Non ACM	-	-	-	-
214	2043	Classroom 214	Wall	Plaster	-	-	Non ACM	SL	S03ab	15-Sep-08	ND
214	2043	Classroom 214	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
214	2043	Classroom 214	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
214A	2042	Washroom	Floor	Vinyl Floor Tile 12"x12"	Brown Dense Fleck (2014)	-	Non ACM	-	-	-	-
214A	2042	Washroom	Floor	Vinyl Floor Tile 9"x9"	Tan with White and Mustard	NF	ACM	SL	S04abc	15-Sep-08	3.5% Chrysotile
214A	2042	Washroom	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
214A	2042	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
214A	2042	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
214B	2041	Office	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
214B	2041	Office	Floor	Epoxy	-	-	Non ACM	-	-	-	-
214B	2041	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
214B	2041	Office	Wall	Plaster	-	-	Non ACM	HM	S03	15-Sep-08	ND
214B	2041	Office	Ceiling	Drywall	Drywall Joint Compoind (2014)	-	Non ACM	-	-	-	-
215	2012	Computer Room 215	Floor	Vinyl Floor Tile 9"x9"	Beige with Purple and Orange	NF	ACM	HM	S01	15-Sep-08	5.1% Chrysotile
215	2012	Computer Room 215	Wall	Concrete	-	-	Non ACM	-	-	-	-
215	2012	Computer Room 215	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
215	2012	Computer Room 215	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
215	2012	Computer Room 215	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
217	2009	Computer Room	Floor	Vinyl Floor Tile 9"x9"	Beige with Purple and Orange	NF	ACM	SL	S01abc	15-Sep-08	5.1% Chrysotile
217	2009	Computer Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
217	2009	Computer Room	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
217	2009	Computer Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
217	2009	Computer Room	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
217A	2011	Storage	Floor	Vinyl Floor Tile 9"x9"	Beige with Purple and Orange	NF	ACM	HM	S01	15-Sep-08	5.1% Chrysotile
217A	2011	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
217A	2011	Storage	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
217A	2011	Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
217A	2011	Storage	Ceiling	Transite	Peg Board	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
250	2001	Mechanical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
250	2001	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-

For Tender Purposes

School Name	Legend:	Notes:
Southwood Secondary School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **NF** - Non-Friable **F**- Friable	**All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.**
Date Built:		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**
Original: 1962		
Addition(s): 1965, 1981, 1984		

WRDSB Fixed Reference Number	Functional Space Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
250	2001	Mechanical Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
250	2001	Mechanical Room	Ducting	Flex Joint	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
251	2001	Mechanical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
251	2001	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
251	2001	Mechanical Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
252	2000	Equipment Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
252	2000	Equipment Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
252	2000	Equipment Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
252	2000	Equipment Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
253	2003	Storage	Floor	Vinyl Floor Tile 9"x9"	Olive with Brown and White	NF	ACM	HM	S26	15-Sep-08	2.5% Chrysotile
253	2003	Storage	Wall	Wood	-	-	Non ACM	-	-	-	-
253	2003	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
253	2003	Storage	Ceiling	Ceiling Tile 1x1	Large and Medium Pinhole	NF	ACM	HM	S03	26-Mar-24	5% Amosite
254	2002	Storage	Floor	Vinyl Floor Tile 9"x9"	Olive with Brown and White	NF	ACM	HM	S26	15-Sep-08	2.5% Chrysotile
254	2002	Storage	Wall	Wood	-	-	Non ACM	-	-	-	-
254	2002	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
254	2002	Storage	Ceiling	Ceiling Tile 1x1	Large and Medium Pinhole	NF	ACM	HM	S03	26-Mar-24	5% Amosite
255	2004	Student Council	Floor	Vinyl Floor Tile 9"x9"	Olive with Brown and White	NF	ACM	HM	S26	15-Sep-08	2.5% Chrysotile
255	2004	Student Council	Wall	Wood	-	-	Non ACM	-	-	-	-
255	2004	Student Council	Wall	Concrete	-	-	Non ACM	-	-	-	-
255	2004	Student Council	Ceiling	Ceiling Tile 1x1	Large and Medium Pinhole	NF	ACM	SL	S03ABC	26-Mar-24	5% Amosite
256	2005	Mechanical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
256	2005	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
256	2005	Mechanical Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
256	2005	Mechanical Room	Ducting	Flex Joint	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
821	2044	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
821	2044	Corridor	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
821	2044	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
821	2044	Corridor	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
821	2044	Corridor	Piping	Pipe Insulation	Mag Block	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
821	2044	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.768 Pinchin	1990	Chrysotile
901	2008	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
901	2008	Stairwell	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
901	2008	Stairwell	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
902	2016	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
902	2016	Stairwell	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
902	2016	Stairwell	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-
903	2024	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
903	2024	Stairwell	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
903	2024	Stairwell	Ceiling	Ceiling Tile 2'x4'	Short Fissure Random Pinhole (1996)	-	Non ACM	-	-	-	-

For Tender Purposes

			School Name		**Legend:**				**Notes:**			
			Southwood Secondary School		**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **NF** - Non-Friable **F**- Friable				**All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.**			
			Date Built:						**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**			
			Original: 1962									
			Addition(s): 1965, 1981, 1984									
WRDSB Fixed Reference Number	**Functional Space Number**	**Room Description**	**Inspected Item**	**Inspected Material**	**Material Description**	**Friability**	**Asbestos Classification**	**Sample / Identification Summary**	**Sample ID**	**Sample Date**	**% Asbestos & Fibre Type**	
904	2001	Stairs	Floor	Concrete	-	-	Non ACM	-	-	-	-	
904	2001	Stairs	Wall	Concrete	-	-	Non ACM	-	-	-	-	
904	2001	Stairs	Ceiling	Concrete	-	-	Non ACM	-	-	-	-	
905	2001	Stairs	Floor	Concrete	-	-	Non ACM	-	-	-	-	
905	2001	Stairs	Wall	Concrete	-	-	Non ACM	-	-	-	-	
905	2001	Stairs	Ceiling	Concrete	-	-	Non ACM	-	-	-	-	
-	2025	Elevator	Floor	Vinyl Sheet Flooring	Brown Pebble	NF	ACM	SL	S13abc	15-Sep-08	30% Chrysotile	
-	2025	Elevator	Wall	Metal	-	-	Non ACM	-	-	-	-	
-	2025	Elevator	Ceiling	Metal	-	-	Non ACM	-	-	-	-	
Summary of Potential ACM Hidden or Not Assessed												
		Throughout Building	Not Inspected	Not Inspected	Wall Cavity Insulation							
		Throughout Building	Not Inspected	Not Inspected	Door Core Insulation							

For Tender Purposes

Appendix B

Figures

For Tender Purposes

ORIGINAL BUILDING - FLOOR TILE MASTIC IS ACM.
1965 ADDITION - WHITE SEALANT ON INTERIOR WINDOW FRAMES IS ACM.
1965 ADDITION - FLOOR TILE MASTIC IS ACM.

1965 ADDITION
1962 ORIGINAL BUILDING
1981 ADDITION
1984 ADDITION
1981 ADDITION

For Tender Purposes

NOTES:

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

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

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

Legend

- 13 Fixed Reference Number
- No Access
- Post 2011 Construction

Asbestos-Containing Materials (ACM):

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

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CLIENT
WATERLOO REGION DISTRICT SCHOOL BOARD

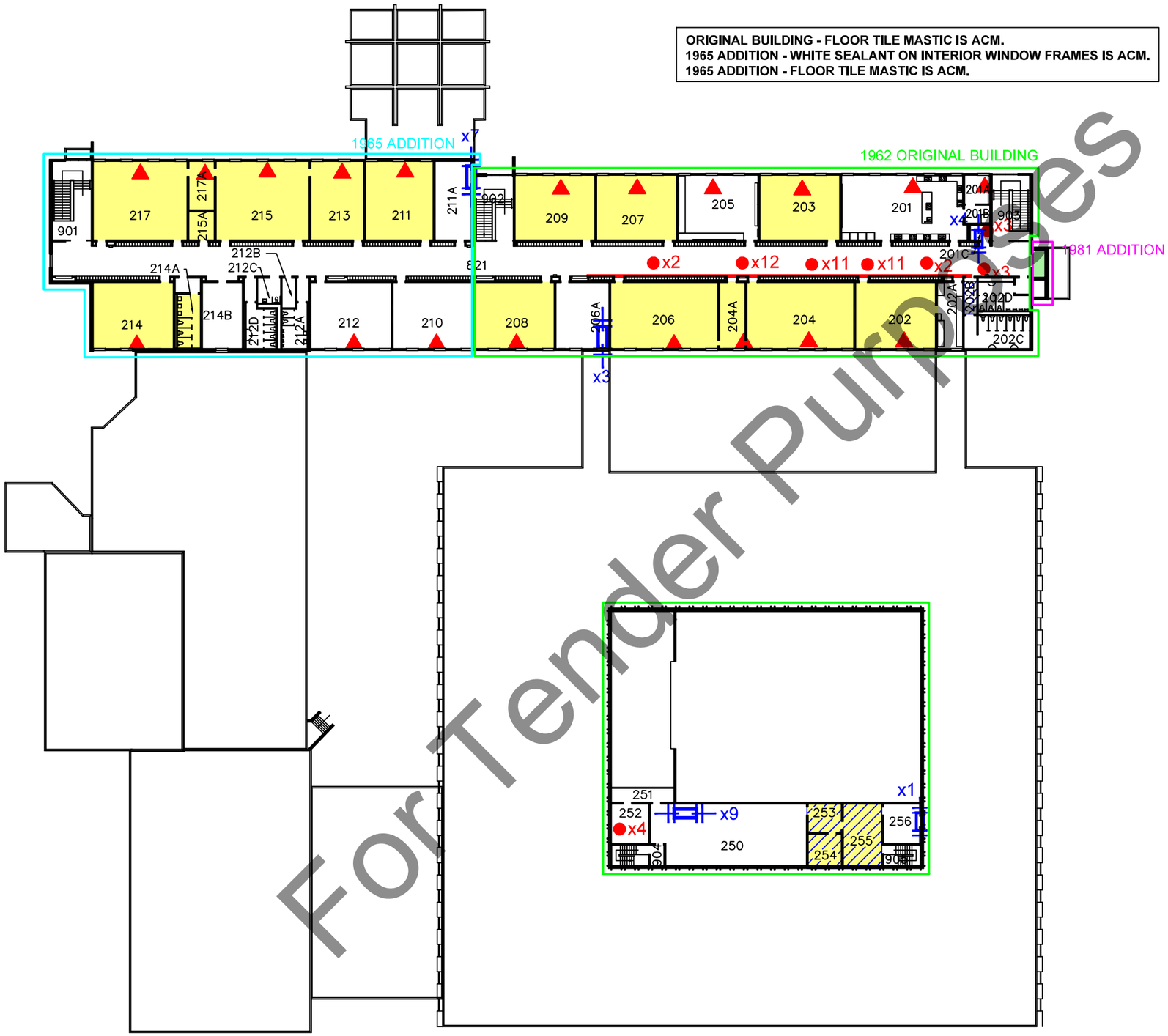
PROJECT
2024 ASBESTOS AUDIT UPDATE

DRAWING
SOUTHWOOD SECONDARY SCHOOL

LEVEL ONE

Project Manager: P. Semeniuk	Date: JANUARY 2024
Design By: WRDSB	Project No.: 34532-944
Drawn By: S-P. Lemieux	Drawing No.: 1.0
Scale: N.T.S.	

ORIGINAL BUILDING - FLOOR TILE MASTIC IS ACM.
1965 ADDITION - WHITE SEALANT ON INTERIOR WINDOW FRAMES IS ACM.
1965 ADDITION - FLOOR TILE MASTIC IS ACM.



For Tender Purposes

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Legend

- 13 Fixed Reference Number
- No Access
- Post 2011 Construction

Asbestos-Containing Materials (ACM):

- Floor Tile
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- Ceiling Tile
- Friable Soft Textured Ceiling
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- x2(1) Pipe Fitting Insulation w Quantity (Brackets Indicate # of Damaged Fittings)
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- Transite (Asbestos Cement) Pipe (Vertical and Horizontal)
- x2(1) Duct Expansion Joints w Quantity (Brackets Indicate # of Damaged Joints)
- Friable Debris
- Pegboard

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WATERLOO REGION DISTRICT SCHOOL BOARD

PROJECT
2024 ASBESTOS AUDIT UPDATE

DRAWING
SOUTHWOOD SECONDARY SCHOOL

LEVEL TWO

Project Manager P. Semeniuk	Date JANUARY 2024
Design By WRDSB	Project No. 34532-944
Drawn By S-P. Lemieux	Drawing No. 1.1
Scale N.T.S.	

Appendix 01 35 34B– Limited Pre-Renovation Designated Substance Survey

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

Attention: Jeff Cull, Environmental Officer

Limited Pre-Renovation Designated Substance Survey
Summer 2026 Construction Project – RAAC & Roof Replacement – Project Phase One
Southwood Secondary School
30 Southwood Drive, Cambridge, ON

EXP Project Number:
LON-26000583-A0

Prepared By:
EXP Services Inc.
405 Maple Grove Road, Unit 6
Cambridge, Ontario N3E 1B6 Canada

Date Submitted:
February 19, 2026

Executive Summary

EXP Services Inc. (EXP) was retained by the Waterloo Region District School Board (WRDSB) to conduct a Limited Pre-Renovation Designated Substances Survey of Southwood Secondary School located at 30 Southwood Drive, Cambridge, Ontario (the site), pertaining to the upcoming Summer 2026 Construction Project – RAAC and Roof Replacement – Project Phase One.

The survey was completed by Kinjal Prajapati on January 22 and 29, 2026. The survey included only the portion(s) of the building to be renovated (project area). The project area was defined by the client and is represented by the drawings provided in Appendix C.

The following designated substances were identified:

Friable Asbestos-Containing Materials

- Asbestos-containing parging cement was observed on pipe elbows in the Rooms 121, 124, 815B & 812A. Fifty-two (52) elbows were observed in good condition during the survey.
- Asbestos-containing magnesia block insulation was previously observed on pipe straights in Room 46A. Approximately ten (10) linear feet of this insulation were identified in good condition during the survey.
- Friable materials may be present inside inaccessible areas of the building (wall voids, pipe chases etc.).

Non-Friable Asbestos-Containing Materials

- Presumed asbestos-containing Transite piping was identified in Rooms 815B and 122. Approximately fifty (50) linear feet of Transite piping were observed in good condition during the survey.
- Presumed asbestos-containing Transite peg boards were identified in Rooms 122 and 124. Approximately two hundred (200) square feet of this material were identified in good condition during the survey.
- Asbestos-containing grey caulking was identified associated with upper exterior wall on the roof. Approximately eighty (80) linear feet of this material were observed.
- Asbestos-containing dark red duct mastic was identified associated with ducts in Room 121. Approximately two (2) square feet of this material were observed during the survey.
- Non-friable materials may be present inside inaccessible areas of the building (wall voids, pipe chases etc.).

Lead-Containing Materials

- Results indicate that sample 26000583-Pb-01 has a lead concentration of less than 0.1% and should be considered to have low levels of lead.
- Lead is expected to be present in solder on copper plumbing throughout the building.

Mercury

- Mercury is assumed to be present as a vapour in fluorescent light tubes.

Silica

- Crystalline silica is present in concrete products, mortar, brick, etc. These construction products are typically found throughout building structures.

Mould

- No suspect mould was identified.
- Minor amounts of concealed mould growth may not be identified as part of the survey in the absence of visual indicators.

Recommendations

If identified asbestos-containing materials are to be disturbed as part of upcoming renovations, removal of the asbestos-containing materials must be completed following the precautions and procedures outlined in Ontario Regulation 278/05 as amended.

Destructive investigation of ceiling voids was not completed as part of this survey. Concealed locations should be investigated immediately prior to project start up. Materials suspected of containing asbestos or other designated substances should be sampled upon discovery.

Any materials suspected of containing asbestos and not addressed within this report must be assumed to be asbestos containing until sampling and analysis proves otherwise.

Refer to Section 6.0 for procedures required when disturbing or removing the hazardous materials identified in this report.

Remedial Recommendations

All identified asbestos-containing materials were in good condition at the time of the survey. No remedial work is required at this time.

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APPENDIX B Lead Paint Analysis Results
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1.0 INTRODUCTION

EXP Services Inc. (EXP) was retained by the Waterloo Region District School Board (WRDSB) to conduct a Limited Pre-Renovation Designated Substances Survey of Southwood Secondary School located at 30 Southwood Drive, Cambridge, Ontario (the site), pertaining to the upcoming Summer 2026 Construction Project – RAAC and Roof Replacement – Project Phase One.

The survey was completed by Kinjal Prajapati on January 22 and 29, 2026. The survey included only the portion(s) of the building to be renovated (project area). The project area was defined by the client and is represented by the drawings provided in Appendix C.

Under Section 30 of the Ontario Occupational Health & Safety Act (OSHA), an owner must determine whether any Designated Substances are present in a building and is required to prepare a list of all Designated Substances that are present prior to tendering any work that may disturb a Designated Substance in the project area. These substances may require special handling precautions or procedures.

The current OHSA regulation lists the following eleven (11) substances as Designated Substances in the workplace: acrylonitrile, arsenic, asbestos, benzene, coke oven emissions, ethylene oxide, isocyanates, lead, mercury, silica, and vinyl chloride. Prior to issuing any project plans the owner or an agent acting on behalf of the owner must provide the Designated Substance report to the constructors. Sequentially, the constructor must provide this report to any sub-contractors who would potentially disturb any Designated Substances identified in the report.

Based on the construction date and the reported use of the building, the survey completed by EXP included investigation into the following Designated Substances as listed by the Ministry of Labour, Immigration, Training and Skills Development: Asbestos, Lead, Mercury, and Silica. In addition, EXP included a limited assessment for suspect mould growth.

The survey did not include investigation into Arsenic, Acrylonitrile, Benzene, Coke Oven Emissions, Ethylene Oxide, Isocyanates and Vinyl Chloride as listed by the Ministry of Labour, Immigration, Training and Skills Development. These materials are not found within typical buildings and were not reported to EXP prior to the survey.

2.0 SITE BACKGROUND

The building is a two-storey structure, used as a secondary school, originally constructed in 1962. Additions to the building were constructed in 1965, 1981, and 1984.

The survey was conducted within all accessible areas of the project area, which included part of the original 1962 construction era as made accessible by WRDSB at the time of the survey. This survey accounts for approximately 20,000 SF of project area.

Each building era was treated as a separate structure when determining an appropriate sampling strategy.

The surveyor was unable to access the following areas/rooms at the time of the survey:

- 48A
- 48C

The following reports have been previously completed for the building and provided to EXP:

- "Southwood Secondary School – 2024 Asbestos Audit Update Report,", dated January 18, 2024, 30 Southwood Drive, Cambridge, ON. MTE File No. C34532-944.

3.0 SURVEY METHODOLOGY

During this assessment the surveyor inspected the building for materials typically suspected of containing designated substances.

Note:

- Repetitive testing was generally not performed. Items, which were visually homogenous to others tested, were considered to be of like material and were not sampled again. However, due to the variable nature of some building materials, several additional samples may have been collected of a potentially identical material as required.
- Our survey was non-invasive in nature. The survey did not include demolition of walls, and ceilings to inspect voids and chases for concealed materials. EXP did not complete repairs of the locations where demolition has occurred. Doors, motors, equipment, and exterior finishes were not disassembled to inspect for concealed asbestos-containing materials.

3.1 *Asbestos*

The surveyor sampled typical friable and non-friable building materials historically suspected to contain asbestos.

Ontario Regulation 278/05 defines an asbestos-containing material (ACM) as a material that contains 0.5% or more asbestos by dry weight. The precautions and procedures regarding the disturbance or removal of the ACM in Ontario Regulation 278/05 are generally based upon what is referred to as the friability of the material and the quantity of the material(s) to be disturbed. A friable material is defined as a material when dry, can be crumbled, pulverized, or powdered by hand pressure. Friable materials are considered more dangerous to human health by nature of the materials ability to generate airborne asbestos fibres. Non-friable products pose no danger of releasing airborne fibres unless cut, broken or otherwise physically abraded. Once airborne, asbestos fibres tend to be suspended in the air if not controlled and can be inhaled deep in the lungs past the body's natural defenses, causing asbestos related occupational diseases.

The most common friable building products used in construction include but are not limited to spray applied fireproofing, textured coat finishes, decorative or acoustic finishes and mechanical or pipe insulations. Manufactured non-friable materials containing asbestos include but are not limited to vinyl floor tiles, ceiling tiles, drywall joint compound (when painted), mastics, adhesives, asbestos cement products and textiles. In addition, some materials exist between friable and non-friable generalizations due to the nature of their application and the manner in which they behave when disturbed. Plaster exists in its typical state as non-friable material but when disturbed or removed must be treated as a friable product.

Samples were collected in accordance with Table 1 of Ontario Regulation 278/05 including determination of the accessibility and condition of each material. Remedial recommendations were prioritized based on the combination of accessibility and condition. Samples of suspected asbestos-containing materials were not collected if the sampling of the material created a hazard to the surveyor, required extensive demolition of covering materials to identify the material, or would create damage to the integrity of the building envelope. Building materials not sampled and analyzed are considered asbestos containing until proved otherwise as required by Ontario Regulation 278/05.

A number of materials may have been visually examined and identified to be asbestos containing based on historical knowledge including but not limited to, asbestos cement products and duct connectors.

Sample analysis was completed by EMSL Analytical Inc. (EMSL). Bulk asbestos analyses were performed in accordance with the method outlined in Asbestos on Construction Projects and in Buildings and Repair Operations – made under the Occupational Health and Safety Act Ontario Regulation 278/05, (EPA/600/R-93-116). EMSL holds accreditations with The National Laboratory Accreditation Program (NVLAP) for the determination of asbestos in bulk building materials and the interim method for the determination of asbestos in bulk insulation samples.

The analysis of the materials submitted was completed using a method referred to as “stop positive analysis”. This method requires one result of greater than 0.5% asbestos to consider a material as asbestos-containing. Conversely, all samples of a sample set are subject to analysis before a material is considered a non-asbestos material. This approach is required by Ontario Regulation 278/05.

Materials comprised of more than one compound are analyzed in different phases to provide a result for each compound.

Where materials are listed as non-asbestos, or results indicate “none detected” it should be understood that this determination is based upon the limitations of analysis performed. Building materials defined as non-asbestos should be considered to contain no detectable concentrations of asbestos fibres. Materials found to contain less than 0.5% asbestos by dry weight have been labelled as containing trace amounts of asbestos. These materials are considered non-asbestos under Ontario Regulation 278/05.

Asbestos analytical certificates are included in Appendix A.

3.2 *Lead*

Suspected lead-containing paints or coatings present in more than a trivial amount, and/or where the condition was judged to poor were collected as part of the survey. Sample collection included determination of the accessibility and condition of each paint finish. Remedial recommendations were prioritized based on the combination of accessibility and condition. Other suspected lead materials were identified based on visual assessment and historical usage including but not limited to roof flashing, pipe solder and sound attenuation panels.

The EACC Lead Guideline for Construction, Renovation, Maintenance or Repair, dated October 2014 was prepared to aid building owners, constructors, contractors, subcontractors, and workers. The new guideline is intended to promote safe work practices, the appropriate use of or personal protective equipment and worker awareness/training. It was developed through an exhaustive review of pertinent regulatory and guidance documents as well as professional experiences of the abatement industry.

The guideline defines work on lead as operations involving drilling, handling, application, removal, disturbance, or clean-up of any material containing Lead during renovation work. The previous Ministry of Labour, Immigration, Training and Skills Development guideline for the control of lead exposures during the removal of lead on construction projects does not include criteria for categorizing paint as lead-based by concentration (% by weight, ppm, mg/kg, or ug/g). However, the EACC guideline has established a *de minimus* (virtually safe) concentration of lead in paints or coatings where a hazard during normal work would not likely be present in the absence of aggressive disturbance (sanding, grinding, abrading, torching etc.) or heating of the material. The guideline was established based on interpretation and adherence to the following regulations or guidelines:

- *The Surface Coating Materials Regulation (SOR/2005-109) as amended.*
- *Ontario Regulation 490/09 – Designated Substances; and,*
- *The Ministry of Labour, Immigration, Training and Skills Development Guideline – Lead on Construction Projects.*

The Surface Coating Materials Regulation (SOR/2005-109) as amended in October 2010 regulates the amount of lead present in a paint or coating to be 0.009% or less in Canada. Some exceptions have been granted to allow for higher lead concentrations. These exceptions include:

- as an anti-corrosive or an anti-weathering coating applied on the interior or exterior surface of any building or equipment that is used for an agricultural or industrial purpose;
- as an anti-corrosive or an anti-weathering coating applied on any structure, other than a building, that is used for an agricultural, industrial, or public purpose;
- as a touch-up coating for metal surfaces;

- on traffic signs;
- for graphic art on billboards or similar displays;
- for identification marks in industrial buildings; or
- as material for the purposes of arts, crafts, or hobbies, other than material for use by children (SOR/2010-224, s.1).

Ontario Regulation 490/09 applies to every employer and worker at a workplace where lead is present, produced, processed, used, handled, or stored where a worker is likely to be exposed to lead.

The Ministry of Labour, Immigration, Training and Skills Development Guideline (Lead on Construction Projects) is intended to assist people who have duties under the Occupational Health and Safety Act, and its regulations to protect all workers from exposure to inorganic lead. Additionally, all employers are required by Ontario Regulation 833 "Control of Exposure to Biological or Chemical Agents" to limit the exposure of workers to specified hazardous agents in accordance with the values set out within the regulation. This is in conjunction with the requirement of Ontario Regulation 490/09. The current airborne lead exposure limits for the relevant regulations are:

- *Ontario Regulation 490/09 – Designated Substances*
  - 0.05 mg/m^3 - Time Weighted Average (8 Hour Day or 40 Hour Work Week)
- *Ontario Regulation 833*
  - 0.05 mg/m^3 (8 Hour Day or 40 Hour Work Week)

The guideline has established the following recommendations based upon lead concentrations in paints or coatings:

- Paints or surface coatings containing less than or equal to 0.1% lead by weight (1000 µg/g or 1000 mg/kg or 1000 ppm lead) are considered low-level lead paints or surface coatings. If these materials (and the surfaces to which they are applied) are disturbed in a non-aggressive manner, performed using normal dust control procedures and are completed so that the TWA for PNOS is not exceeded, then worker protection from the inhalation of lead is not required. General health and safety precautions must still be implemented, which may include, in part, prohibiting eating, drinking, smoking, and chewing in the work area, implementing dust suppression techniques, and washing facilities for workers to wash hands and face.
- Paints or surface coatings containing greater than 0.1% lead by weight (1000 µg/g, or 1000 mg/kg, or 1000 ppm) but less than 0.5% lead by weight (5000 µg/g, or 5000 mg/kg, or 5000 ppm lead) are considered lead-containing paints or surface coatings. Tasks performed that disturb these materials must be completed in accordance with the

Classifications of Work Operations (in Section 7) and corresponding procedures (in Section 8). Alternatively, a hygiene or exposure assessment can be performed to determine procedures that are required.

- Construction operations involving lead-based paints or surface coatings (i.e., concentrations equal to or greater than 0.5% lead by weight (5000 µg/g, or 5000 mg/kg, or 5000 ppm lead) must always be completed in accordance with the procedures listed in the Classifications of Work Operations (in Section 7) and corresponding procedures (in Section 8). Alternatively, a hygiene or exposure assessment can be performed to determine procedures that are required.
- Regardless of lead content in paints or surface coatings, tasks that create an aggressive disturbance of coatings such as torching/welding, abrasive blasting must always be completed in accordance with the procedures listed in the Classifications of Work Operations (in Section 7) and corresponding procedures (in Section 8). Alternatively, a hygiene or exposure assessment can be performed to determine procedures that are required.

This guideline is used for interpretation of all results and any recommendations regarding lead paints or coatings identified during this survey.

A total of one (1) paint sample was collected from the building components where possible and was submitted to EMSL for analysis of total lead content by EPA Method No. 7000B; by flame atomic absorption spectrophotometry. EMSL holds accreditations with AIHA (American Industrial Hygiene Association).

Lead analytical certificates are included in Appendix B.

3.3 *Mercury*

Suspected mercury-containing materials were identified based on visual assessment and historical usage. Sampling of suspected mercury-containing materials was not completed.

3.4 *Silica*

Suspected silica-containing materials were identified based on visual assessment and historical usage. Sampling of suspected silica-containing materials was not completed.

3.5 *Visible Suspect Mould*

A limited visual assessment for the presence of mould and/or water damage was completed as part of the survey. No samples were collected.

4.0 REGULATORY REQUIREMENTS

"Designated Substance" as defined by the Ontario Occupational Health & Safety Act (OHSA) means "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." Under Section 30 of the OHSA prior to issuing any project plans the owner or an agent acting on behalf of the owner must provide the Designated Substance report to the constructors. Sequentially, the constructor must provide this report to any sub-contractors who would potentially disturb any designated substances identified in this report. Designated Substances are regulated under Ontario Regulation 490/09.

The Ministry of Labour, Immigration, Training and Skills Development (MOL) has issued a regulation (Ontario Regulation 278/05) with respect to the disturbance of asbestos on construction projects and has drafted guidelines for control of lead and silica exposures on construction projects.

Ontario Regulation 278/05 classifies all disturbance of asbestos as Type 1, Type 2, or Type 3, each of which is associated with defined work practices. All asbestos-containing material waste is subject to special handling and disposal practices and must be removed prior to renovation or demolition. Removal of any quantity of friable asbestos of greater than $1m^2$ requires notification of the MOL. Disposal of asbestos waste is subject to waste management regulations under Ontario Regulation 347/90 as amended to Ontario Regulation 102/07.

The MOL guideline for the control of lead exposures during the removal of lead on construction projects does not include criteria for categorizing lead paint. The MOL does not have a standard percentage of lead (by dry weight) or a concentration a material must have to be considered lead based.

The Designated Substance regulation (Ontario Regulation 490/09) specifies occupational exposure limits (OELs) for lead and, where necessary, requires implementation of a control program to ensure compliance with these OELs. The time-weighted average (TWA) OEL for lead (i.e., all lead except tetraethyl lead) is: 0.05 milligrams per cubic metre (mg/m^3) of air. However, under Subsection 3(3) of the Regulation, construction projects are excluded from the OELs and most of the other requirements of the Regulation. This exclusion should not be interpreted as meaning nothing is to be done for construction workers who are exposed to lead. The OELs establish an Ontario standard for worker protection from lead. Procedures that provide an equivalent level of protection should, therefore, be implemented on construction projects where exposure to lead is a hazard. Ensuring such procedures are in place would, in the words of clause 25(2)(h) of the Occupational Health and Safety Act (OHSA), be "taking reasonable precautions to protect the health and safety of workers".

The EACC Lead Guideline for Construction, Renovation, Maintenance or Repair, dated October 2014 was prepared and released to aid building owners, constructors, contractors, subcontractors, workers, and engineering professionals who deal with the occupational environmental hazards. This guideline was

written in conjunction with the MOL and was used to determine appropriate recommendations for the disturbance of lead-containing coatings by instituting administrative and engineering controls during the disturbance of lead-containing materials to adhere to the above-mentioned regulations regarding inorganic lead.

5.0 RESULTS

5.1 *Asbestos-Containing Materials (ACM)*

Asbestos is a general name for several varieties of highly fibrous silicate minerals. Commercially popular types of asbestos include Chrysotile, Amosite and Crocidolite. The fibres are valued for their heat and chemical resistance properties. The combination of fibrous structures, low heat conductivity, high electrical resistance, chemical inertness, strength, and flexibility, as well as its effectiveness as a reinforcing or binding agent when combined with cement and/or plastic, made asbestos popular for widespread industrial use.

One measure of the potential hazard of ACM is its friability. The Ontario Ministry of Labour, Immigration, Training and Skills Development asbestos regulation defines a friable material as one when dry can be crumbled, pulverized, or powdered by hand pressure. The friability of ACM is theoretically an indicator of the ease with which fibres may be released into the air. Non-friable products with bound asbestos pose no danger of releasing airborne fibres unless cut, broken up or otherwise physically abraded.

Friable Materials

5.1.1 Sprayed Fireproofing

Spray applied fireproofing was not identified in the project area during the survey.

5.1.2 Texture Coat

Texture coat was not identified in the project area during the survey.

5.1.3 Mechanical Pipe Insulation

Parging cement was identified on elbows in Rooms 121, 124, 815B, 812A of the 1962 Original era during the survey. Samples were previously collected and submitted for analysis (Historic Sample Group 1680.768 Pinchin). The parging cement was found to contain Chrysotile asbestos – no percentage was specified. Approximately fifty-two (52) fittings were identified in good condition during the survey.

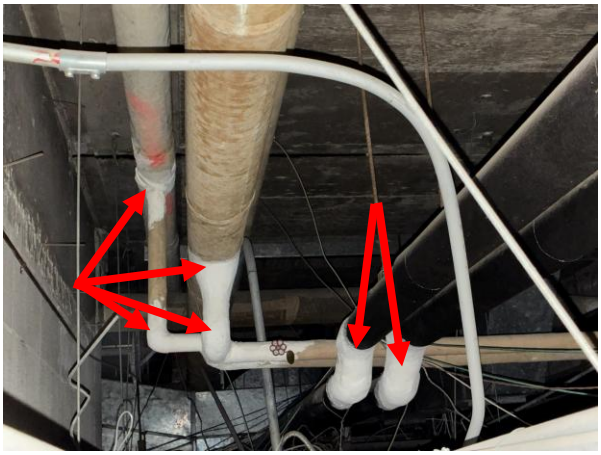
Magnesia block (Mag Block) insulation was previously identified on pipe straights in Room 46A. Samples were previously collected and submitted for analysis (Historic Sample Group 1680.768 Pinchin). The insulation was found to contain Chrysotile asbestos – no percentage was specified. Approximately ten (10) linear feet of insulation were previously identified. The mag block insulation was concealed at the

time of the survey, but and is not anticipated to require disturbance in conjunction with the renovation scope of work.

The remaining pipes identified in the project area during the survey are either uninsulated or insulated with fibreglass.

Friable pipe insulations may be present inside inaccessible areas of the building (wall voids, pipe chases etc.).

Photographs of the mechanical insulations can be found below:



Photograph No. 1
Asbestos-Containing Parging cement
(Historic Sample Group 1680.768 Pinchin). Location 812A.

5.1.4 HVAC System

All ducts were identified to be insulated with fibreglass and canvas or fibreglass foil face insulations. No parging cement was identified on the seams or edges of the insulation.

Friable and non-friable duct insulations may be present inside inaccessible areas of the building (wall voids, pipe chases etc.).

5.1.5 Mechanical Equipment

Mechanical equipment identified in the project area during the survey is either uninsulated or insulated with fibreglass.

5.1.6 Vermiculite

Vermiculite was not identified in the project area during the survey.

Non-Friable Materials

5.1.7 Acoustic Ceiling Tiles

Two (2) distinct patterns of acoustic ceiling tiles were identified in the project area during the survey. The following table represents our findings:

Style of Ceiling Tile	Pattern	Room Name or Number	Sample Group	Asbestos Present	Condition
Lay-in	2'x4' Short Fissure Random Pinhole	Rooms 48, 51, 51B, 75, 121, 815B, 812A	Dated 1996	None	N/A
Mechanically Fastened	1'x1' Medium and Small Pinhole	Room 812A	S05	None	N/A

Photographs of the ceiling tiles can be found below:

Photograph No. 2
Non-Asbestos 2'x4' Short Fissure Random Pinhole (Dated 1996). Location 121.

Photograph No. 3
Non-Asbestos 1'x1' Medium and Small Pinhole Ceiling Tile (Mechanically Fastened). Location 812A (Vestibule).

5.1.8 Plaster Finishes

Plaster is considered to be non-friable while in general use. If the plaster becomes damaged or requires removal the material is to be considered friable.

Single-phase rough coat plaster was identified on walls in Rooms 75 and 121 of the 1962 Original building era during the survey. Three (3) samples were collected and submitted for analysis (Sample Group 26000583-ASB-01A-C). No asbestos was identified.

Two-phase skim and rough coat plaster was identified on walls in Room 815B of the 1962 Original building era during the survey. Three (3) samples were collected and submitted for analysis (Sample Group 26000583-ASB-08A-C). No asbestos was identified.

5.1.9 Drywall Joint Compound

Drywall joint compound was identified on walls in Rooms 51 & 51B of the 1962 Original building era during the survey. Samples were previously collected and submitted for analysis (Historic Sample Group S15). No asbestos was identified.

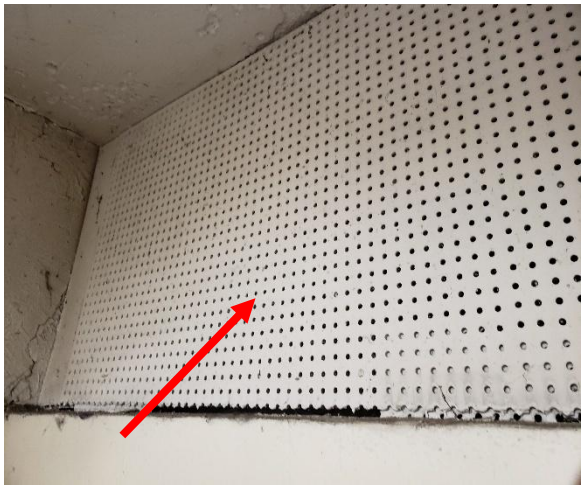
5.1.10 Asbestos Cement Products

Transite piping was previously identified in Room 815B and 122 of the 1962 Original building era during the survey. No samples were collected. The Transite pipe was visually identified to contain asbestos. Approximately fifty (50) linear feet of Transite were identified in good condition during the survey.

Transite Peg Boards were identified in Room 122 & 124 of the 1962 Original building era during the survey. No samples were collected. The Transite peg boards were visually identified to contain asbestos. Approximately twenty-four (24) Transite containing peg boards were identified during the survey.

Photographs of the asbestos-cement products can be found below:

Photograph No. 4
Asbestos-Containing Transite Pipe (Visually Confirmed). Location 122.



Photograph No. 5
Asbestos-Conatining Transite Peg Board (Visually Confirmed). Location 122.

5.1.11 Vinyl Floor Tiles and Mastic Adhesive

Flooring materials were not included in the scope of work for this survey as they are not anticipated to require disturbance in conjunction with the renovation scope of work.

5.1.12 Vinyl Sheet Flooring

Flooring materials were not included in the scope of work for this survey as they are not anticipated to require disturbance in conjunction with the renovation scope of work.

5.1.13 Roofing

Roofing materials were investigated as part of the survey and suspect materials were collected and submitted for analysis. The roof consists of the following layers throughout the project area: Tar Membrane 1, Fiberboard, Tar, Tar Membrane 2, Compound, Tar paper, Felt & Foam. Three (3) samples of each suspect asbestos containing layer was collected and submitted for analysis (Sample Group 26000583-ASB-13A-C). No asbestos was identified.

Photographs of the roofing materials can be found below:

Photograph No. 6
Non-Asbestos Roofing layers: Tar membrane 1, fiberboard, tar, tar membrane 2, compound, tar paper, felt & foam (Sample Group 26000583-ASB-13A-C). Roof.

5.1.14 Mastic

Grey mastic was identified associated with unit penetration on the boiler roof during the survey in project area. Three (3) samples were collected and submitted for analysis (Sample Group 26000583-ASB-09A-C). No asbestos was identified.

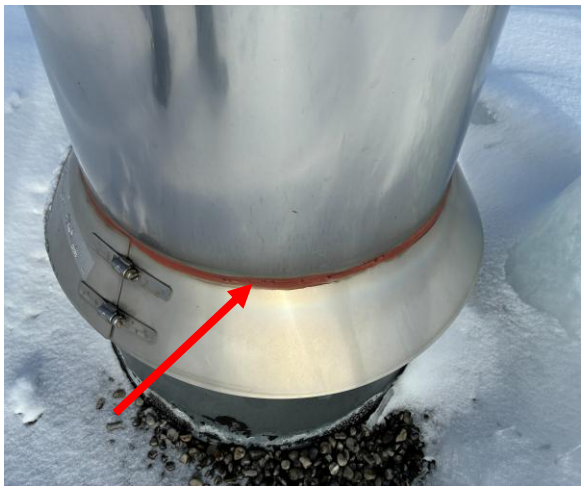
Red mastic was identified associated with unit penetration on the boiler roof during the survey in the project area. Three (3) samples were collected and submitted for analysis (Sample Group 26000583-ASB-10A-C). No asbestos was identified.

Dark red mastic associated with ducts were identified in the Room 121 of the 1962 Original era during the survey. Three (3) samples were collected and submitted for analysis (Sample Group 26000583-ASB-02A-C). The dark red mastic was found to contain 3% Chrysotile asbestos. Approximately two (2) square feet of this material were identified during the survey.

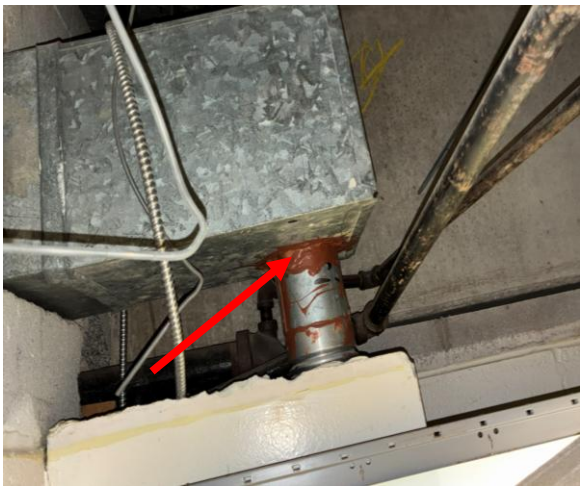
Bright red mastic associated with pipe penetrations were identified in the Room 46 of 1962 Original era during the survey. Three (3) samples were collected and submitted for analysis (Sample Group 26000583-ASB-07A-C).

Photographs of the mastics can be found below:

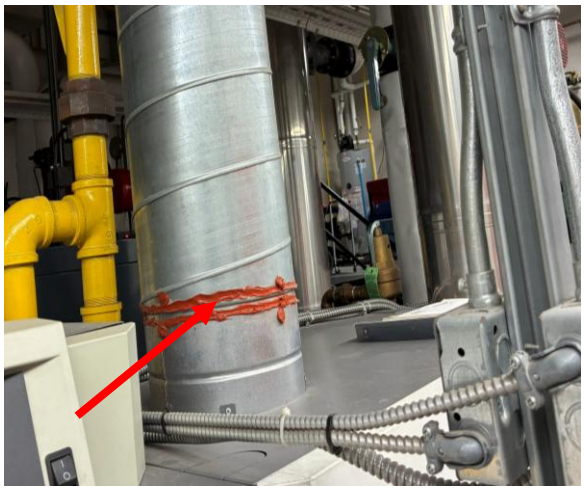
Photograph No. 7
Non-Asbestos Grey mastic associated with unit penetration (Sample Group 26000583-ASB-09A-C). Boiler roof.



Photograph No. 8
Non-Asbestos Red mastic associated with unit penetration (Sample Group 26000583-ASB-10A-C). Boiler roof.



Photograph No. 9
Asbestos-Containing Dark red mastic associated with pipe penetration (Sample Group 26000583-ASB-02A-C). Room 121.



Photograph No. 10
Non-Asbestos Bright red mastic associated with pipe penetration (Sample Group 26000583-ASB-07A-C). Room 46.

5.1.15 Caulking

Grey caulking was identified associated with metal wall on the roof in the project area during the survey. Three (3) samples were collected and submitted for analysis (Sample Group 26000583-ASB-11A-C). The Grey caulking was found to contain 2% Chrysotile asbestos. Approximately eighty (80) linear feet of this material were identified during the survey.

Photographs of the caulking can be found below:

Photograph No. 11
Non-Asbestos grey caulking associated under metal wall (Sample Group 26000583-ASB-11A-C). Roof.

5.1.16 Mortars

Grey mortar associated with concrete block walls was identified throughout the project area during the survey. Three (3) samples were collected and submitted for analysis (Sample Group 26000583-ASB-03A-C). No asbestos was identified.

Grey putty/mortar associated between RAAC panels on ceilings were identified throughout the project area during the survey. Three (3) samples were collected and submitted for analysis (Sample Group 26000583-ASB-05A-C). No asbestos was identified.

Photographs of the mortars can be found below:

Photograph No. 12
Non-Asbestos mortar associated with concrete block walls (Sample Group 26000583-ASB-03A-C). Location 121.

Photograph No. 13
Non-Asbestos grey putty/mortar associated between RAAC panels (Sample Group 26000583-ASB-05A-C). Location 124.

5.1.17 Block Filler Compounds

Block filler compound was identified on concrete block walls throughout the project area during the survey. Three (3) samples were collected and submitted for analysis (Sample Group 26000583-ASB-03A-C). This material was found to contain 0.25% Chrysotile and is considered to be non-asbestos.

5.1.18 Tar

Black tar paper & compressed insulation was identified associated with pipe straights in Room 812A of the 1962 Original era during the survey. Three (3) samples were collected and submitted for analysis (Sample Group 26000583-ASB-04A-C). No asbestos was identified.

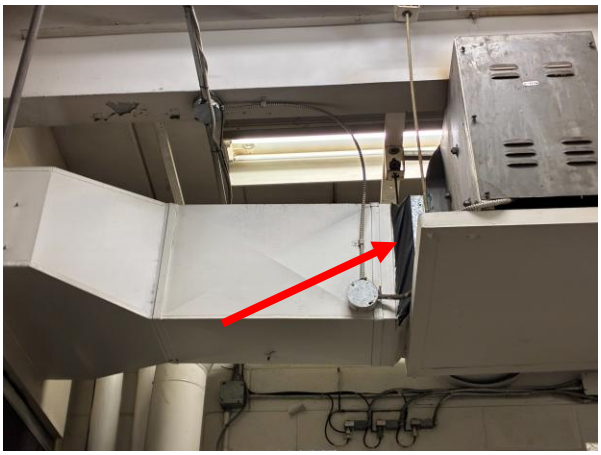
Black tar paper was identified associated with fiberglass pipe straights in Room 124 of the 1962 Original era during the survey. Three (3) samples were collected and submitted for analysis (Sample Group 26000583-ASB-06A-C). No asbestos was identified.

Black tar was identified associated with duct/vent on the roof during the survey. Three (3) samples were collected and submitted for analysis (Sample Group 26000583-ASB-12A-C). No asbestos was identified.

5.1.19 Duct Connectors

Flex joint duct connectors were previously identified in Rooms 122, 124 of 1962 Original building era during the survey. This material has not been sampled and is presumed to contain asbestos. Approximately eight (8) duct connectors were identified in good condition during the survey.

Photographs of the duct connectors can be found below:



Photograph No. 14
Asbestos-Containing flex joints connectors associated with duct (Visually Confirmed). Location Room 122.

5.2 *Visible Mould*

No visual indicators of suspect mould were identified in the project area during the survey. Visible suspect mould was not observed.

5.3 *Lead-Containing Materials*

One (1) representative paint sample was collected from the project area during the survey. The following table represents our findings:

Sample Number	Description	Condition	Result %	Classification
26000583-PB-01	White Paint on RAAC ceiling – Room 122	Good	0.0074	Low-level Lead Coating

Results indicate that sample 26000583-Pb-01 has a lead concentration of less than 0.1% and should be considered to have low levels of lead. In the absence of aggressive disturbance (sanding, torching, grinding) normal dust control measures and should be sufficient in controlling the requirement for respirators during renovation work. General safety precautions should still be adhered to when working in the area including no eating, smoking, chewing, or drinking. Workers shall be provided proper washing facilities to ensure workers wash hands and faces before leaving the work area.

Any paint or coating that will be aggressively disturbed (grinding, sanding, torching, burning, abrasive blasting etc.) must be completed must be in accordance with the Classifications of Work Operations (Section 7) and the corresponding procedures in Section 8 of the EACC Lead Guideline. Alternatively, a

project specific exposure assessment can be completed to further delineate the proper precautions and procedures required for the project.

Based on the building age of construction, lead is also expected to be present in solder on copper plumbing fixtures throughout the building.

Lead is present in all emergency back-up battery powered lighting systems.

5.4 *Mercury*

Mercury is assumed to be present in fluorescent light tubes throughout the project area.

5.5 *Silica*

Crystalline silica is present in concrete products, mortar, brick, etc. These construction products are typically found throughout building structures.

5.6 *Ethylene Oxide*

Evidence suggesting the presence of ethylene oxide was not observed at the Site. This product would not be expected to be present in this building.

5.7 *Vinyl Chloride*

Evidence suggesting the presence of vinyl chloride monomer was not observed at the Site. Vinyl chloride would not be expected to be present in this building.

5.8 *Benzene*

Evidence suggesting the presence of benzene was not observed at the Site. Benzene would not be expected to be present in this building.

5.9 *Coke Oven Emissions*

Evidence suggesting the presence of coke oven emissions was not observed at the Site. Coke oven emissions would not be expected to be present in this building.

5.10 *Acrylonitrile*

Evidence suggesting the presence of acrylonitrile was not observed at the Site. Acrylonitrile would not be expected to be present in this building.

5.11 *Isocyanates*

Evidence suggesting the presence of isocyanates was not observed at the Site. Isocyanates would not be expected to be present in this building.

5.12 *Arsenic*

Evidence suggesting the presence of arsenic was not observed at the Site. Arsenic would not be expected to be present in this building.

6.0 RECOMMENDATIONS

6.1 *Short Term General Recommendations*

Prior to issuing any project plans the owner or an agent acting on behalf of the owner must provide this report to the constructor. Sequentially, the constructor must provide this report to any sub-contractors who would potentially disturb any designated substances identified in this report.

Based on the quantity of designated substances identified during of the survey EXP recommends abatement specifications meeting be issued prior to any disturbance of the designated substances identified in this report.

6.2 *Short Term Recommendations Regarding Asbestos*

6.2.1 Abatement Precautions and Procedures

6.2.1.1 Mechanical Insulation

Removal or disturbance of friable asbestos-containing mechanical insulation on pipes, ducting and mechanical equipment is governed by the procedures outlined in Ontario Regulation 278/05. The disturbance of less than one (1) square metre of asbestos-containing mechanical insulation on pipes and ducts may be performed following Type 2, or Glove Bag precautions. If removal of greater than one (1) square metre of friable insulation is required, follow Type 3 precautions as outlined in Ontario Regulation 278/05.

Remediation of damaged friable mechanical insulation must be completed using Type 2 precautions as outlined in Ontario Regulation 278/05.

Advance notice of project to the Ministry of Labour, Immigration, Training and Skills Development is required when disturbing greater than one (1) square metre of friable insulation (Glove Bag and Type 3).

6.2.1.2 Asbestos Cement Products

Non-friable asbestos cement products may be altered or removed, with handheld non-powered tools, following the Type 1 procedures outlined in Ontario Regulation 278/05. The use of power tools on asbestos cement products must be performed under Type 3 precautions. Alternately, if the power tool is equipped with a HEPA filtered dust collection system the work may be completed following Type 2 precautions and procedures.

6.2.1.3 Caulking

Activities that will disturb the non-friable caulking must follow Type 1 precautions as outlined in Ontario Regulation 278/05. The use of power tools on non-friable asbestos materials must be performed under Type 3 precautions. Alternately, if the power tool is equipped with a HEPA filtered dust collection system the work may be completed following Type 2 precautions and procedures.

6.2.1.4 Mastic

Activities that will disturb the non-friable mastic must follow Type 1 precautions as outlined in Ontario Regulation 278/05. The use of power tools on non-friable asbestos materials must be performed under Type 3 precautions. Alternately, if the power tool is equipped with a HEPA filtered dust collection system the work may be completed following Type 2 precautions and procedures.

6.3 *Recommendations Regarding Lead During Renovation, Maintenance or Repair*

The EACC Lead Guideline for Construction, Renovation, Maintenance or Repair (October 2014) was used for interpretation of all results and any recommendations regarding lead paints or coatings identified during this survey. The application of a physical barrier (e.g., an encapsulate or new coat of paint) to a stabilized lead-containing material, or a paint or surface coating, is not considered a Lead Operation.

Please see below for specific recommendations pertaining to the paint(s) or coating(s) identified within the project area.

Low-level Lead Paint or Coating

Paints and coatings identified to have a lead concentration of less than 0.1% should be considered to contain low levels of lead. In the absence of aggressive disturbance (sanding, torching, grinding) normal dust control measures and should be sufficient in controlling the airborne lead concentrations and the requirement for respirators during work. General safety precautions should still be adhered to when working in the area including no eating, smoking, chewing, or drinking. Workers shall be provided proper washing facilities to ensure workers wash hands and faces before leaving the work area.

Please refer to The EACC Lead Guideline for Construction, Renovation, Maintenance or Repair (October 2014) for determination of the required precautions or procedures related to this specific project scope of work. EXP will be happy to review your project and the health and safety requirements related to lead.

6.4 *Recommendations Regarding Mercury*

The presence of mercury vapour in fluorescent light tubes poses minimal risk to occupants or workers provided the equipment is handled properly and the mercury is not allowed to escape. Prior to the demolition activities the light tubes should be removed intact to prevent the mercury vapour from escaping. These tubes can be recycled by specialized contractors.

It is good management practice to take precautions to prevent mercury vapour from becoming airborne during building demolition. Exposure to airborne mercury is regulated Ontario Regulation 490/09. The current TWAEV for mercury vapour is 0.025 mg/m^3 (except alkyl compounds).

Mercury waste must be handled and disposed of according to Ontario Regulation 347, as amended by O. Reg. 102/07, and may be subject to Leachate Criteria (Schedule 4) of this regulation.

6.5 *Recommendations Regarding Silica*

Disturbance of materials containing silica will occur during demolition of walls and ceilings, saw cutting floor slabs etc. and is regulated under Ontario Regulation 490/09. The current Time Weighted Average Exposure Value (TWAEV) for amorphous fused silica is 0.1 mg/m^3 and is 0.05 mg/m^3 for crystalline silica (quartz). This can be accomplished through proper work practices such as wetting the surface of the materials to reduce overall dust levels and providing workers with washing facilities and proper respiratory protection.

7.0 LIMITATIONS AND WARRANTY

EXP has prepared this report for the exclusive use of the Waterloo Region District School Board in evaluating the Site at the time of EXP's assessment. EXP will not be responsible for the use of this report by any third party, or reliance on or any decision to be made based on it without the prior written consent of EXP. EXP accepts no responsibility for damages, if any, by any third party because of decisions or actions based on this report.

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with that level of care and skill normally exercised by qualified professionals currently practicing in this area of environmental assessment. No other warranty, expressed or implied, is made.

The findings contained in this report are based upon conditions as they were observed at the time of investigation. No assurance is made regarding changes in conditions subsequent to the time of investigation.

If new information is developed in future work, EXP should be contacted to re-evaluate the conclusions of this report and to provide amendments as required.

Respectfully submitted,

EXP Services Inc.

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APPENDIX A
ASBESTOS BULK ANALYSIS RESULTS

EMSL Canada Inc.

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EMSL Canada Order 552601701
Customer ID: 55ADEC69
Customer PO: LON-26000583-A0
Project ID:

Attn: Kinjal Prajpati
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Phone: (519) 652-6105
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Collected: 1/22/2026
Received: 1/30/2026
Analyzed: 2/09/2026

Proj: LON-26000583-A0 SSS RAAC Phase-1

Summary Test Report for Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05

Client Sample ID: 26000583-ASB-01A **Lab Sample ID:** **552601701-0001**
Sample Description: Rough Coat Plaster - Original Era - Room 121

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-01B **Lab Sample ID:** **552601701-0002**
Sample Description: Rough Coat Plaster - Original Era - Room 121

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-01C **Lab Sample ID:** **552601701-0003**
Sample Description: Rough Coat Plaster - Original Era - Room 121

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-02A **Lab Sample ID:** **552601701-0004**
Sample Description: Dark Red Duct Mastic - Original Era - Rm 121

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Red	0.0%	97.0%	**3% Chrysotile**	

Client Sample ID: 26000583-ASB-02B **Lab Sample ID:** **552601701-0005**
Sample Description: Dark Red Duct Mastic - Original Era - Rm 121

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026				Positive Stop (Not Analyzed)	

Client Sample ID: 26000583-ASB-02C **Lab Sample ID:** **552601701-0006**
Sample Description: Dark Red Duct Mastic - Original Era - Rm 121

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026				Positive Stop (Not Analyzed)	

Client Sample ID: 26000583-ASB-03A - Paint Filler **Lab Sample ID:** **552601701-0007**
Sample Description: Block Mortar - Original Era - Rm 815B

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
400 PLM Pt Ct	2/05/2026	White	0.0%	100.0%	**<0.25% Chrysotile**	

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Client Sample ID: 26000583-ASB-03A - Mortar ***Lab Sample ID:*** **552601701-0007A**

Sample Description: Block Mortar - Original Era - Rm 815B

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-03B - Paint Filler ***Lab Sample ID:*** **552601701-0008**

Sample Description: Block Mortar - Original Era - Rm 812A

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
400 PLM Pt Ct	2/05/2026	White	0.00%	99.75%	**0.25% Chrysotile**	

Client Sample ID: 26000583-ASB-03B - Mortar ***Lab Sample ID:*** **552601701-0008A**

Sample Description: Block Mortar - Original Era - Rm 812A

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-03C - Paint Filler ***Lab Sample ID:*** **552601701-0009**

Sample Description: Block Mortar - Original Era - Rm 48

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
400 PLM Pt Ct	2/05/2026	White	0.0%	100.0%	**<0.25% Chrysotile**	

Client Sample ID: 26000583-ASB-03C - Mortar ***Lab Sample ID:*** **552601701-0009A**

Sample Description: Block Mortar - Original Era - Rm 48

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-04A - Tar Paper ***Lab Sample ID:*** **552601701-0010**

Sample Description: Black Tar Paper and Compressed Insulation - Original Era - Rm 812A

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	60.0%	40.0%	None Detected	

Client Sample ID: 26000583-ASB-04A - Insulation ***Lab Sample ID:*** **552601701-0010A**

Sample Description: Black Tar Paper and Compressed Insulation - Original Era - Rm 812A

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Beige	98.0%	2.0%	None Detected	

Client Sample ID: 26000583-ASB-04B - Tar Paper ***Lab Sample ID:*** **552601701-0011**

Sample Description: Black Tar Paper and Compressed Insulation - Original Era - Rm 812A

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	60.0%	40.0%	None Detected	

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Client Sample ID: 26000583-ASB-04B - Insulation ***Lab Sample ID:*** **552601701-0011A**

Sample Description: Black Tar Paper and Compressed Insulation - Original Era - Rm 812A

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Beige	98.0%	2.0%	None Detected	

Client Sample ID: 26000583-ASB-04C - Tar Paper ***Lab Sample ID:*** **552601701-0012**

Sample Description: Black Tar Paper and Compressed Insulation - Original Era - Rm 812A

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	60.0%	40.0%	None Detected	

Client Sample ID: 26000583-ASB-04C - Insulation ***Lab Sample ID:*** **552601701-0012A**

Sample Description: Black Tar Paper and Compressed Insulation - Original Era - Rm 812A

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Beige	98.0%	2.0%	None Detected	

Client Sample ID: 26000583-ASB-05A - Putty ***Lab Sample ID:*** **552601701-0013**

Sample Description: Grey Putty/Mortar between RAAC Panels - Original Era - Rm 122

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	White	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-05A - Mortar ***Lab Sample ID:*** **552601701-0013A**

Sample Description: Grey Putty/Mortar between RAAC Panels - Original Era - Rm 122

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-05B - Putty ***Lab Sample ID:*** **552601701-0014**

Sample Description: Grey Putty/Mortar between RAAC Panels - Original Era - Rm 122

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray	0.0%	100.0%	None Detected	Sample split from sample 5a at client request

Client Sample ID: 26000583-ASB-05B - Mortar ***Lab Sample ID:*** **552601701-0014A**

Sample Description: Grey Putty/Mortar between RAAC Panels - Original Era - Rm 122

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/06/2026	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-05C - Putty ***Lab Sample ID:*** **552601701-0015**

Sample Description: Grey Putty/Mortar between RAAC Panels - Original Era - Rm 122

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	White	0.0%	100.0%	None Detected	Sample split from sample 5a at client request

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Client Sample ID: 26000583-ASB-05C - Mortar ***Lab Sample ID:*** **552601701-0015A**

Sample Description: Grey Putty/Mortar between RAAC Panels - Original Era - Rm 122

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/06/2026	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-06A ***Lab Sample ID:*** **552601701-0016**

Sample Description: Black Tar Paper on Fiberglass Straight Pipe Insulation - Original Era - Rm 124

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	80.0%	20.0%	None Detected	

Client Sample ID: 26000583-ASB-06B ***Lab Sample ID:*** **552601701-0017**

Sample Description: Black Tar Paper on Fiberglass Straight Pipe Insulation - Original Era - Rm 124

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Brown/Black	80.0%	20.0%	None Detected	

Client Sample ID: 26000583-ASB-06C ***Lab Sample ID:*** **552601701-0018**

Sample Description: Black Tar Paper on Fiberglass Straight Pipe Insulation - Original Era - Rm 124

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Brown/Black	80.0%	20.0%	None Detected	

Client Sample ID: 26000583-ASB-07A ***Lab Sample ID:*** **552601701-0019**

Sample Description: Bright Red Duct Mastic - Original Era - Rm 121

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Red	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-07B ***Lab Sample ID:*** **552601701-0020**

Sample Description: Bright Red Duct Mastic- Original Era - Rm 121

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Red	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-07C ***Lab Sample ID:*** **552601701-0021**

Sample Description: Bright Red Duct Mastic - Original Era - Rm 121

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Red	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-08A - Skim Coat ***Lab Sample ID:*** **552601701-0022**

Sample Description: Skim and Rough Coat Plaster - Original Era - Rm 815B

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	White	0.0%	100.0%	None Detected	

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Client Sample ID: 26000583-ASB-08A - Base Coat ***Lab Sample ID:*** **552601701-0022A**

Sample Description: Skim and Rough Coat Plaster - Original Era - Rm 815B

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray	2.0%	98.0%	None Detected	

Client Sample ID: 26000583-ASB-08B - Skim Coat ***Lab Sample ID:*** **552601701-0023**

Sample Description: Skim and Rough Coat Plaster - Original Era - Rm 815B

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	White	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-08B - Base Coat ***Lab Sample ID:*** **552601701-0023A**

Sample Description: Skim and Rough Coat Plaster - Original Era - Rm 815B

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray	2.0%	98.0%	None Detected	

Client Sample ID: 26000583-ASB-08C - Skim Coat ***Lab Sample ID:*** **552601701-0024**

Sample Description: Skim and Rough Coat Plaster - Original Era - Rm 815B

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	White	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-08C - Base Coat ***Lab Sample ID:*** **552601701-0024A**

Sample Description: Skim and Rough Coat Plaster - Original Era - Rm 815B

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray	2.0%	98.0%	None Detected	

Client Sample ID: 26000583-ASB-09A ***Lab Sample ID:*** **552601701-0025**

Sample Description: Grey mastic associated with unit penetration - Boiler roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray/Silver	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-09B ***Lab Sample ID:*** **552601701-0026**

Sample Description: Grey mastic associated with unit penetration - Boiler roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray/Silver	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-09C ***Lab Sample ID:*** **552601701-0027**

Sample Description: Grey mastic associated with unit penetration - Boiler roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray	0.0%	100.0%	None Detected	

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Client Sample ID: 26000583-ASB-10A ***Lab Sample ID:*** **552601701-0028**

Sample Description: Red mastic associated with unit penetration - Boiler roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Red	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-10B ***Lab Sample ID:*** **552601701-0029**

Sample Description: Red mastic associated with unit penetration - Boiler roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Red	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-10C ***Lab Sample ID:*** **552601701-0030**

Sample Description: Red mastic associated with unit penetration - Boiler roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Red	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-11A ***Lab Sample ID:*** **552601701-0031**

Sample Description: Grey caulking associated with metal wall - Corridor roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Gray	0.0%	98.0%	**2% Chrysotile**	

Client Sample ID: 26000583-ASB-11B ***Lab Sample ID:*** **552601701-0032**

Sample Description: Grey caulking associated with metal wall - Corridor roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026				Positive Stop (Not Analyzed)	

Client Sample ID: 26000583-ASB-11C ***Lab Sample ID:*** **552601701-0033**

Sample Description: Grey caulking associated with metal wall - Corridor roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026				Positive Stop (Not Analyzed)	

Client Sample ID: 26000583-ASB-12A ***Lab Sample ID:*** **552601701-0034**

Sample Description: Black tar associated with duct/vent - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-12B ***Lab Sample ID:*** **552601701-0035**

Sample Description: Black tar associated with duct/vent - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	0.0%	100.0%	None Detected	

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Client Sample ID: 26000583-ASB-12C ***Lab Sample ID:*** **552601701-0036**

Sample Description: Black tar associated with duct/vent - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-13A - Tar Membrane 1 ***Lab Sample ID:*** **552601701-0037**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	25.0%	75.0%	None Detected	

Client Sample ID: 26000583-ASB-13A - Fiberboard ***Lab Sample ID:*** **552601701-0037A**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Brown	97.0%	3.0%	None Detected	

Client Sample ID: 26000583-ASB-13A - Tar ***Lab Sample ID:*** **552601701-0037B**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-13A - Tar Membrane 2 ***Lab Sample ID:*** **552601701-0037C**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	10.0%	90.0%	None Detected	

Client Sample ID: 26000583-ASB-13A - Compound ***Lab Sample ID:*** **552601701-0037D**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	White	5.0%	95.0%	None Detected	Sample split from sample 13B at client request

Client Sample ID: 26000583-ASB-13A - Tar Paper ***Lab Sample ID:*** **552601701-0037E**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	60.0%	40.0%	None Detected	

Client Sample ID: 26000583-ASB-13A - Felt ***Lab Sample ID:*** **552601701-0037F**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/09/2026	Black	90.0%	10.0%	None Detected	Sample split from sample 13B at client request

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Client Sample ID: 26000583-ASB-13A - Foam ***Lab Sample ID:*** **552601701-0037G**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/09/2026	Beige	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-13B - Tar Membrane 1 ***Lab Sample ID:*** **552601701-0038**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	15.0%	85.0%	None Detected	

Client Sample ID: 26000583-ASB-13B - Fiberboard ***Lab Sample ID:*** **552601701-0038A**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Brown	98.0%	2.0%	None Detected	

Client Sample ID: 26000583-ASB-13B - Tar ***Lab Sample ID:*** **552601701-0038B**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-13B - Tar Membrane 2 ***Lab Sample ID:*** **552601701-0038C**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	15.0%	85.0%	None Detected	

Client Sample ID: 26000583-ASB-13B - Compound ***Lab Sample ID:*** **552601701-0038D**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	White	5.0%	95.0%	None Detected	

Client Sample ID: 26000583-ASB-13B - Tar Paper ***Lab Sample ID:*** **552601701-0038E**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	60.0%	40.0%	None Detected	Sample split from sample 13A at client request

Client Sample ID: 26000583-ASB-13B - Felt ***Lab Sample ID:*** **552601701-0038F**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/06/2026	Brown/Black	90.0%	10.0%	None Detected	

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Client Sample ID: 26000583-ASB-13B - Foam ***Lab Sample ID:*** **552601701-0038G**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/09/2026	Beige	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-13C - Tar Membrane 1 ***Lab Sample ID:*** **552601701-0039**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	12.0%	88.0%	None Detected	

Client Sample ID: 26000583-ASB-13C - Fibreboard ***Lab Sample ID:*** **552601701-0039A**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Brown	98.0%	2.0%	None Detected	

Client Sample ID: 26000583-ASB-13C - Tar ***Lab Sample ID:*** **552601701-0039B**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	0.0%	100.0%	None Detected	

Client Sample ID: 26000583-ASB-13C - Tar Membrane 2 ***Lab Sample ID:*** **552601701-0039C**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Black	15.0%	85.0%	None Detected	

Client Sample ID: 26000583-ASB-13C - Compound ***Lab Sample ID:*** **552601701-0039D**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/05/2026	Beige	5.0%	95.0%	None Detected	Sample split from sample 13B at client request

Client Sample ID: 26000583-ASB-13C - Tar Paper ***Lab Sample ID:*** **552601701-0039E**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/09/2026	Black	60.0%	40.0%	None Detected	Sample split from sample 13A at client request

Client Sample ID: 26000583-ASB-13C - Felt ***Lab Sample ID:*** **552601701-0039F**

Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/09/2026	Black	90.0%	10.0%	None Detected	

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 552601701
Customer ID: 55ADEC69
Customer PO: LON-26000583-A0
Project ID:

Summary Test Report for Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05

Client Sample ID: 26000583-ASB-13C - Foam ***Lab Sample ID:*** **552601701-0039G**

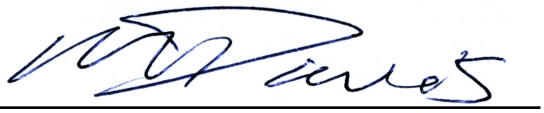
Sample Description: Roofing materials - fiber board, insulation/foam, tar paper, felt - Roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/09/2026	Yellow	0.0%	100.0%	None Detected	

Analyst(s):

Alexandra Carlson PLM (24)
Hazel Macaldo PLM (41)
400 PLM Pt Ct (3)

Reviewed and approved by:



Matthew Davis or other approved signatory
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This is a summary report; official reports are available on LabConnect or upon request and relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Canada Inc. Calgary, AB NVLAP Lab Code 500100-0

Report amended: 02/06/202616:27:37 Replaces initial report from: 02/06/202608:06:35 Reason Code: Client-Change to Sample ID

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Certificate of Analysis

MTE Consultants Inc. (Kitchener)

520 Bingemans Centre Dr.
Kitchener, ON N2B 3X9
Attn: Jason Scozzafava

Client PO:
Project: 34532-908-Southwood SS
Custody:

Report Date: 4-Oct-2017
Order Date: 4-Oct-2017

Order #: 1740206

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1740206-01	S01A-Room 121(1084)
1740206-02	S01B-Room 121(1084)
1740206-03	S01C-Room 121(1084)

Approved By:

Heather S.H. McGregor, BSc
Laboratory Director - Microbiology

Any use of these results implies your agreement that our total liabilty in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

PARACEL LABORATORIES LTD.

Order #: 1740206

Certificate of Analysis

Report Date: 04-Oct-2017

Client: MTE Consultants Inc. (Kitchener)

Order Date: 4-Oct-2017

Client PO:

Project Description: 34532-908-Southwood SS

Asbestos, PLM Visual Estimation **MDL - 0.5%**

Paracel I.D.	*Sample Date*	*Layers Analyzed*	*Colour*	*Description*	*Asbestos Detected:*	*Material Identification*	*% Content*
1740206-01	02-Oct-17	sample homogenized	Black	Mastic	**Yes**	Client ID: S01A-Room 121(1084)	
						Chrysotile	1
						Non-Fibers	99
1740206-02	02-Oct-17					Client ID: S01B-Room 121(1084)	
						not analyzed	
1740206-03	02-Oct-17					Client ID: S01C-Room 121(1084)	
						not analyzed	

**** Analytes in bold indicate asbestos mineral content.**

Analysis Summary Table

Analysis	Method Reference/Description	Lab Location	NVLAP Lab Code *	Analysis Date
Asbestos, PLM Visual Estimation	by EPA 600/R-93/116	1 - Mississauga	200863-0	4-Oct-17

** Reference to the NVLAP term does not permit the user of this report to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.*

Work Order Revisions / Comments

None

PARACEL LABORATORIES LTD.

TRU
RES
REL

Paracel ID: 1740206

Blvd.
4J8

os.com

Chain of Custody
(Lab Use Only)

Page 1 of 1

Client Name: MTE Consultants Inc	Project Reference: 34532-908 - Southwood SS
Contact Name: Jaosn Scozzafava	Quote #:
Address: 520 Bingemans Centre Drive, Kitchener, ON, N2B3X9	PO #:
	Email Address: jscozzafava@mte85.com, adennett@mte85.com
Telephone: 519-743-6500	

Turnaround Time:

- ☐ Immediate
- ☐ 4 Hour
- ✻ 8 Hour
- 1 Day
- ☐ 2 Day
- ☐ 3 Day
- ☐ Regular

Date Required: Wed. Oct 4 - end of day

ASBESTOS & MOLD ANALYSIS

Matrix: ☐Air ☐Bulk ☐Tape Lift ☐Swab ☐Other **Regulatory Guideline:**

Required Analyses: ☐Microscopic Mold ☐Culturable Mold ☐Bacteria GRAM ☐PCM ☐PLM ☐Chatfield ☐TEM

Paracel Order Number: 1740206

	Sample ID	Sampling Date	Air Volume (L)	Analysis Required	Asbestos - Bulk: Matrix Description	Positive Stop? (Y/N)	Is the Sample Layered? (Y/N)	If layered, Describe Layer(s) to be Analyzed Separately* or Homogenize all **
1	S01A-Room 121(1084)	2-Oct	-	PLM	mastic	Y	N	-
2	S01B-Room 121(1084)	2-Oct	-	PLM	mastic	Y	N	-
3	S01C Room 121(1084)	2-Oct	-	PLM	mastic	Y	N	-
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

*Each layer will be analyzed and charged separately **Homogenize = All layers are blended into a single uniform sample.

Comments: Samples dropped off at MTE office by WRDSB -

Method of Delivery: Purolator

Relinquished By (Sign):	Received at Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Jaosn Scozzafava			
Date/Time: October 3, 2017	Date/Time:	Date/Time: Oct 4/17 8:30	Date/Time: Oct 4/17

APPENDIX B

LEAD PAINT ANALYSIS RESULTS

EMSL Canada Inc.
2756 Slough Street, Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com torontolab@emsl.com

EMSL Canada Or	552601721
CustomerID:	55ADEC69
CustomerPO:	LON26000583A0
ProjectID:	

Attn: **Kinjal Prajpati**
EXP Services Inc.
15701 Robin's Hill Rd
London, ON N5V 0A5

Phone:	(519) 652-6105
Fax:	(519) 652-1709
Received:	1/30/2026 11:04 AM
Collected:	1/22/2026

Project: **LON-26000583-A0 SSS RAAC**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client SampleDescription	*Collected*	*Analyzed*	*Weight*	*RDL*	*Lead Concentration*
26000583-Pb-01	1/22/2026	2/2/2026	0.2534 g	0.0064 % wt	0.0074 % wt
552601721-0001	Site: White Paint on RAAC Ceiling - Original Era - Rm 122				

Rowena Fanto, Lead Supervisor
or other approved signatory

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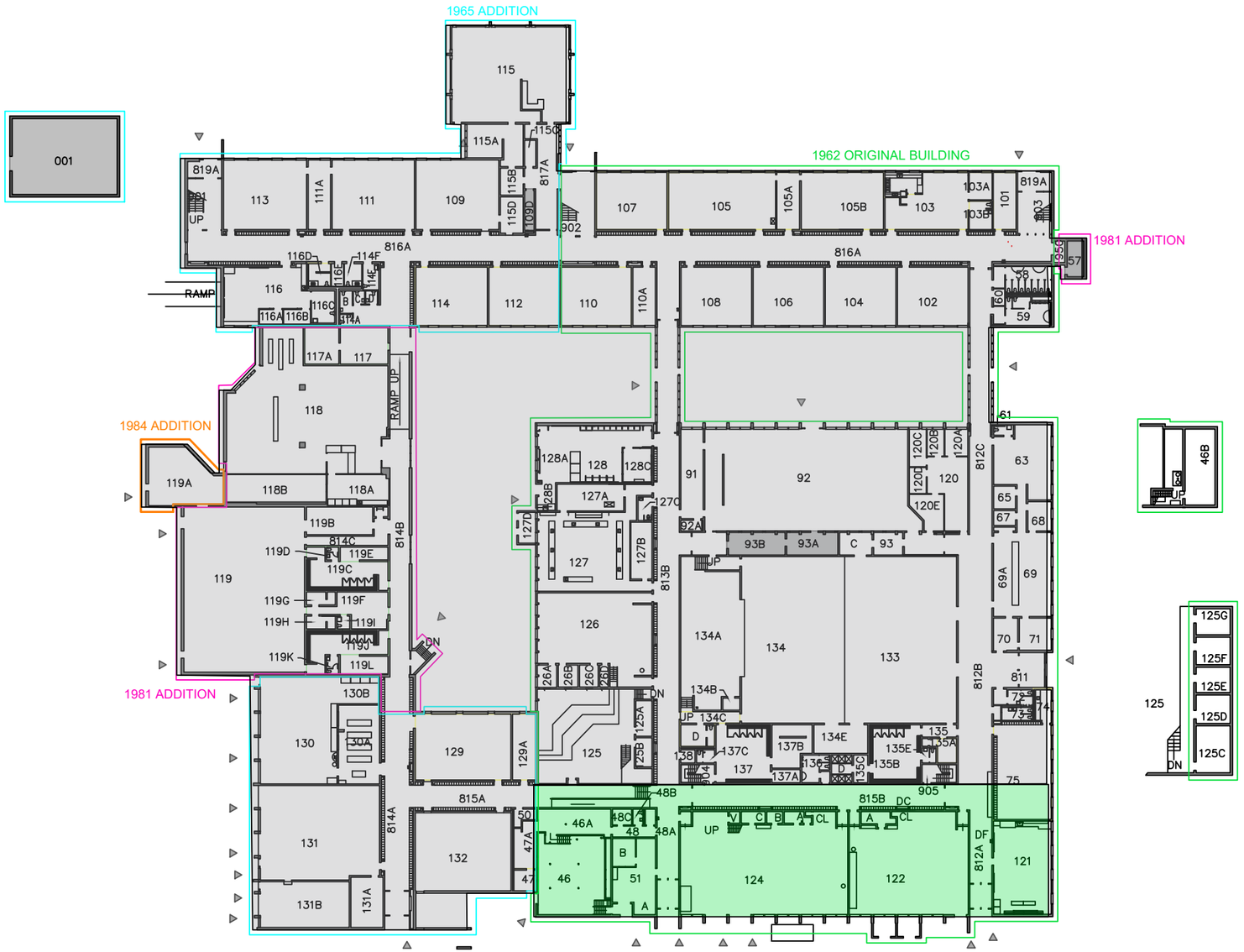
Samples analyzed by EMSL Canada Inc. Mississauga, ON AIHA LAP, LLC-ELLAP Accredited #196142

Initial report from 02/05/2026 09:36:00

APPENDIX C
DRAWINGS

KEY PLAN - PROJECT AREA



SOUTHWOOD SECONDARY SCHOOL - FIRST FLOOR PLAN - PROJECT AREA

SCALE - NTS

LEGEND

- PROJECT AREA
- OUTSIDE PROJECT AREA

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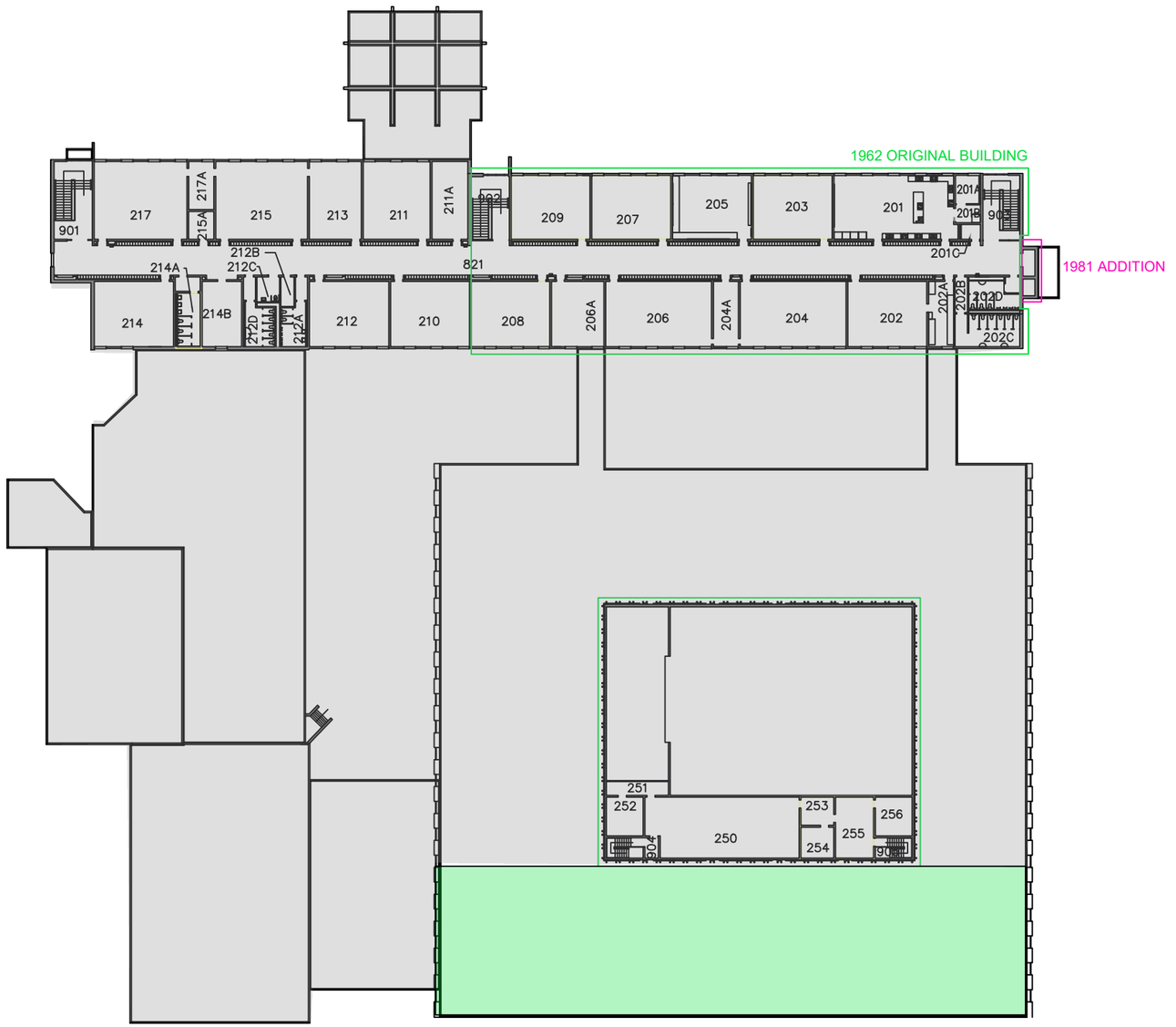
2. DO NOT SCALE DRAWINGS.
3. ALL DEFICIENCY LOCATIONS SHOWN ON DRAWINGS ARE APPROXIMATE.

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

PROJECT
Designated Substances Survey
Southwood Secondary School
30 Southwood Dr, Cambridge, Ontario

TITLE
Project Area
First Floor Plan

DESIGN	N/A	PROJECT NO.	
DRAWN BY	K.C.		LON-26000583-A0
CHECKED	J.D.	DRAWING NO.	
DATE	FEB 2026		1.0
SCALE	N/A		



KEY PLAN - PROJECT AREA

SOUTHWOOD SECONDARY SCHOOL - ROOF PLAN - PROJECT AREA

SCALE - NTS

LEGEND

- PROJECT AREA
- OUTSIDE PROJECT AREA

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Project Area
Roof Plan

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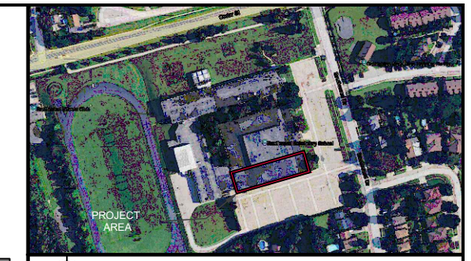
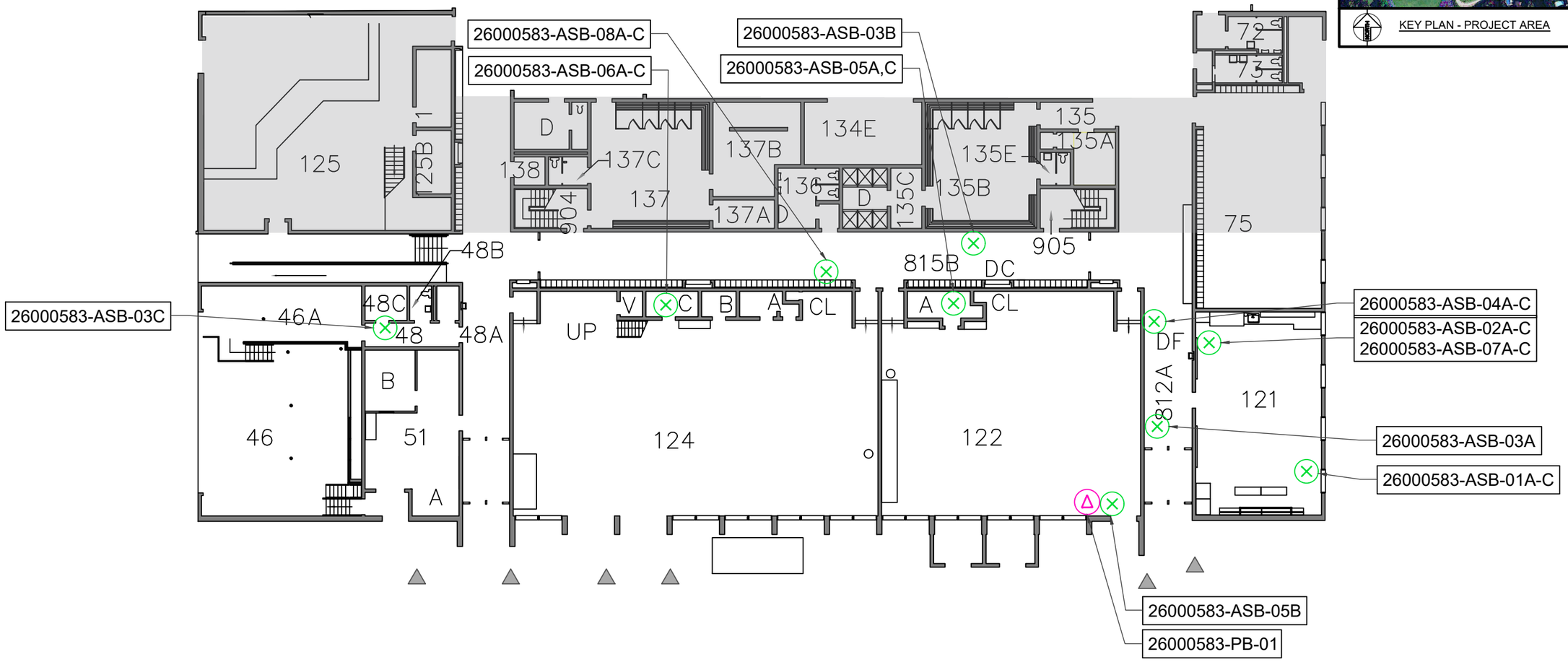


KEY PLAN - PROJECT AREA



SOUTHWOOD SECONDARY SCHOOL - FIRST FLOOR SAMPLE LOCATION PLAN

SCALE - NTS

LEGEND

- SAMPLE LOCATION (ASBESTOS)
- SAMPLE LOCATION (LEAD)
- OUTSIDE PROJECT AREA

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30 Southwood Dr, Cambridge, Ontario

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Sample Location Plan
First Floor Plan

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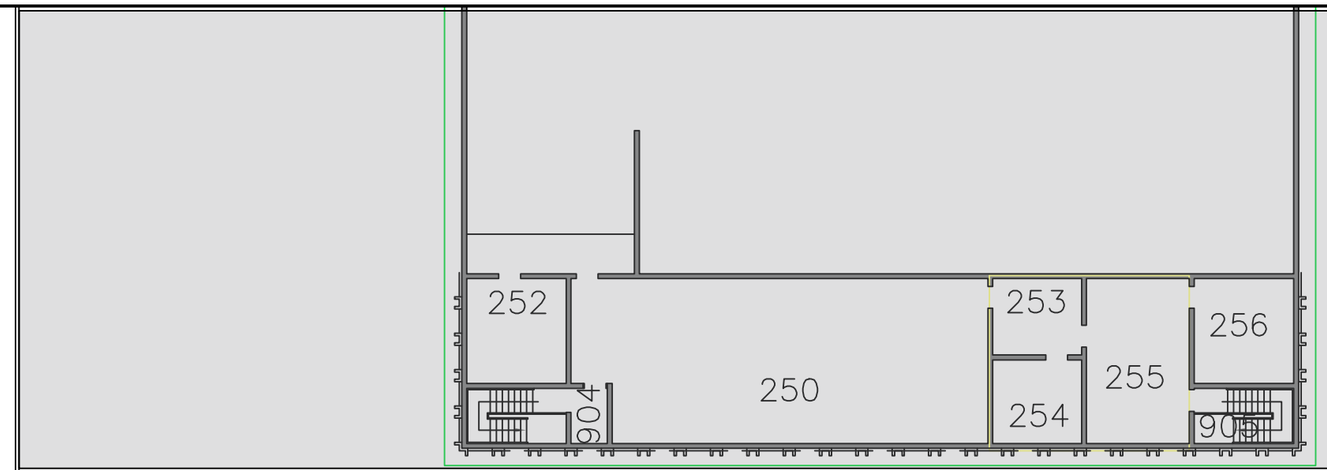
SCALE	N/A	



KEY PLAN - PROJECT AREA

26000583-ASB-11A-C

26000583-ASB-10A-C

26000583-ASB-09A-C

26000583-ASB-13C

26000583-ASB-12A-C

26000583-ASB-13A,B

SOUTHWOOD SECONDARY SCHOOL - ROOF SAMPLE LOCATION PLAN

SCALE - NTS

LEGEND

- SAMPLE LOCATION (ASBESTOS)
- SAMPLE LOCATION (LEAD)
- OUTSIDE PROJECT AREA

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Southwood Secondary School
30 Southwood Dr, Cambridge, Ontario

TITLE
Sample Location Plan
Roof Plan

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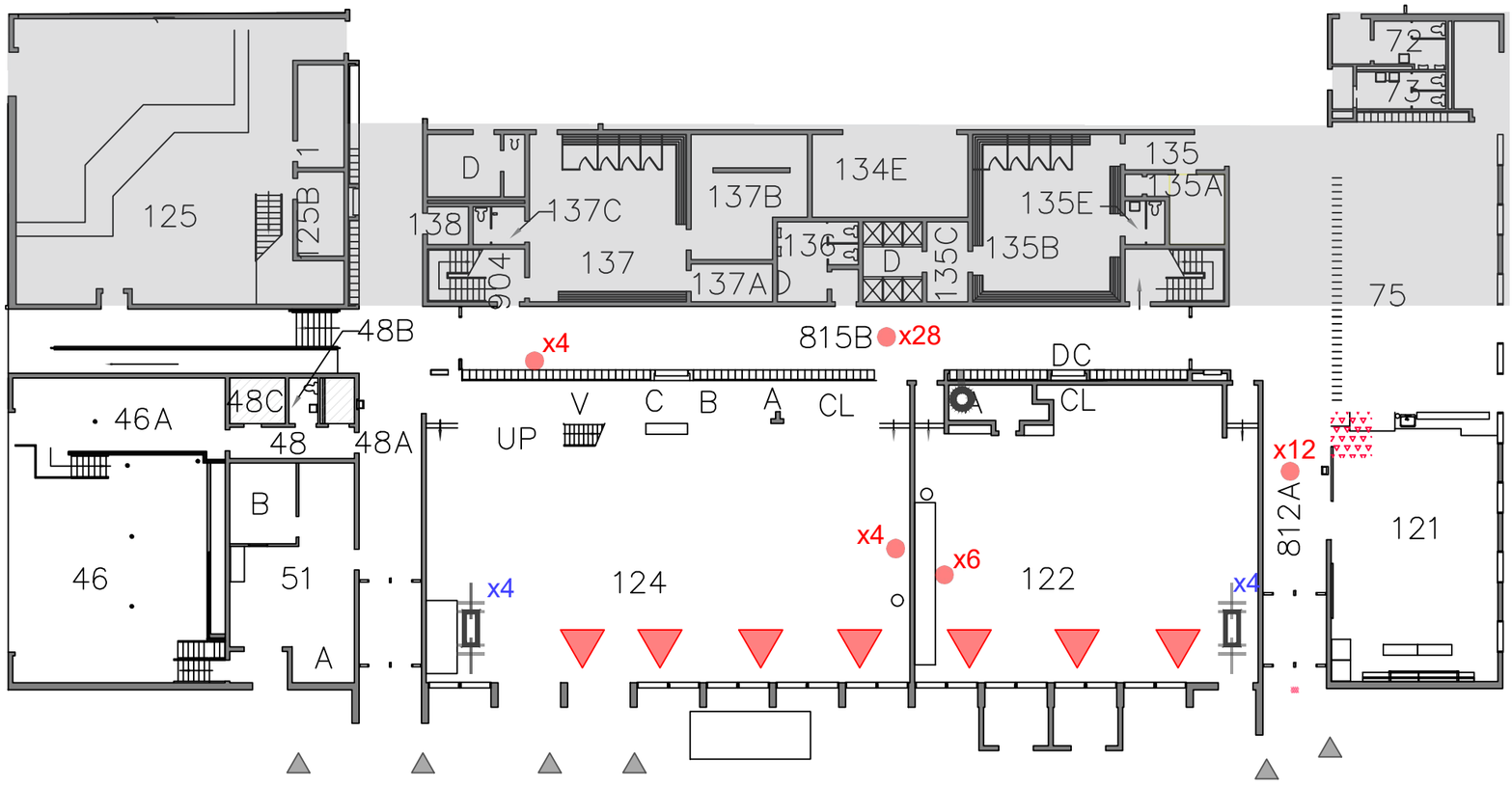
SCALE	N/A	

KEY PLAN - PROJECT AREA



NORTH

SOUTHWOOD SECONDARY SCHOOL - FIRST FLOOR DISTRIBUTION PLAN

SCALE - NTS

LEGEND

- ASBESTOS-CONTAINING DARK RED DUCT MASTIC (SAMPLE GROUP 26000583-ASB-02A-C)
- x2 — ASBESTOS-CONTAINING PIPE INSULATIONS
- PIPE FITTING INSULATION W QUANTITY
- TRANSITE (ASBESTOS CEMENT PIPE) (VERTICAL AND HORIZONTAL)
- x2 — DUCT EXPANSION JOINTS w QUANITTY
- PEGBOARD
- NO ACCESS
- OUTSIDE PROJECT AREA

NOTE

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Designated Substances Survey
Southwood Secondary School
30 Southwood Dr, Cambridge, Ontario

TITLE
Distribution Plan
First Floor Plan

DESIGN	N/A	PROJECT NO.
DRAWN BY	K.C.	LON-26000583-A0
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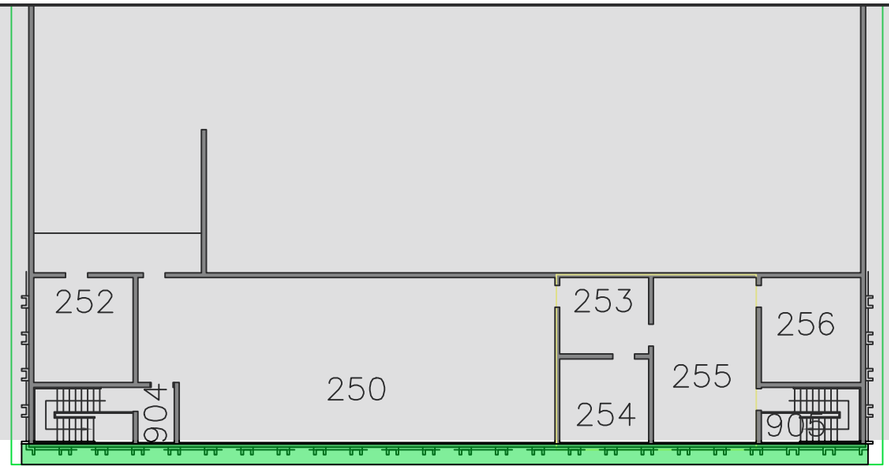
SCALE	N/A	



KEY PLAN - PROJECT AREA

SOUTHWOOD SECONDARY SCHOOL - ROOF DISTRIBUTION PLAN

SCALE - NTS

LEGEND

- ASBESTOS-CONTAINING GREY CAULKING (SAMPLE GROUP 26000583-ASB-011A-C)
- OUTSIDE PROJECT AREA

NOTE

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

PROJECT
Designated Substances Survey
Southwood Secondary School
30 Southwood Dr, Cambridge, Ontario

TITLE
Distribution Plan
Roof Plan

DESIGN	N/A	PROJECT NO.
DRAWN BY	K.C.	LON-26000583-A0
CHECKED	J.D.	DRAWING NO.
DATE	FEB 2026	3.1
SCALE	N/A	

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 00 – 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. DEMOLITION PROTECTION FOR ROOF REMOVALS – FOR INTERIOR PROTECTION

.1 Provide continuous ¾" plywood protection in areas of work to protect existing floors from falling debris during roof replacement, prior to the commencement of roof demolition.

.2 any additional requirements as regulated by authorities having jurisdiction, local by-laws and zoning.

.3 Protection to all walls, including protection equal to type 3 abatement work protection, Polysheet Tarping 15mil thick taped and sealed at edges, prior to the commencement of roof demolition, and

.4 ¾" plywood boxes, with 2x4 wood framing, to box out any fixed furnishings, millwork or equipment that are not being removed prior to commencement of roof demolition.

.5 Maintain watertightness and protection against water damage throughout the process of roof removal. Replace roof section by section with new water tight roofing or temporary roof membranes on a day to day basis.

1.12. SCAFFOLDING

.6 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.

1.13. 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.

1.14. 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.

1.15. 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.

1.16. 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.

1.17. 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.

1.18. 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.

1.19. 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.

1.20. 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.

1.21. 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.

1.22. 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.

1.23. SANITARY FACILITIES

.1 Provide weatherproof temporary toilet/sanitary facilities for the work force in accordance with governing regulations and ordinances.

.2 Service temporary toilet/sanitary facilities as required by authorities but not less than weekly.

.3 Post notices and take such precautions as required by local health authorities.

.4 The use of existing washroom facilities is not allowed unless specifically approved by the Board. The Contractor will be required to clean and maintain the existing washrooms to Board standards.

.5 Except where connected to the municipal sewer system, periodically remove wastes from Site.

.6 Keep toilet/sanitary facilities clean and sanitary and protect from freezing.

.7 Keep sanitary facilities clean and fully stocked with the necessary supplies at all times.

END OF SECTION

01 54 00 – Materials and Equipment

1.0 GENERAL

1.1. RELATED SECTIONS

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

1.2. PRODUCT AND MATERIAL QUALITY

.1 Products, materials, equipment and articles referred to as “Products”; throughout the specifications incorporated in the Work, shall be new, not damaged or defective, and of the best quality, compatible with specifications for the purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Defective products will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is a precaution against oversight or error. Remove and replace defective products at own expense, and be responsible for delays and expenses caused by rejections.

.3 Should any dispute arise as to the quality or fitness of products, the decision rests strictly with the Board contact, based upon requirements of the Contract Documents.

.4 Current Material Safety Data Sheets shall be on file with the successful Contractor and shall be provided to the Board contact upon request, within twenty-four (24) hours.

.5 Material safety data sheets are not required for products currently WHMIS exempt.

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

.1 Handle and store products in a manner to prevent damage, adulterations, deterioration, and soiling, and in accordance with manufacturer’s instructions.

.2 Store packaged or bundled products in original and undamaged condition, with manufacturer’s seals and labels intact.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Provide and maintain tools, equipment and materials in a clean and orderly condition. Board tools, ladders, lifts, power cords, flashlights etc. are not to be used.

.5 Materials are to be stored in a manner to cause the least interference with WorK activities.

.6 The Contractor shall determine with the Board contact, prior to ordering materials, those locations that are suitable for receiving and storage of materials and equipment.

.7 All materials and equipment shall be kept in a secure area, at Contractor's expense, or removed from the job site when Work is not actually in progress.

.8 Vehicles, trailers or other similar apparatus may not be stored or parked overnight at site without written authorization from Board contact. Written requests are to be forwarded directly to the Board contact.

.9 Approval for parking does not imply any liability or responsibility for safe keeping by the Board.

.10 The Contractor may use the existing electrical and water services, as required, for the Work, and the costs of these services shall be borne by the Board.

1.4. WORKMANSHIP

.1 Workmanship shall be the best quality, executed by Workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Consultant if required Work is such as to make it impractical to produce required results.

.2 Do not employ any unfit persons or anyone unskilled in their required duties.

.3 Decisions as to the quality or fitness of Workmanship in cases of dispute rest solely with the Board contact, whose decision is final.

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

.5 The Contractor shall make their own arrangements for emergency treatment of accidents.

.6 Any accidents shall be reported immediately to the Board contact.

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

.8 The Contractor shall supply constant on-site supervision in the form of a Project Superintendent. The Project Superintendent shall have within their authority to negotiate minor changes regarding scheduling, manpower and equipment.

1.5. MANUFACTURER'S INSTRUCTIONS

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

1.6. TOOLS OF THE TRADE

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

1.7. EXISTING EQUIPMENT

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

END OF SECTION

01 61 00 – Product Requirements

1.0 GENERAL

1.1. RELATED SECTIONS

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

.2 Section 01 31 00 – Project Managing and Coordination

1.2. TERMINOLOGY

.1 New: Produced from new materials.

.2 Renewed: Produced or rejuvenated from an existing material to like-new condition to serve a new or existing service.

.3 Defective: A condition determined exclusively by the Consultant.

1.3. PRODUCT QUALITY

.1 The term 'new' in the following paragraph does not exclude re-manufactured products that have some or all of the materials recycled from other sources. Preference in recycling is for post-consumer recycled materials.

.2 Products, materials, equipment, parts or assemblies (referred to as Products) incorporated in Work:

.3 New Product, not damaged or defective, of best quality (compatible with specification requirements) for purpose intended. If requested, provide evidence as to type, source and quality of Products provided.

.4 Defective Products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective Products at own expense and be responsible for delays and expenses caused by rejection.

.5 Should any dispute arise as to the quality or fitness of Products, decision rests strictly with Consultant.

.6 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout the building.

1.4. AVAILABILITY

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

.2 Immediately upon receipt of the Board's Purchase Order the Contractor shall issue Purchase Orders and or Contracts to all Sub-trades. Provide proof to the Consultant and the Board within 3 days. The Subcontractors shall identify in writing any delivery issues within 14 days of receiving the Contractor's purchase order or contract. The Schedule noted in 01-31 00 1.7.1 shall incorporate all deliveries and installation.

.3 If delays in supply of Products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.4 In the event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves the right to substitute more readily available Products of similar character, at no increase in Contract Price or Contract Time.

1.5. STORAGE AND PROTECTION

.1 Store and protect Products in accordance with manufacturers' written instructions.

.2 Store with seals and labels intact and legible.

.3 Store sensitive Products in weather tight, climate controlled, enclosures in an environment favourable to Product.

.4 For exterior storage of fabricated Products, place on sloped supports above ground.

.5 Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.

.6 Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

.7 Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

.8 Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.6. TRANSPORTATION AND HANDLING

.1 Transport and handle Products in accordance with manufacturer's written instructions.

.2 Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

.3 Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

.4 Suitably pack, crate and protect products during transportation to site to preserve their quality and fitness for the purpose intended.

.5 Store products in original, undamaged condition with manufacturer's labels and seals intact until they are being incorporated into completed work.

.6 Protect materials from damage by extreme temperatures or exposure to the weather.

1.7. EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum disturbance to the owner.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in a manner approved by authority having jurisdiction. Stake and record location of capped service.

1.8. MANUFACTURER'S WRITTEN INSTRUCTIONS

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

.2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant may establish course of action.

.3 Improper installation or erection of Products, due to failure in complying with these requirements, authorizes Consultant to require removal and reinstallation at no increase in Contract Price or Contract Time.

1.9. QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Consultant if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Consultant and or Board reserves right to require dismissal from site any workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Consultant, whose decision is final.

.4 Products, materials, systems and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the applicable manufacturer's printed directions.

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

1.10. COORDINATION

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

.3 Contractor is responsible to ensure suppliers or distributors of materials specified or alternatives accepted, which he intends to use, have materials with original schedule, and similarly it shall be the responsibility of all subcontractors and suppliers to so inform the Contractor.

.4 Contractor shall contact Consultant immediately upon receipt of information indicating materials or items, will not be available on time, in accordance with the latest approved schedule, and similarly it shall be the responsibility of all subcontractors and suppliers to so inform the Contractor.

.5 The above, in no way releases the Contractor, or their subcontractors and suppliers of their responsibility for ensuring timely ordering of materials and items required, including the necessary expediting, to complete the Work as scheduled in accordance with the Contract Documents including temp accommodations and or materials to ensure occupancy date is achieved.

1.11. CONCEALMENT

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform the Consultant if there is interference. Install as directed by the Consultant at no additional cost to the Board.

1.12. REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.13. LOCATION OF FIXTURES

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

1.14. FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use Type 304 or 316 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.15. PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of any part of the Project.

.2 Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated, without written approval of the Consultant.

END OF SECTION

01 70 00 – Examination and Preparation

1.0 GENERAL

1.1. RELATED SECTIONS

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

1.2. REFERENCES

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

1.3. SUBMITTALS

.1 Submit name and address of Surveyor to Consultant.

.2 On request of Consultant, submit documentation to verify accuracy of field engineering work.

.3 Submit certificate signed by surveyor certifying that elevations and locations of completed Work conforms with Contract Documents.

1.4. QUALIFICATIONS OF SURVEYOR

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

1.5. SURVEY REFERENCE POINTS

.1 Existing base horizontal and vertical control points are designated on Drawings.

.2 Locate, confirm and protect control points prior to starting site Work. Preserve permanent reference points during construction.

.3 Make no changes or relocations without prior written notice to the Consultant.

.4 Report to Consultant when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.5 Require the surveyor to replace control points in accordance with original survey control.

1.6. SURVEY REQUIREMENTS

.1 Establish existing and new permanent bench marks on site, referenced to established benchmarks by survey control points.

.2 Record locations, with horizontal and vertical data in Project Record Documents.

.3 Establish lines and levels, locate and lay out, by instrumentation.

.4 Establish pipe invert elevations.

.5 Stake batter boards

.6 Establish foundation and floor elevations.

.7 Establish lines and levels for mechanical and electrical work.

1.7. SUBSURFACE CONDITIONS

.1 Promptly notify Consultant in writing if discovered surface or subsurface conditions at Place of Work differ materially from those indicated in Contract Documents.

.2 Advise the Consultant of a reasonable assumption of probable conditions when determined.

.3 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work.

1.8. EXAMINATION

.1 The Contractor is expected to be totally familiar with site conditions and shall assume full responsibility for the cost involved in repairing any damage to the building, site and services, city property, adjacent buildings, etc., during general construction, regardless of the extent of the damage.

.2 Inspect existing conditions, including elements or adjacent Work subject to irregularities, damage, movement, including Work during cutting and patching.

.3 The Contractor shall provide all equipment necessary to make a full and detailed site evaluation. This shall include but not be limited to ladders, flashlights and hand tools.

.4 The Contractor expressly agrees that conditions above existing suspended acoustic ceilings, but below fixed structure, unless obscured by an additional ceiling above, shall be considered exposed conditions for the purposes of making findings under the provisions of the Contract. There shall be no claims for extra costs for extra Work in these areas.

.5 After uncovering, inspect conditions affecting performance of the Work.

.6 Beginning of cutting or patching means acceptance of existing conditions.

1.9. PREPARATION

.1 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of the project from damage.

.2 Provide protection from elements for areas which may be exposed by uncovering work; maintain excavations free of water.

1.10. EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in the area of Work and notify the Consultant of findings.

.2 Remove abandoned service lines running through existing and new structures. Cap or seal lines at cut-off points as directed by the Consultant.

1.11. LOCATION OF EQUIPMENT AND FIXTURES

.1 Inform Consultant of conflicting installations, install as directed.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Consultant of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Consultant.

1.12. SURVEY RECORD

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.

.3 Record locations of maintained, re-routed and abandoned service lines.

END OF SECTION

01 73 30 – Execution and Cutting and Patching

1.0 GENERAL

1.1. RELATED SECTIONS

.4 Section 01 32 00 - Construction Progress Documentation: Submittals and scheduling.

.5 Section 01 61 00 - Product Requirements.

.6 Section 01 70 00 – Examination and Preparation

.7 Individual Product Specification Sections:

.1 Cutting and patching incidental to work of the section.

.2 Advance notification to other sections of openings required in Work of those sections.

1.2. SUBMITTALS

.8 Submit written request in advance of cutting or alteration which affects:

.1 Structural integrity of any element of Project.

.2 Integrity of weather exposed or moisture resistant element.

.3 Efficiency, maintenance, or safety of any operational element.

.4 Visual qualities of sight exposed elements.

.5 Work of Owner or separate contractor.

.9 Include in request:

.1 Identification of Project.

.2 Location and description of affected Work.

.3 Necessity for cutting or alteration.

.4 Description of proposed Work and Products to be used.

.5 Alternatives to cutting and patching.

.6 Effect on work of Owner or separate contractor.

.7 Written permission of affected separate contractor.

.8 Date and time work will be executed.

1.3. TOLERANCES

.10 Monitor fabrication and installation tolerance control of Products to produce acceptable Work.

.11 Do not permit tolerances to accumulate beyond effective or practical limits.

.12 Comply with manufacturers' tolerances. In case of conflict between manufacturers' tolerances and Contract Documents, request clarification from the Consultant before proceeding.

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

2.0 PRODUCTS

2.1. MATERIALS

.1 Primary Products: Those required for original installation.

.2 Product Substitution: For any proposed change in materials, submit a request for substitution described in Section 01 33 00.

3.0 EXECUTION

3.1. EXAMINATION

.1 Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

.2 After uncovering existing Work, assess conditions affecting performance of work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

3.2. PREPARATION

.1 Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of the Project from damage.

.2 Provide protection from elements for areas which may be exposed by uncovering work.

.3 Maintain excavations free of water.

3.3. CUTTING

.1 Execute cutting and fitting as needed to complete the Work. Prior to any cutting and or coring of concrete floors the contractor shall confirm the area is free of services or rebar. Notify the Consultant of any interferences.

.2 Uncover work to install improperly sequenced work.

.3 Remove and replace defective or non-conforming work.

.4 Remove samples of installed work for testing for Hazardous materials.

.5 Provide openings in the Work for penetration of mechanical and electrical work.

.6 Employ experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

.7 Cut rigid materials using a masonry saw or core drill. Pneumatic tools are not allowed without prior approval.

.8 Do all cutting, patching, and making good, to leave a finished condition and to make the several parts of the work come together properly. Coordinate work to keep cutting and patching to a minimum.

.9 Make cuts with clean, true, smooth edges. Fit unit to tolerance established by test standard practice for applicable work. Make patches invisible in the final assembly.

.10 Cutting shall be done in a manner to keep patching to minimum. Obtain Consultant's approval of method to be used to conceal new mechanical and electrical services before beginning cutting. Chasing of concrete surfaces is not permitted.

.11 Cutting or coring of any structural concrete is to be reviewed and approved by the Consultant.

.12 Do not endanger any work by cutting, digging or otherwise altering, and do not cut nor alter any load bearing element without written authorization by Consultant. Provide bracing, shoring and temporary supports as required to keep construction safely supported at all times

.13 Any cost caused by omission or ill-timed work shall be borne by the party responsible thereof.

.14 Regardless of which Section of work is responsible for any portion of cutting and patching, in each case tradesmen qualified in work being cut and patched shall be employed to ensure it is correctly done.

3.4. PATCHING

.1 Execute patching to complement adjacent Work.

.2 Fit Products together to integrate with other Work.

.3 Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

.4 Employ original installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.

.5 Restore work with new Products in accordance with requirements of Contract Documents.

.6 Fit work with adequate support to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.7 At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with firestop material.

.8 Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to the nearest intersection or natural break. For an assembly, refinish the entire unit.

.9 Complete and tightly fit all construction to pipes, ducts and conduits which pass through construction to completely prevent the passage of air.

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

END OF SECTION

01 74 00 – Cleaning and Waste Management

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Common Work by All Trades

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

.3 Conduct cleaning and disposal operations to comply with local ordinances and environmental protection legislation.

.4 Store volatile wastes in covered metal containers, and remove them from premises at the end of each working day.

.5 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

2.0 PRODUCTS

2.1. CLEANING PRODUCTS

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

3.0 EXECUTION

3.1. CLEANING DURING CONSTRUCTION

.1 Maintain the Work in tidy condition, free from accumulation of waste products and debris, other than that caused by the Owner or other Contractors.

.2 Remove waste material and debris from the work areas and deposit in a waste container at the end of each working day.

.3 Vacuum clean interior areas prior to the start of finishing work. Maintain areas free of dust and other contaminants during finishing operations.

.4 Individual Subcontractors are responsible for the daily clean-up and removal of debris related to, or generated by, their own work. The overall responsibility for project cleanliness rests with the Contractor.

.5 The Contractor shall be responsible for snow removal within the construction area.

.6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.7 Wherever possible recycle materials

.8 Containers:

.1 Provide adequate number and sizes of on-site garbage and recycling containers within designated work site as required for collection of waste materials and debris on a daily basis.
.2 Provide additional waste containers when the extent of work warrants.
.3 Provide and use clearly marked, separate bins for recycling.

.9 Dispose of waste materials and debris at registered waste disposal and recycling facility.

.10 Remove oily rags, waste and other hazardous substances from premises at close of each day, or more often when required.

.11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

3.2. WASTE MANAGEMENT

.1 Audit, separate and dispose of construction waste generated by new construction or by demolition of existing structures in whole or in part, in accordance with Ontario Regulations 102/94 and 103/94 made under the Environmental Protection Act.

.2 Containers:
.1 Provide adequate number and sizes of on-site garbage and recycling containers within designated work site as required for collection of waste materials and debris on a daily basis.
.2 Provide additional waste containers when the extent of work warrants.
.3 Provide and use clearly marked, separate bins for recycling.

.3 Fires, and burning of rubbish or waste on site is strictly prohibited.

.4 Burying of rubbish or waste materials on site is strictly prohibited.

.5 Disposal of waste or volatile materials such as mineral spirits, oil, gasoline or paint thinner into ground, waterways, or sewer systems is prohibited.

.6 Empty waste containers on a regular basis to prevent contamination of site and adjacent properties by wind-blown dust or debris

3.3. PREPARATION FOR FINAL CLEANING

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

3.4. FINAL CLEANING PRIOR TO ACCEPTANCE: INTERIOR

.1 Prior to applying for Substantial Performance of the Work, or, prior to Owner occupancy of the building or portion of the building affected by the Work, whichever comes first, conduct full and complete final cleaning operations for the areas to be occupied.

.2 Final cleaning operations shall be performed by an experienced professional cleaning company, possessing equipment and personnel sufficient to perform full building cleaning operations. Contractors “broom cleaning” is not acceptable as a “Final Clean”. The cleaning contractor shall:

.1 clean interiors of all millwork and surfaces of any furniture and equipment present,

.2 use only cleaning materials recommended by the manufacturer of the surface to be cleaned,

.3 remove all stains, spots, scuff marks, dirt, dust, remaining labels, adhesives or other surface imperfections,

.4 clean and polish all glass and mirrors and remove remaining manufacturer's and safety "X" labels,

.5 clean and polish all finished metal surfaces such as enamelled or stainless steel, chrome, aluminum, brass, and bronze,

.6 clean and polish all vitreous surfaces such as plumbing fixtures, ceramic tile, porcelain enamel, or other such materials,

.7 clean all ceramic tile surfaces in accordance with the manufacturer's instructions,

.8 vacuum, clean and dust behind grilles, louvres and screens,

.9 steam clean all unprotected carpets immediately prior occupancy by Owner, and

.10 clean all equipment and fixtures to a sanitary condition.

.3 For any areas to be occupied after the owner’s initial occupancy, provide full cleaning operations as outlined above prior to turning over to owner,

.4 The Board’s supplies and equipment must not be used for any cleaning operations including, but not limited to: garbage cans, mops, brooms, rags, ladders, chemicals etc.

3.5. FINAL CLEANING PRIOR TO ACCEPTANCE: EXTERIOR

.1 For areas affected by construction final exterior cleaning operations shall be performed by the General Contractor or competent 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 00 – Closeout Submittals and Requirements

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 01 78 00 – 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 00 – Closeout Documents.
.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

PART 1 GENERAL

1.1 Section Includes

.1 A report from a Professional Structural Engineer licensed in the Province of Ontario with the expert demolition company describing the structural design characteristics of the existing structure to be demolished and the method of demolition that satisfies the authorities having jurisdiction requirements.

.2 Site dust control plan that satisfies the authorities having jurisdiction requirements.

.3 Provide all work indicated in Demolition Documents, regardless whether located within or outside the Owner's property line. All hoarding and other protection pertaining to demolition and removal of the existing systems shall form scope of demolition work. Demolition work shall be done under the supervision of the Professional Engineer certifying the demolition portion of the work as required by the authorities having jurisdiction.

.4 All work shall be carried out by qualified tradesmen of the discipline concerned.

.5 Related work – review Designated Substance reports and Asbestos Audit, in appendix 01 35 43a and 01 35 43b.

1.2 Regulatory Requirements

.1 Obtain and pay for any necessary permits for work of this Section. Give required notices.

.2 Comply with applicable requirement of jurisdictional authorities and CSA S350-M-1980 "Code of Practice for Safety in Demolition of Structures".

.3 Comply with the authorities having jurisdiction Noise By-laws.

.4 Comply with the authorities having jurisdiction – Demolition Procedures.

.5 Asbestos and Other Designated Substance removals to O. Reg. 278/05.

1.3 Qualifications

.1 Work of this Section shall be executed by a company able to deploy adequate equipment and skilled personnel to complete Work expediently in an efficient and orderly manner.

.2 Demolition work shall be done under the supervision of the Professional Engineer certifying the demolition portion of the work.

1.4 Examination

.1 Examine existing property. Review existing site conditions thoroughly to establish full extent of items to be removed, including secondary steel structures, building envelope,

all finishes and secondary floor finishes. Commencement of work will be considered to be acceptance of existing site conditions and removal of such items.

.2 Examine adjacent properties. Determine extent of protection required.

1.5 Salvage

.1 Unless otherwise noted, materials resulting from demolition shall become property of Contractor who shall promptly remove demolished materials from Site.

.2 Do not sell material at Site.

1.6 Maintaining Traffic

.1 Do not close, obstruct, place or store material in Owner's driveways and passages. Conduct operations with minimum interference with roads, streets, driveways and passages.

1.7 Hauling Operations

.1 Haul and move machines, vehicles and equipment over designated route and within work areas as designated by Consultant.

.2 Maintain roadways and paving in the hauling areas clean on a daily basis and as required by Municipal authorities.

1.8 Safety Requirements

.1 Undertake Work and effect arrangements required by authorities having jurisdiction for protection of the public.

.2 Post danger signs conspicuously around property. Close doorways and thoroughfares giving access to area of demolition with barricades.

.3 Provide a competent, experienced supervisor in charge of the Work and on Site at times while Work is in progress.

.4 Review the designated substances report in Appendix 01 35 43A & Appendix 01 35 43b, prior to start of demolition.

1.9 Life and Fire Safety

.1 Provide fire extinguishers in acceptable locations to fire prevention authorities and of type suitable to enable personnel to cope with fire occurring during progress of Work.

1.10 Protection

.1 Ensure Work is done in accordance with Provincial Environmental Protection Act.

.2 Protect work to remain against damage of any kind. Repair or replace damaged work at the discretion of the Consultant, at no cost to Owner.

.3 Prevent uncontrolled movement, settlement, or damage. Provide shoring and bracing where required.

.4 Take steps to positively prevent uncontrolled falling of demolished materials.

.5 Prevent debris from blocking drainage systems. Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.6 Ensure that temporary guards, hoardings are provided in accordance with applicable safety regulations.

.7 Protect trees, plants and foliage on site and adjacent properties where not designated for removal, as per drawings.

.8 Prevent uncontrolled water damage to existing systems and structures to remain.

PART 2 PRODUCTS

2.1 Not applicable.

PART 3 EXECUTION

3.1 Preparation

.1 Do not commence demolition work until occupants have permanently vacated demolition areas and materials and equipment not included in demolition work have been removed from demolition areas. Obtain Consultant's approval before commencing demolition.

.2 Verify that existing services in areas affected by demolition work are disconnected, capped or removed, prior to start of work.

.1 Post warning signs on electrical lines and equipment which must remain energized to serve other properties during the period of demolition.

.3 Legally dispose of demolished materials, except where noted otherwise and in accordance with authorities having jurisdiction.

.4 The Contractor shall make adequate arrangements for the protection of persons and property during the performance of the work under this specification. Proper barricades and warning devices shall be erected to prevent persons from entering unguarded work locations.

.5 All demolition and construction of hoardings and barriers for protection of the public shall be carried out in accordance with the "Construction Safety Act" of Ontario or other authority having jurisdiction.

3.2 Demolition

.1 Refer to Demolition Plans.

.2 Demolish work in a safe and systematic manner, from top to bottom.

.3 Do not throw or drop demolished materials from heights. Use chutes, conveyors, or hoisting equipment to lower materials where necessary.

.4 Demolish in a manner to minimize dusting. Keep dusty materials wetted but prevent flooding or contaminated runoff.

.5 Demolish masonry and concrete elements in small sections.

.6 At the end of each work period, leave work in safe condition, so that no part is in danger of toppling or falling.

.7 Remove and legally dispose of all PCB containing ballasts.

.8 Disconnect and cap all main electrical and telephone services, in accordance with authorities having jurisdiction.

.9 If safety of adjacent structures or services appears to be endangered, cease operation and notify Architect.

.10 Prevent movement, settlement of damage to areas outside of scope of demolition work adjacent to structures and services and asphalt pavings. Make good any drainage caused by demolition.

.11 Disconnect and cap designated mechanical services in accordance with authorities having jurisdiction.

.12 Natural gas supply lines to be disconnected by Gas Company, or by qualified tradesman in accordance with gas company instructions.

.13 In removal of existing pavements and concrete works:

.1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by the Consultants.

.2 Project underlying granular materials.

3.3 Salvageable Items

.1 None

3.4 Disposal and Clean-up

.1 All materials, rubbish and debris resulting from demolition work shall become the Contractor’s property and shall be removed from site and legally disposed of unless specifically indicated otherwise.

.2 Do not allow demolished materials to accumulate on site. Promptly, as work progresses, remove and legally dispose of materials away from site.

.3 Selling, burning and burying of materials on site is not permitted.

.4 Leave site in clean condition with all required guards in place.

.5 The General Contractor shall provide waste containers. Front load and roll off type containers shall be located on site. Waste, debris, generally all dirt resulting from the project, shall be disposed of in appropriate waste containers, as the work proceeds.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Cast in place concrete.

1.2 PRODUCTS FURNISHED OR INSTALLED UNDER OTHER SECTIONS

.1 Section 05 10 00 includes grouting beneath steel columns and bearing plates.

1.3 RELATED SECTIONS

.1 Chainlink Fencing – Section 32 31 13.

1.4 REFERENCES

.1 CAN/CSA-A5-98: Portland Cement.

.2 CSA A23.1-04: Concrete Materials and Methods of Concrete Construction.

.3 CSA A23.2-04: Methods of Test and Standard Practices for Concrete.

.4 CSA A23.3-04: Design of Concrete Structures for Buildings.

.5 CAN3-A266.1-M78: Air-Entraining Admixtures for Concrete.

.6 CAN3-A266.2-M78: Chemical Admixtures for Concrete.

.7 CAN3-A266.4-M78: Guidelines for the Use of Admixtures in Concrete.

.8 CSA A266.5-M1981: Guidelines for the Use of Superplasticizing Admixtures in Concrete.

.9 CAN3-A266.6-M85: Superplasticizing Admixtures for Concrete.

.10 ASTM C1059-99: Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.

1.5 SUBMITTALS

.1 Submit samples to the Testing Laboratory for testing to requirements of Section 01 45 00.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Cold Weather Requirements
  .1 When the air temperature is at or below 5 deghrees Celsius or when there is a probability of it falling to that limit within 24 hours of placing, the concrete temperature shall be maintained in accordance with CSA A23.1 Curing and Protection.
  .2 In cold weather, concrete shall be delivered to the work having a temperature of not less than 18 degrees Celsius and not more than 32 degrees Celsius.

.3 Provide approved heating equipment. Protect concrete surfaces from direct exposure to the combustion gases of heaters.

.4 The housing, covering, or other protection used in connection with curing shall remain in place and intact at least twenty-four hours after the artificial heating is discontinued. No dependence shall be placed on salt or other chemicals for the prevention of freezing.

.2 Hot Weather Requirements

.1 When the air temperature is at or above 25 degrees Celsius or when there is a probability of it rising to 25 degrees Celsius during the placing period, special effort shall be made to maintain the concrete temperature in accordance with CSA A23.1, Curing and Protection.

.2 In hot weather, concrete shall be delivered to the work having a temperature of not less than 10 degrees Celsius and not more than 27 degrees Celsius.

.3 Take suitable precautions to avoid drying of the concrete prior to finishing operations. Provide windbreaks, sunshades, fog sprays or other devices.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Store materials to requirements of CSA A23.1.

2 Products

2.1 CONCRETE MATERIALS

.1 Portland Cement: to CAN/CSA-A5, Type 10.

.2 Fine and Coarse Aggregate: to CSA A23.1.

.3 Water: potable, to CSA A23.1.

2.2 ADMIXTURES

.1 Air Entrainment Admixture: to CAN3-A266.1-M.

.2 Chemical Admixture: to CAN3-A266.2-M.

.3 Superplasticizer Admixture: to CAN3-A266.6-M.

.4 Fibre Reinforcement: fibrillated polypropylene fibre, 51 mm long; grey colour; c/w water soluble bag containing plasticizer; *Conloc SE* by Pro Technologies Ltd.

2.3 CONCRETE ACCESSORIES

.1 Grout: non-shrink type; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 50 MPa at 28 days.

2.4 CONCRETE MIXES

.1 Mix concrete to requirements of CSA A23.1.

.2 Coarse aggregates shall be not more than 19 mm and not less than 8 mm in size, except for concrete on steel deck where size of aggregates shall be not more than 8 mm.

.3 Concrete shall be designed to prevent segregation and excessive bleeding. Submit mix designs for approval. Provide any necessary evidence that the mix designs will provide the desired properties.

.4 Concrete Exposed to De-icing Chemicals: water/cement ratio not to exceed the values indicated in Table 7 for Class F-2 exposure of CSA A23.1-M.

.5 Determine concrete strengths from standard cylinders, sampled, cured and tested at 28 days in accordance with CSA A23.2.

.6 Refer to Structural Drawings for strength of concrete required for various locations, but in all cases, the minimum 28 day strength shall be not less than 20 MPa.

.7 Provide concrete with an average slump of 75 mm, $\pm$ 25 mm.

.8 Accelerating admixtures may be used in cold weather, subject to Consultant approval. If approved, the use of admixture will not relax the cold weather placement requirements of CSA A23.1. The use of calcium chloride will not be permitted.

.9 Set-retarding admixture may be used during hot weather subject to Consultant approval, to allow for proper finishing of concrete.

.10 For all concrete exposed to weather provide 5 to 8 percent air entrainment.

3 Execution

3.1 EXAMINATION

.1 Verify that site conditions are ready to receive work.

.2 Ensure that footing excavations and skim slabs are free of frost or water before placing concrete. If a sump is required for pumping water from the excavation, excavate it outside the area of the footing.

.3 Ensure all forms are rigid and structurally safe, and all reinforcing steel, formwork, sleeves, anchor bolts and other items are installed in accordance with the Contract Documents.

.4 Ensure that all trades have checked the security and location of all component required in the concrete by those trades.

.5 Beginning of installation implies acceptance of site conditions.

3.2 PREPARATION

.1 Notify Consultant at least 24 hours before each placement of concrete.

.2 Remove any wet or disturbed soil just prior to placing concrete.

.3 Set sleeves, ties, anchor bolts, pipe hangers and other inserts, openings and sleeves in concrete work, as required by other Sections. Sleeve, openings, etc., greater than 100 mm square or in diameter not indicated on the structural drawings must be approved by the Consultant.

.4 Set all frames in concrete.

3.3 INSTALLATION

.1 Place concrete to requirements of CSA A23.1.

.2 Maintain records of poured concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

.3 Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's recommendations.

.4 Pour concrete continuously between predetermined construction and control joints.

.5 Pour floor slabs in checker board or saw cut pattern indicated on drawings. Saw cut joints within 24 hours after finishing. Use 5 mm thick blade, cutting into slab 1/4 of its thickness.

.6 In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solidly with non-shrink grout.

3.1 SEPARATE FLOOR TOPPINGS

.1 Place concrete floor toppings to required lines and levels.

.2 Prior to placing, roughen concrete base course and remove deleterious material. Broom and vacuum clean.

.3 Refer to Section 03 35 00 for floor finishing.

3.2 SCREEDING

.1 Screed floors, slabs-on-fill and concrete base for toppings level, maintaining surface flatness of maximum 2 mm per metre.

3.3 FIELD QUALITY CONTROL

.1 Field inspection and testing will be performed under the provisions of Section 01 45 00.

.2 Test concrete to requirements of CSA A23.2.

.3 Supply additional labour required to assist the Testing Laboratory in making such tests. Pay for cost of such material and labour.

.4 Slump tests shall be carried out following the requirements of CSA A23.2; Test A23.2-5C.

.5 Slump tests shall be taken in conjunction with sampling of concrete for cylinder tests. If the slump is excessive, remove the balance of that concrete from the site without further instructions.

.6 If Consultant suspects that the slump of concrete is excessive, carry out additional slump tests in the presence of the Consultant. No further concrete shall be placed until the test is carried out. Remove concrete with excessive slump from the site. Provide a slump testing equipment on the site, readily available for this testing.

3.4 PATCHING

.1 Patch imperfections as directed by Consultant.

3.5 DEFECTIVE CONCRETE

.1 Modify or replace concrete not conforming to required lines, details and elevations.

.2 Concrete will be considered defective when:
- .1 Completed installation contains visible honeycombing or embedded debris;
- .2 Concrete has been damaged by freezing;
- .3 Concrete has been placed at too high a temperature;
- .4 Three consecutive 28 day compressive strength tests fail to meet specified strength;
- .5 Any 28 day compressive strength test fails to meet 88 percent of the specified strength;
- .6 Cracking occurs in locations other than along control or construction joints; and
- .7 Curing is not carried out in accordance with the Contract Documents.

3.6 CONCRETE FINISHING

.1 Refer to Section 03 35 00 for finishing floor slabs.

3.7 CURING AND PROTECTION

.1 Beginning immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, or mechanical injury.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Requirements for the curing and finishing of concrete floors and slabs.

1.2 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 Design-Builder (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.

1.3 SUBMITTALS

.1 Wet Curing Procedures

.1 At least four weeks prior to implementation in the field, submit a detailed description of the methods and procedures which will be employed to wet cure the concrete floors and slabs.

.2 As a minimum, the procedures shall indicate:

.1 the method of curing which will be used;
.2 the type of materials which will be used;
.3 the duration of curing;
.4 for wet cure procedures describe location and number of hoses, sprinklers etc., to ensure 100% continuous coverage of the pour.

.2 Product Data

.1 Provide product data as specified in section 01 33 00, supplemented as follows:

.1 Submit three copies of the manufacturer's printed product literature, MSDS sheets, test data and application instructions for the floor sealer.

1.4 PROTECTION

.1 Keep traffic which would affect or disturb the curing procedures off the finished surfaces for a period of 7 days minimum the minimum period of cure time specified for the concrete mix proposed by the Design-Builder and concrete supplier and as reviewed and approved by the Consultant.

.2 Protect exposed concrete finishes against damage.

.3 Protect floors which are to receive applied coatings and finishes against contamination by oil, paint or other deleterious materials.

.4 Protect items set into floors from damage and ensure that alignment is not disturbed.

2 PRODUCTS

2.1 MATERIALS

.1 Concrete Sealer/Densifier: WR Meadow Liqui-Hard Ultra Molecular Concrete Densifier and Chemical Hardener or Bellatrix Premium Concrete Enhancer as indicated on architectural drawings.

3 EXECUTION

3.1 QUALITY OF WORK

.1 General

.1 Comply with the requirements of CAN/CSA A23.1, except where greater requirements are specified herein.

.2 Comply with requirements of section 03 30 00 and 03 36 00, as applicable, and except where greater requirements are specified herein.

.3 Comply with manufacturer's installation instructions.

.4 Ensure surfaces are free of trowel marks and wash-boarding.

.5 Use compatible curing compounds, additives, admixtures, sealers and hardeners.

.6 Do not sprinkle dry cement or dry cement and sand mixture over concrete surfaces.

.7 Curing methods and materials shall be compatible with subsequent applied finishes.

.2 Tolerances

.1 Completed surfaces shall not vary more than 6mm in 3000mm from dead level except where slopes, and slopes to drains are required.

3.2 FINISHING

.1 Moist/Wet Curing

.1 All new concrete shall be wet cured where scheduled as such, as follows:

.1 Curing Procedure: All interior concrete slabs shall be protected from premature drying for a minimum of five days, as required in ACI 301, using moisture-retaining cover. Previously used cover material that is clean, in good condition, and free of tears can be reused. Cover concrete surfaces with moisture-retaining cover, placed in widest practical width with sides and ends lapped at least 75mm and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape. Remove curing cover and allow

concrete to air dry for at least twelve (12) hours prior to applying liquid densifier/sealer.

.1 Acceptable Moisture-Retaining Cover:
- .1 "Transguard EG" by Reef Industries
- .2 "Hydrasorb 2" by Firstline Corp.
- .3 "UltraCure NCF" by McDonald Technology Group

.2 Curing and Sealing Compounds
- .1 Apply curing and sealing compounds in accordance with manufacturer's directions and as required to properly cure and seal the surfaces.
- .2 Apply curing compounds immediately after final finishing.

.3 Levelling and Floating
- .1 Strike off concrete after it is placed, level and flush and then level and consolidate with a wooden Darby or bullfloat. Complete levelling and consolidation before free moisture (bleeding) rises to surface.
- .2 When concrete has stiffened sufficiently to sustain foot pressure and after removing free bleed water, float concrete with hand or power float.

.4 Steel Trowel Finish
- .1 After floating, trowel surface with steel hand or float trowel keeping blade flat at first and raising blade angle a little more on subsequent passes. Leave surface smooth, dense, of fine uniform texture without a swirl.

.5 Broom Finish for Slip Resistance
- .1 After steel trowelling, lightly broom the surface with a bristle push broom to obtain a fine even texture finish.

.6 Hardened Concrete
- .1 Coverage of premix hardener shall be 5-6 kg/m^2
- .2 Apply hardener to the surface in form of three shakes, each shake being floated using power equipment. Then power-trowel and hand-trowel as necessary to a satisfactory finish.
- .3 As soon as the concrete is firm enough to support the weight of workmen and their equipment and so standing water is present on the surface, apply the first shake of the hardener material. Use 50% of the total shake in the first application. Treat areas adjacent to walls and columns first. Spread the material evenly by sprinkling at right angles in two passes close to the floor level. In order to avoid non-uniform distribution of the hardener, do not broadcast from a stationary position. Allow the hardener to absorb surface moisture. Float application promptly. Work wall, column and door areas first. Avoid excessive floating, but ensure that the shake application is completely wetted and incorporated into the base slab. Follow immediately behind first floating and apply 25% of the hardener material and float again as described above. Follow immediately behind the second floating and apply the remainder of the hardener material and float again as described above.
- .4 Proceed with power trowelling as soon as the floor surface begins to lose moisture sheen and stiffens, setting the trowel blades at a flat angle. As floor stiffens further, proceed with a second trowelling with the trowel angle raised. When a minimum amount of cement paste clings to the trowel edges, proceed with final trowelling. Eliminate trowel marks, pinholes or any other flaws.

.7 Remedial Work

.1 Grind floor levels which do not comply with the specified tolerances to the tolerances required or level with an approved epoxy or latex modified cementitious compound.

.2 Obtain approval of method for correcting tolerances before proceeding.

.3 Immediately prior to installation of applied floor finishes but not sooner than 28 days after concrete has been placed, examine concrete floor surfaces and repair cracks. Rout cracks which exceed 0.8 mm in width with mechanical router to 13 mm square cross section. Clean and fill cracks as specified for control joints.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Masonry Procedures.
.2 Mortar and Grout for Masonry.
.3 Masonry Reinforcing & Connectors.
.4 Masonry Accessories.
.5 Plain Concrete Unit Masonry.

1.2 References

.1 CSA-A165 Series; CSA Standards on Concrete Masonry Units.
.2 CSA-A179; Mortar and Grout for Unit Masonry.
.3 CSA-A370; Connectors for Masonry.
.4 CSA-A371; Masonry Construction for Buildings.
.5 CSA-S304.1; Masonry Design for Buildings (Limit States Design).

1.3 Submittals

.1 Source Quality Control

.1 Manufacturers of concrete masonry units must submit independent laboratory test reports performed within the twelve-month period immediately prior to date of delivery of material, certifying compliance of masonry units and mortar components with specification requirements, in accordance with Section 01 33 23.

.2 All concrete masonry units supplied for this project must be from one supplier only.

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 Delivery, Storage & Handling

.1 Deliver materials to job site in dry condition. Keep materials dry until use except where wetting is specified.

.2 Deliver all masonry units cubed and banded on hardwood pallets, with polyethylene "shrink-wrap", or other non-staining covering. Prevent damage to units.

.3 Deliver mortar materials in original unbroken and undamaged packages with manufacturer's name and brand distinctly marked thereon, and upon delivery store in dry shed until used on work.

.4 Store or pile sand on a plank platform and protect from dirt and rubbish. Store mortar materials and sand in such a manner as to prevent deterioration or contamination by foreign materials.

.5 Lift skids with proper and sufficiently long slings or forks with protection to prevent damage to units. Protect edges and corners.

.6 Store masonry in a manner designed to prevent damage and staining of units.

.7 Place polyethylene or other plastic film between wood and other finished surfaces of units when stored for extended periods of time.

.8 Cover stored units with protective enclosure if exposed to weather.

.9 Do not use salt or calcium-chloride to remove ice from masonry surfaces.

1.6 Project Conditions

.1 Cold Weather Requirements

.1 Supplement Clause 5.16.2.1 of CSA-A371 with the following:

.1 Maintain mortar temperature between 5°C and 50°C for a minimum of 3 days after setting.

.2 Hot Weather Requirements

.1 Supplement Clause 5.16.4 of CSA-A371 with the following:

.1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

2 PRODUCTS

2.1 Materials

.1 Use same suppliers of masonry units, accessory materials and source of aggregate for entire project.

.2 Portland cement: Type 10 to CSA-A5.

.3 Blended Cement: to CSA-A362.

.4 Aggregates: to CSA-A23.1.

.5 Hydrated Lime: to ASTM C207.

.6 Supplementary Cementing Materials: to CSA-A23.5.

2.2 Concrete Masonry Units

.1 The physical properties of the concrete masonry units at the time of delivery by the manufacturer to the site, shall conform to the requirements of Table 1 of CSA-A165.1, as classified herein. Test reports submitted to the Consultant by the manufacturer prior to delivery shall verify conformance, in order for material to be acceptable.

.2 Provide special shapes such as return corners, ashlar blocks, lintels, universal knock-outs, A-blocks, sash blocks, piers, bull-nosed blocks, etc., to perform masonry work with minimal cutting or breaking of masonry units.

.3 Concrete Masonry Units: to CSA-A165.1.
- .1 Classification: H/15/A/M.
- .2 Sizes:
  - .1 OCBA metric modular.
  - .2 Thicknesses: as indicated on the drawings.

2.3 Reinforcement And Anchorages

.1 Single Wythe Joint Reinforcement: No.9 Truss type, 3.7 mm side rods with 3.7 mm cross ties; to CSA G30.3; hot dipped galvanized to ASTM A153, Class B2; Dur-O- Wal "DW-100" or an accepted alternate.

.2 Reinforcing Steel: as specified on Structural Drawings. Sizes as indicated on the drawings.

.3 Masonry Ties: to CSA A370 and CAN3-S304-M.

2.4 Mortar And Grout

.1 Use aggregate passing 1.18mm sieve where 6 mm thick joints are indicated, to CSA-A179.

.2 Mortar for interior concrete masonry and all load-bearing masonry above grade, including inner wythe of exterior cavity walls: Type "S" based on specifications of CSA-A179.

.3 Mortar for all exterior veneer masonry above grade: Portland cement/hydrated lime, Type "N" (1:1:6) based on specifications of CSA-A179.

.4 Mortar Colour
- .1 Interior Concrete Block: Natural.

.5 All mortar products for masonry work shall be batch plant mixed on site for quality control. No hand mixing will be permitted. Use Maxi-Mix or other similar batch plant silo system.

.6 Grout: for masonry shall be pre-mixed, high strength, non-shrink cementitious grout, to CSA-A179, with minimum compressive strength of 30MPa.

.7 All mortar products for masonry work shall be batch plant mixed on site for quality control. No hand mixing will be permitted. Use Maxi-Mix or other similar batch plant silo system.

2.5 Accessories

.1 Control Joint Block Fillers: "Titewall" by Bloc-Lok Ltd., or "RS Series" by Hohmann & Barnard Inc.

3 EXECUTION

3.1 Quality Of Work

.1 Perform masonry work in accordance with CSA-A371, except where specified otherwise.

.2 Build masonry plumb, level, and true to line, with vertical joints in alignment.

.3 Perform masonry mortar and grout work in accordance with CSA-A179 except where specified otherwise.

.4 Provide temporary bracing of all masonry walls until permanent bracing is installed.

.5 Lay out coursing and bond to achieve correct coursing heights and continuity of bond above and below openings, with minimum of cutting.

.6 Machine cut all exposed masonry units where adjusted in size.

.7 Tolerances in notes to Article 5.3 of CSA-A371 apply.

.8 Remove chipped, cracked, or otherwise damaged units and replace with new.

.9 Coordinate work of this section with work of mechanical and electrical trades for conduit, piping, and other items built-in to masonry work. Masonry Subcontractor must cooperate with mechanical and electrical trades, for placement of such items within masonry walls.

3.2 Laying Concrete Masonry Units

.1 Bond:

.1 Running Bond unless otherwise noted on drawings.

.2 Coursing Heights:

.1 Standard Block: 200mm for one 190mm high block + one joint.

.3 Provide bullnose concrete masonry units at all exposed corners, except at the first course at the floor level, and at the corresponding course located at the ceiling level.

.4 Construct all masonry walls full height to underside of structure or deck above, unless otherwise shown. Leave 25mm void between top of wall and structure above. Fill void with 25x152mm mineral wool insulation. Where walls are fire separations, firestop to Section 07 84 00.

.5 Set bearing plates for joists, beams, etc., at locations and elevations indicated, and grout into place.

.6 Special Shapes
- .1 Provide Universal Knock-out blocks for chases for piping and conduit.
- .2 Provide A-Blocks for all vertical reinforcing locations.

.7 Provide solid masonry units where required for mechanically fastening of blocking, furring or mechanically applied finishes.

.8 Do not form chases in load-bearing walls less than 240mm thick. Do not form chases closer than 2m apart in any wall, unless otherwise shown.

.9 Do not construct horizontal chases for piping or conduit unless other reasonable means of allowing for services are impossible. Where horizontal chases are required, construct chases using lintel blocks filled solid with concrete fill as specified.

.10 Build in conduits as required without breaking bond.

3.3 Jointing

.1 Allow joints to set sufficiently to remove excess water;
- .1 Concave Joints: tool with round jointer to provide smooth, compressed, uniformly concave joints, vertical and horizontal.
- .2 Flush: strike flush all joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.

.2 Remove all excess mortar from surface of masonry.

3.4 Reinforcement And Anchorages

.1 Place masonry joint reinforcement continuous in every second horizontal joint.

.2 Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend 400 mm minimum each side of opening.

.3 Place joint reinforcement continuous in first and second joint below top of walls.

.4 Place reinforcing bars supported and secured against displacement.

.5 Secure wall ties to structural back-up for veneer at maximum 400 mm OC vertically and 900 mm OC horizontally. Place at maximum 75 mm OC each way around perimeter of openings, within 300 mm of openings.

.6 Reinforce joint corners and intersections with strap anchors 400 mm OC.

3.5 Lintels

.7 Install loose steel lintels as scheduled. Set steel lintels dry to permit movement.

.8 Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled. Construct lintels using grout fill and reinforcing. Maintain minimum 200 mm bearing on each side of opening.

3.6 Fire Stopping Of Cavity

.1 Install continuous "Z" bar fire stops in cavity prior to installation of insulation, fastened to inner wythe of masonry, to the requirements of the Ontario Building Code.

.2 Cavity fire stops shall span full depth of cavity from inner wythe to outer wythe of masonry. Vertical stops shall be placed at borders of area to be fire stopped.

3.7 Control Joints

.1 Provide vertical control joints to CSA-A371, and as shown on the drawings.

.2 Width of control joints shall be 10mm.

.3 Horizontal reinforcing shall be continuous across control joints.

.4 Control joints shall be continuous across thickness of exterior wall. Where vertical joints in wythes of brick and block do not align, offset of maximum 200mm is allowable.

.5 Where not otherwise shown or detailed, the following minimum requirements for vertical control joints in unit masonry shall apply:

.1 Above all openings in masonry, extending from end point of lintel to top of masonry.
.2 At all structural column or pilaster locations.
.3 All locations where structural substrate changes.
.4 At all uninterrupted panels of masonry. Maximum panel width 7m.
.5 Within 1000mm each side of changes in direction of wall.

3.8 Joining Of Work

.1 Where necessary to temporarily stop horizontal runs of masonry, and in building corners, step-back masonry diagonally to lowest course previously laid. Do not "tooth-in" new masonry. Fill in adjacent courses before heights of stepped masonry reach 1220mm.

3.9 Support Of Loads

.1 For all masonry under concentrated loads, where concrete fill is used in lieu of solid units, use minimum 15MPa concrete for width and depth equal to 3 times the length of bearing.

.2 Use grout to CSA-A179 where grout is used in lieu of solid units.

.3 Install building paper below voids to be filled with concrete. Keep paper 13mm back from faces of units.

3.10 Field Quality Control

.1 The work of this section is subject to inspection and testing as specified in Section 01 45 00. Allow for independent inspection by an Independent Testing Authority. Costs for inspection and testing will be paid by the Owner.

.2 Prior to commencement of construction, the masonry Subcontractor shall prepare and mix on-site, under supervision of the Consultant and the Inspection and Testing Authority, mortar samples to determine compliance with the specifications

.3 Tests of such samples shall determine a ratio-by-mass value or "control value" for mortar mixes.

.4 Masonry Mortar shall be tested in accordance with CSA-A179; Mortar and Grout for Unit Masonry, supplemented as follows:

.1 Additional cubes shall be poured under on-site conditions for comparison with "ideal" samples.

.5 Subsequent sample ratio tests taken during the course of construction shall not vary from the control value by more than 15%.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Structural steel framing members, support members, suspension cables, sag rods, struts and loose steel lintels.

.2 Baseplates, shear stud connectors, expansion joint plates, and lintels.

.3 Grouting beneath baseplates.

1.2 REFERENCE STANDARDS

.1 Reference Standards are to be latest editions.
.2 Ontario Building Code

.3	CAN/CSA-S16.1-09	Design of Steel Structures
.4	CSA W47.1-09	Certification of Companies for Fusion Welding of Steel Structures.
.5	CSA W59-03(R2008)	Welded Steel Construction (Metal-Arc Welding).
.6	CSA-G40.20-04 (R2009)	General Requirements for Rolled or Welded Structural Quality Steel.
.7	CSA-G40.21-04 (R2009)	Structural Quality Steels

1.3 QUALIFICATIONS

.1 Work of this Section shall be executed by a company able to deploy adequate equipment and skilled personnel to complete Work expediently in an efficient and orderly manner.

.2 The steel fabricators and erectors must be certified under the requirements of CSA W47.1 as required by CSA-S16-09.

.3 Welding procedures, welders and welding operations shall be qualified in accordance with the Canadian Welding Bureau Standards.

.4 All connections shall be designed by a C.I.S.C. approved Fabricator unless otherwise noted.

1.4 EXAMINATIONS

.1 All dimensions taken from the Drawings are to be confirmed on site prior to fabrication. Contractor is to be responsible for the correctness of such measurements and report to the Consultant in writing all discrepancies between measurements at building and those shown on drawings prior to commencing work. Verify location of anchor bolts and embedded steel and ensure that work prepared by other trades is at a proper elevation, on-line, level, and true.

.2 Contractor to locate all mechanical/electrical openings required in structural members for existing systems prior to fabrication.

.3 Contractor responsible for all costs associated with site location of existing strands and embedded conduits.

1.5 SHOP DRAWINGS SUBMITTAL

.1 Submit erection and detail drawings to the requirements of Section 01 33 00.

.2 Shop drawings must bear the stamp and signature of a professional engineer registered in the Province of Ontario.

.3 Indicate profiles, sizes, spacing, and locations of structural members, openings, attachments, fasteners, connections, cambers, and loads.

.4 Submit copies of mill test reports, properly correlated to the materials, to the Consultant.

.5 Design to seismic requirements.

1.6 INSPECTION AND TESTING

.1 Testing agency shall be selected and paid for through the CASH ALLOWANCE.

.2 Allow free access to all parts of the work area for the purposes of inspection at all times.

.3 Submit certified results of testing in accordance with CSA-G40.20 properly correlated to the elements being fabricated.

.4 For the purpose of bidding, assume all welds will be examined by a non-destructive testing method.

.5 Testing of all connections and splices not indicated on the design drawings shall be undertaken by the Owner's testing agency and will be to the Contractor's account.

.6 The Engineer may reject at any time during the progress of the work a piece of material for any member which he may find defective or not in accordance with the detailed drawings. This material may be rejected notwithstanding any previous acceptance and components so rejected shall be replaced at no expense to the Owner. In case of dispute, the decision of the Engineer shall be final.

1.7 STORAGE AND HANDLING

.1 The Contractor shall be responsible for the protection of all steel work during fabrication, shipping, storage, and construction. All small bends and damage shall be reported to the Engineer for instruction. Steel work, which is bent, broken, or otherwise damaged, shall be replaced by the Contractor prior to erection, to the satisfaction of the Engineer, at no cost to the Owner.

.2 The Contractor shall be responsible for proper scheduling of delivery and erection for the structural steel, all in accordance with the construction schedule.

.3 Structural steel members shall be stored at the site above ground on platforms, skids, or other devices.

.4 Steel shall be protected from corrosion.

.5 Other material shall be stored in a weather tight and dry place until ready for use in the Work.

.6 Package materials shall be stored in their original unbroken packages or container.

1.8 Co-Ordination With Other Trades

.1 Supply all necessary instructions and drawings to other trades for setting bearing plates, anchor bolts, and other members that are built in with the work of other trades. Supply the necessary material in accordance to the construction schedule.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Rolled shapes, rolled plate, and welded wide flange sections shall be to CSA-G40.21-300W.

.2 Structural Steel: to CAN/CSA-G40.20-04, and CAN/CSA-G40.21-04, Type 44W.

.3 Hollow structural sections shall be to CSA-G40.21-350W Class C.

.4 High strength bolts shall be to ASTM A325M or A490.

.5 Welding material shall be in accordance with CSA W59.

.6 Anchor bolts and nuts to ASTM A307.

.7 Touch-up primers for exterior exposure not to receive a shop or field paint finish shall be zinc chromate Type - 1, conforming to CGSB 1-GP-40D.

.8 Primers used in a multi-coat system where a final shop or field paint finish is to be applied shall be selected and pre-approved based on surface preparation, exposure conditions and compatibility with subsequent coatings.

2.2 DESIGN

.1 All connections and beam web openings shall be designed by the fabricator to the reference standards unless otherwise noted.

PART 3 EXECUTION

3.1 FABRICATION

.1 Verify all dimensions and take necessary field measurements before fabrication.

.2 All fabrication shall be to CAN3-S16-09.

.3 All welding shall be to CSA W59.

.4 All fabricated units shall be straight and true and without sharp kinks or bends.

.5 All hollow structural sections shall be closed airtight with end plates sealed with welds.

.6 All plates and shapes shall be inspected visually for laminations. Repair plates or shapes that contain laminations in a manner approved by the Consultant.

.7 Provide punched holes for the convenience of other trades in attaching wood blocking or other materials. Co-ordinate with drawings of other disciplines for location and details.

.8 Obtain Consultant's approval for holes required through structural steel that are not shown on the drawings.

3.2 CLEANING AND PRIMING

.1 All steel shall be thoroughly cleaned of all loose mill scale, loose rust, oil, or dirt.

.2 All steel shall be primed (exterior exposure) except for steel to be encased in concrete, steel to be fireproofed, steel which will receive shear studs, and fraying surfaces of friction connections.

.3 Structural steel to be primed for exterior exposure or to receive a shop or field paint finish shall be cleaned in accordance with SSPC-SP6 "Commercial Blast Cleaning".

.4 All primers shall be applied strictly in accordance with the Manufacturers instructions. Apply one (1) coat of primer thoroughly and evenly and work well into the joints and other open spaces. Primer colour to be Grey for all non-galvanized steel.

.5 After erection and after connections are completed, provide a field touch up coat of primer to all surfaces that had no shop coat, or have been chipped or scraped.

3.3 SHOP PAINTING

.1 Steel shall be painted with shop primer meeting the requirements of CSA Standard CSA-S16-09 unless noted otherwise. Primer colour to be Grey for all non-galvanized steel.

.2 Cleaning, preparation of steel and the paint product shall be compatible with requirements of finish painting.

.3 Use paint as prepared by manufacturer without thinning or adding admixtures. Execute painting on dry surfaces, free from rust, scale, and grease. Do not paint in temperatures lower than 8 deg C.

.4 Interior structural steel - steel surfaces to be encased in concrete, welded, fireproofed, zinc coated, galvanized or to receive shear connector studs or embedment anchors shall not be painted.

.5 Clean contact surfaces by effective means before assembly but do not paint.

.6 Where shop painting is required give two coats of paint (preferably of different colours) to parts inaccessible after final assembly.

.7 Touch-up welds, bolts, and burnt or scratched surfaces of painted steel after completion of erection.

3.4 CONNECTIONS

.1 Use connections of the type and detail shown on the Drawings. Modifications to the specified connection types and details will not be permitted without prior approval from the Consultant.

.2 Connections designed by the fabricator shall be in accordance with CSA Standard CAN/CSA-S16.1 and stamped and sealed by a Professional Engineer registered in the Province of Ontario.

.3 All connections shall be designed to carry the loads specified on the Drawings. If loads are not given, the connection shall have the capacity not less than the members being connected.

.4 Column to beam and girder connections shall allow for a horizontal stability force in all directions equal to 2% of the design column axial load in addition to all other loads.

.5 Structural steel members spliced for ease of fabrication or transportation shall have splices designed to develop the full strength and stiffness of the member. Splices shall be subject to non-destructive testing as directed by the Consultant. The cost for such testing shall be borne by the Contractor.

.6 Use standard connection types where possible.

.7 Provide stiffeners in beam webs at all locations of beam continuity. Unless noted otherwise web stiffeners shall be 12 mm minimum.

.8 All bolted connections may be snug tight.

.9 Connections for seismic lateral load resisting elements, bolts in tension and elements connected with oversize or slotted holes unless designed to accommodate movement may be bearing connections but shall be pretensioned.

3.5 SEPARATORS AND MISCELLANEOUS SUPPORTS

.1 Provide separators for all double members in accordance with CSA-S16-09.

.2 Provide plates and / or angles for support of masonry where required.

3.6 ERECTION

.1 Supervise the setting of bases, anchor bolts, and other steel to concrete connections. Cutting of base plates to accommodate anchor bolts shall be cause for rejection of base plates.

.2 Install all temporary bracing that is required to stabilize the work against wind, earthquake, and construction loads. Keep structure true and plumb until completion of the building.

.3 As erection progresses, the work shall be securely bolted up to take care of all dead loads, wind, and erection stresses. Any failure to make proper and adequate provisions for stresses during erection shall be solely the responsibility of the Contractor.

.4 The structural steel erector shall be responsible for the design of all hooks, erection connections and handling gear.

.5 Whenever piles of materials, erection equipment, or other loads are carried during erection, proper provision shall be made to take care of stresses resulting from it.

.6 All structural steel shall be assembled and erected in accordance with the approved erection drawings and specified reference standards.

.7 Structural steel work shall be carefully located at the proper grade and rigidly secured in place, using steel shims. All spaces under the steel shall then be filled with non-shrink pre-mix grout.

.8 Plumb, level and align individual members of steel work as specified in the latest CSA S16-09.

.9 Structural steel frames shall be accurately assembled to the lines and elevations indicated within the specified tolerances.

.10 The various members forming parts of complete frame of structure after being assembled shall be aligned and adjusted accurately before being fastened.

.11 Bearing surfaces and surfaces that will be in permanent contact shall be cleaned before the members are assembled.

.12 Temporary bolts, clips and angles etc. used to facilitate the erection shall be removed unless noted otherwise on the drawing.

3.7 TEMPORARY FLOORING

.1 Provide all temporary flooring, planking and scaffolding necessary in connection with erection of structural steel, or support of erection machinery in accordance with governing regulations or by-laws.

3.8 COMPLETION

.1 The Registered Professional Engineer responsible for the shop drawings, or his representative shall visit to review in place connections and components designed by that Registered Professional Engineer as required to substantiate compliance with his sealed shop drawings. He shall then submit a letter of compliance provide a seal and signed letter to the Consultant and Engineer.

.2 On completion of the work of this section, all protection erected in conjunction with the structural steel work shall be removed, all damage to this work and adjoining work shall be made good and all surplus materials and debris and all tools and equipment shall be removed from the site.

3.9 WELDING

.1 All welding shall be done by the shielded metal-arc method in accordance with the requirements CSA W59. The welding operators shall have passed within the preceding six (6) months, the qualifications test as set forth in CSA W47.1.

.2 Submit welding procedures prepared and sealed by a Professional Engineer registered in Ontario, and familiar with this discipline to the Consultant for his examination and comments.

.3 Surface to be welded shall be free from loose scale, rust, paint, or other foreign matter. Where weld material is deposited in two or more layers, each layer shall be cleaned before the next layer is deposited. Care shall be taken to minimize stresses due to heat expansion, contraction and distortion by using proper sequence in welding and by approved methods.

.4 Welding consumables for all processes shall be fully approved by the Canadian Welding Bureau and certified by the manufactures as complying with the requirement of this specification. Such certificates shall be not more than two years old.

.5 Electrode strengths to be equal to E480XX (E70xx) or better.

.6 Embedment anchors, shear stubs and deformed bar anchors shall be automatically end welded with suitable stud welding in accordance to the manufacture's recommendations. Fillet welding of anchors will be rejected.

3.10 CLEANING

.1 Thoroughly clean welds between passes and upon completion of slag with a descaling tool and wire brush.

.2 Ensure exposed steel connections, alignment, welding, etc. is neat and thoroughly cleaned.

.3 After final erection, thoroughly clean and paint field joints with a coat of shop primer. Where the shop coat has been rubbed off during erection, apply a touch-up coat of primer.

3.11 FIELD QUALITY CONTROL

.1 Construction review by the testing agency or the Consultant does not relieve the Contractor of his responsibility to furnish materials and workmanship in accordance with the Drawings and Specifications.

END OF SECTION

1 GENERAL

.1 Section Includes

.1 Supply and Install of Steel Deck.

1.2 REFERENCES

.1 The most current version of these standards below shall apply.

.2 ASTM A653/A653M-20: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM A780/A780M-09: Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

.4 CISC Handbook of Steel Construction.

.5 CSA S136-16: North American Specification for the Design of Cold-Formed Steel Structural Members.

.6 CSA W47.1:19: Certification of Companies for Fusion Welding of Steel.

.7 CSA W55.3-08: Certification of Companies for Resistance Welding of Steel and Aluminum.

.8 CSA W59-18: Welded Steel Construction (Metal Arc Welding).

1.3 SHOP DRAWINGS

.1 Submit Shop Drawings as specified in Section 01 33 00.

.2 Shop Drawings: Project-specific drawings, illustrating deck layout, support locations, projections, openings and reinforcement, outlet box locations, pertinent details and accessories.

.3 Shop Drawings must be stamped, signed and dated by fabricator's design engineer.

1.4 QUALIFICATIONS

.1 Fabricator's Design Engineer: A professional structural engineer, experienced in designing steel floor and roof decking, and licensed to practice at Place of the Work.

.2 Welders: Workers certified by CWB to CSA W47.1 and CSA W55.3.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Refer to Section 01 53 00.

.2 Deliver and store Products to prevent bending, warping and corrosion.

.3 Damaged material will be rejected.

2 Products

2.1 MANUFACTURERS

.1 Manufacturers having Product considered acceptable for use:
- .1 Agway Metals Inc.
- .2 Canam Steel Works.
- .3 Vicwest Steel Inc.
- .4 Vulcraft Canada, Inc.

.2 Substitution Procedures: Refer to Section 01 33 00.

2.2 DESIGN CRITERIA

.1 Design roof deck to CSA S136.

.2 Design deck units to span continuously over 3 spans, supplied in proper length for support conditions.

.3 Design deck layout, spans, fastening, joints, and openings under the direct supervision of fabricator's design engineer.

.4 Limit live load deflection to L/360 of span.

.5 Design for Seismic Requirements.

2.3 MATERIALS

.1 Sheet Steel: To ASTM A653/A653M, Structural Steel (SS) Grade 230, Types 1 and 2; cold-rolled sheet steel, with galvanized or galvannealed coatings as indicated; thicknesses as specified below.

.2 Welding Materials: To CSA W59.

.3 Sound Attenuating Insulation Strips: Mineral fibre sound attenuating insulation strips, custom-shaped to snugly fit and fill acoustic flutes.

.4 Touch-Up Primer: Zinc-rich paint.

.5 Joint Sealant: Interior general purpose sealant, as specified in Section 07 92 00.

2.4 COMPONENTS

.1 Steel Roof Deck: Galvanized sheet steel; 0.76 mm thick before galvanizing; 38 mm deep fluted profile, with flutes spaced at 150 mm OC; interlocking male and female side laps; eg. RD-938 by Vicwest Steel Inc.

.2 Acoustic Steel Roof Deck: Galvanized sheet steel; 0.76 mm thick before galvanizing; 38 mm deep fluted profile with flutes spaced at 150 mm OC; acoustic type with webs continuously perforated with 3 mm OD holes staggered at 9 mm OC; interlocking male and female side laps; eg. RD-938 Acoustic by Vicwest Steel Inc.

.3 Cover Plates, Cell Closures, and Flashings: Galvannealed sheet steel, 0.76 mm thick before galvannealing.

.4 Closures to External Walls: Neoprene or polyvinyl chloride, closed cell type.

2.5 FINISHES

.1 Galvanized Coating on Sheet Steel: To ASTM A653/A653M, Z275 hot dipped zinc alloy coating.

.2 Galvannealed Coating on Sheet Steel: To ASTM A653/A653M, ZF75 zinc-iron alloy coating, streak-free matte grey appearance.

3 Execution

3.1 INSTALLATION

.1 Conform to CSSBI standards.

.2 Erect decking on support surfaces with 100 mm minimum bearing. Align and level.

.3 Weld decking to steel supports using 19 mm OD puddle welds, at the following maximum spacings:
- .1 Transverse Welds: 305 mm OC.
- .2 Perimeter Welds: 305 mm OC.
- .3 Longitudinal Welds: 610 mm OC.
- .4 Seams: Button punched at 305 mm OC.

.4 Ensure welds penetrate deck and flashing sheets where double thickness occurs.

.5 Level and align cellular deck intended for electrical raceways and mechanical piping to a tolerance of not more than 3 mm horizontally and vertically. Butt ends, allow for maximum 3 mm gap. Install sheet steel covers over gaps wider than 3 mm. Tape and seal joints watertight.

.6 Field weld components to CSA W59.

.7 Mechanically clinch male/female side laps at 300 mm OC maximum.

.8 Cut and structurally reinforce openings in accordance with accepted Shop Drawings.

.9 Structurally reinforce openings larger than 150 mm square or 200 mm round. Smaller openings need not be reinforced. Refer to Section 05 10 00 for openings greater than 300 mm square.

.10 Cut additional unreinforced openings as required. Confirm placement of such openings with Consultant prior to cutting.

.11 Install 150 mm minimum wide sheet steel cover plates, of same thickness as decking, where deck changes direction. Fusion weld at 300 mm OC maximum.

.12 Make connections and deck alignment neat and to approval of Consultant wherever underside of metal deck is exposed to view. Make Good dented, damaged or weld-perforated deck.

.13 Install closures and angle flashings to close openings between deck and walls, columns, and openings, as described below:
- .1 Where fluted end of metal decking rests on exterior masonry walls, fill web spaces with closed cell neoprene or polyvinyl chloride closures as recommended by manufacturer.
- .2 Where deck flutes are perpendicular to exterior walls, and decking exposed on underside extends beyond these walls, caulk interlocking side laps of decking for 400 mm immediately over walls. Install interior and exterior closures. Seal exterior closures to prevent air infiltration and interior closures to prevent water vapour exfiltration. Provide sufficient quantity of closures to close off topside flutes directly over face of wall.
- .3 Where flutes run perpendicular to interior partitions, install double run of steel closures

as recommended by manufacturer.

.4 Where flutes are parallel to interior partitions, install steel closure flashings to provide neat juncture between two materials, as recommended by manufacturer.

.5 Closures are not required between interior partitions and underside of decking in areas designated to receive suspended ceiling.

.14 Supply sound attenuation strips for installation in acoustic flutes.

3.2 FIELD QUALITY CONTROL

.1 Perform field inspection and testing as specified in Section 01 45 00.

.2 Inspect steel deck welds for structural integrity.

3.3 ADJUSTING

.1 After erection and anchorage, grind welds smooth.

.2 Make Good damaged galvanized coatings to ASTM A780/A780M.

.3 Fill holes blown through deck during welding with weld metal.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Provide all labour, materials and equipment and complete the installation of all miscellaneous metals not otherwise specified in other sections of this specification to the full intent of the drawings and this specification.

.2 This Contractor shall supply and install all fabricated metal items as detailed on the architectural drawings, specified herein or required for the proper execution of the project. No attempt is made to completely itemize the work of this section. This can only be ascertained by careful examination of tender documents. Generally the scope is as follows:

- metal stairs (primed and painted)
- guardrails, handrails, railings and related brackets for same (primed and painted)
- metal countertops
- metal cabinetry

.3 All material shall be thoroughly cleaned of all rust, scale, etc. before priming.

.4 Prime painted as specified herein and finish painted in accordance with Section 09 90 00.

1.2 Related Sections

.1 Architectural Millwork – Section 06 40 00.

.2 Glazing – Section 08 80 00.

1.2 References

.1 AAMA 611-14: Voluntary Specification for Anodized Architectural Aluminum.

.2 AAMA 2605-17a: Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (With Coil Coating Appendix).

.3 ASTM A123/A123M-17: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.4 ASTM A153/A153M-16a: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.5 ASTM A240/A240M-20a: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

.6 ASTM A269/A269M-15a(2019): Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.7 ASTM A276/A276M-17: Standard Specification for Stainless Steel Bars and Shapes.

.8 ASTM A307-21: Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

.9 ASTM A449-14(2020): Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use.

.10 ASTM A563/A563M-21a: Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric).

.11 ASTM A653/A653M-20: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.12 ASTM A780/A780M-09(2015): Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

.13 ASTM A1008/A1008M-21: Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.

.14 ASTM B36/B36M-18: Standard Specification for Brass Plate, Sheet, Strip, and Rolled Bar.

.15 ASTM B103/B103M-19: Standard Specification for Phosphor Bronze Plate, Sheet, Strip, and Rolled Bar.

.16 ASTM B139/B139M-12: Standard Specification for Phosphor Bronze Rod, Bar and Shapes.

.17 ASTM B209/B209M-21: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.18 ASTM B221M-13: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

.19 ASTM F436/F436M-19: Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.

.20 ASTM F467M-06a(2012): Standard Specification for Nonferrous Nuts for General Use (Metric).

.21 ASTM F468M-06(2012): Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use (Metric).

.22 ASTM F593-17: Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.

.23 ASTM F594-09(2020): Standard Specification for Stainless Steel Nuts.

.24 ASTM F3125/F3125M-19e2: Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.

.25 CSA A500-16: Building Guards.

.26 CSA G40.20-13 (R2018): General Requirements for Rolled or Welded Structural Quality Steel.

.27 CSA G40.21-13 (R2018): Structural Quality Steel.

.28 CSA S136-16: North American Specification for the Design of Cold-Formed Steel Structural Members.

.29 CSA W47.1:19: Certification of Companies for Fusion Welding of Steel.

.30 CSA W47.2-11 (R2020): Certification of Companies for Fusion Welding of Aluminum.

.31 CSA W55.3-08 (R2018): Certification of Companies for Resistance Welding of Steel and Aluminum.

.32 CSA W59-18: Welded Steel Construction (Metal Arc Welding).

.33 CSA W59.2-M1991 (R2018): Welded Aluminum Construction.

1.3 Shop Drawings

.1 Submit Shop Drawings as specified in Section 01 33 00.

.2 Shop Drawings: Project-specific drawings, prepared for each required custom-fabricated metal item, illustrating profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.

.3 Shop Drawings for metal ladders, balustrades, guards, railings and handrails must be stamped, signed and dated by fabricator's design engineer.

1.4 QUALIFICATIONS

.1 Fabricator's Design Engineer: A professional structural engineer, experienced in designing metal ladders, balustrades, guards, railings and handrails, and licensed to practice at Place of the Work.

.2 Fabricator: A firm specializing in fabricating custom metal components, and having minimum 3 years documented experience.

.3 Metal Wall Mounted Cabinetry: A firm specializing in fabricating and installing stainless steel commercial kitchen countertops and backsplashes, and having minimum 3 years documented experience.

.4 Welders: Workers certified by CWB to CSA W47.1, CSA W47.2 and CSA W55.3 as applicable.

PART 2 PRODUCTS

2.1 DESIGN CRITERIA

.1 Design cold-formed steel fabrications to CSA S136.

.2 Design metal guards, including balustrades, railings and handrails to CSA A500 and applicable regulatory requirements; and capable of resisting:
- .1 Uniform Load = 0.75 kN/m in any direction.
- .2 Vertical Load = 1.5 kN/m.
- .3 Loads on Pickets = 0.5 kN on 100 x 100 mm area.
- .4 Non-concurrent Loads on Handrails = 0.9 kN applied at any point in any direction.
- .5 Lateral Force = 1.0 kN at any point without damage or permanent set.
- .6 Design for Seismic Restraint.

2.2 MATERIALS

.1 Galvanized Sheet Steel: To ASTM A653/A653M, Structural Steel (SS) Grade 230, Types 1 and 2; cold-rolled sheet steel, galvanized; thicknesses as indicated.

.2 Sheet Steel: To ASTM A1008/A1008M, Structural Steel (SS) Grade 230, Types 1 and 2; cold-rolled sheet steel, thicknesses as indicated.

.3 Steel Sections and Plates: To CSA G40.20 and CSA G40.21, Grade 300W; profiles and sizes as indicated.

.4 Hollow Structural Steel Sections: To CSA G40.20 and CSA G40.21, Grade 350W, Class H; sizes as indicated.

.5 Stainless Steel Sheet, Sections and Plates: To ASTM A240/A240M, Type 304L for welded applications and Type 304 for other applications; thicknesses and sizes as indicated.

.6 Stainless Steel Tubing: To ASTM A269/A269M, Grade TP316L; thicknesses, diameters and sizes as indicated.

.7 Stainless Steel Bars and Shapes: To ASTM A276/A276M, Type 304L for welded applications and Type 304 for other applications; sizes and profiles as indicated.

.8 Extruded Aluminum: To ASTM B221M, 6063 alloy, T6 temper; profiles and sizes as indicated.

.9 Aluminum Sheet: To ASTM B209/B209M, 3003-H14 alloy for shop-painted material and 5005-H32 alloy for anodized material; thicknesses as indicated.

.10 Brass: To ASTM B36/B36M, UNS C22000 alloy, hot rolled temper; profiles and sizes as indicated.

.11 Bronze Plate, Strip and Sheet: To ASTM B103/B103M, UNS C53400; leaded phosphor type, profiles and sizes as indicated.

.12 Cast Bronze: To ASTM B139/B139M; phosphor type, profiles and sizes as indicated.

2.3 MANUFACTURED UNITS

.1 Checker Plate: To CSA G40.20 and CSA G40.21; 6.4 mm thick steel plate, with 1.27 mm raised checker pattern.

.2 Welded Metal Grating: 4.8 mm twisted steel cross bars welded at 102 mm OC to flat steel bearing bars spaced at 30 mm OC; width and length as indicated on Drawings; galvanized after welding (GAW) finish; eg. Type W/B by Borden Metal Products (Canada) Ltd.

.3 Safety Grating Treads: Steel 11 gauge diamond grip metal grating, standard diamond grip treads; Sizes as per drawings.

2.4 ACCESSORIES

.1 Stainless Steel Bolts: To ASTM F593, Group 1.

.2 Stainless Steel Nuts and Washers: To ASTM F594, Group 1.

.3 High-Strength Bolts: To ASTM F3125/F3125M, Type 1 for interior applications, Type 3 for exterior applications; quenched and tempered steel heavy hex structural bolts.

.4 Medium-Strength Bolts: To ASTM A449, Type 1 for interior applications, Type 3 for exterior applications; quenched and tempered steel hex bolts.

.5 Machine Bolts: To ASTM A307, Grade A; carbon and alloy steel, galvanized where noted.

.6 Steel Nuts: To ASTM A563/A563M, Grade A, Heavy Hex Style for use with high strength bolts, and Hex Style for use with medium strength bolts and machine bolts; carbon and alloy steel; galvanized where noted.

.7 Steel Washers: To ASTM F436/F436M, Type 1 for interior applications, Type 3 for exterior applications; hardened steel washers, circular, bevelled and clipped types as required.

.8 Aluminum Bolts: To ASTM F468M, shop finished to match adjacent surfaces.

.9 Aluminum Nuts and Washers: To ASTM F467M, including plain washers; shop finished to match adjacent surfaces.

.10 Welding Materials: To CSA W59 and CSA W59.2.

2.5 PRIMERS

.1 Primer for Ferrous Metal Surfaces: Red oxide type.

.2 Primer for Galvanized Surfaces: Zinc-rich paint type.

2.6 FABRICATION

.1 Prior to fabrication, verify existing conditions and take field measurements to ensure perfect fit of fabricated items.

.2 Fabricate cold-formed steel components to CSA S136.

.3 Fabricate metal guards, including balustrades, railings, and handrails to CSA A500.

.4 Shop weld steel components to CSA W59.

.5 Shop weld aluminum components to CSA W59.2.

.6 Fit and shop assemble components in largest practical sections to accommodate delivery to Place of the Work.

.7 Seal joints with continuous welds.

.8 Grind visually-exposed joints flush and smooth with adjacent finish surface.

.9 Make visually-exposed joints butt tight, flush and hairline.

.10 Exposed Mechanical Fastenings: Flush countersunk screws or bolts; except where specifically noted otherwise.

.11 Supply components required for anchorage of fabrications.

2.7 FINISHES

.1 Shop Priming:
- .1 Clean surfaces of rust, scale, grease, and foreign matter prior to shop priming.
- .2 Do not prime surfaces designated to come into direct contact with concrete, or where field welding is required.
- .3 Prime components using minimum two coats primer.

.2 Galvanized Coating on Steel Components: To ASTM A123/A123M, Z275 hot dipped zinc alloy coating.

.3 Galvanized Coating on Steel Hardware: To ASTM A153/A153M, Class B2 hot dipped zinc alloy coating.

.4 Galvanized Coating on Sheet Steel: To ASTM A653/A653M, Z275 hot dipped zinc alloy coating.

.5 Stainless Steel: To AISI No. 4 - Brushed.

.6 Brass: To AISI No. 4 - Brushed.

.7 Anodized Coating on Aluminum: To AAMA 611, AA-M12C22A31, Class II Clear Anodic Oxide treatment, No. 17.

.8 Monochromatic Paint Coating on Aluminum: To AAMA 2605; two-coat thermosetting fluoropolymer PVDF liquid extrusion and coil coating, factory-applied to 0.03 mm dry film thickness; eg. Duranar by PPG Industries, Inc.; colours as selected by Consultant.

.9 Powder Coated Finish on Metal Components: To AAMA 2605; electrostatically sprayed polymer powder, factory-applied to 0.05 mm dry film thickness; colours as selected by Consultant.

.10 Monochromatic Paint Coating on Sheet Steel: Two-coat silicone modified polyester coil coating, factory-applied to 0.028 mm dry film thickness; eg. WeatherXL by Valspar, colour as selected by Consultant.

3 Execution

3.1 PREPARATION

.1 Make provision for erection loads with temporary bracing.

.2 Clean and strip primed steel items to bare metal where site welding is required.

.3 Supply items required to be cast into concrete and or embedded in masonry with setting templates, to appropriate Sections.

3.2 INSTALLATION

.1 Install components plumb and level, accurately fitted, free from distortion or defects.

.2 Provide fasteners and anchors necessary to secure components rigidly in place.

.3 Field weld steel components to CSA W59.

.4 Field weld aluminum components to CSA W59.2.

.5 Field bolt and weld to match shop bolting and welding.

.6 Mechanically fasten joints butted tight, flush, and hairline.

.7 Grind welds smooth and flush.

.8 After erection, prime welds, abrasions, and surfaces not yet shop primed or galvanized, except surfaces designated to come into direct contact with concrete.

.9 Make Good damaged galvanized coatings to ASTM A780/A780M.

3.3 SCHEDULE

.1 The following schedule is a list of principal items only. Refer to Drawings for items not specifically scheduled.

.1 Sleeves and Openings: Including templates and required information, supplied to appropriate Sections.

.2 Attachments: Anchor bolts, washers, nuts, lag screws, expansion shields, toggles, straps, sleeves, brackets, etc. as required and secured with sufficient self-tapping shake- proof screws with flat countersunk heads.

.3 Brackets: Fabricated from mild steel plate, sizes and configurations as required to support countertops, shelving, seating, benches, valances, coat hooks, and other similar components; pre-drilled for fastening of other components.

.4 Metal Balustrades, Guards and Railings: Sizes and configurations as indicated on Drawings; engineered by fabricator to meet specified design criteria; shop primed steel for interior applications and galvanized steel for exterior applications.

.5 Upper Cabinets: Stainless steel construction, as detailed on Drawings. Minimize seams. See 06 40 00 for Sliding Door hardware, and Section 08 80 00 for Glazing to Upper Cabinet sliding glass doors.

.6 Steel Countertops: Cold Rolled Steel, as detailed on Drawings. Minimize seams.

.7 Steel Service Stairs: Metal Stringers and Steel safety grating treads: engineered by fabricator to meet design criteria; shop primed steel for interior applications.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Provide all labour, materials and equipment necessary to complete the installation of all rough carpentry as indicated on the drawings and herein specified. No attempt is made to completely itemize the work of this Section. This can only be ascertained by a careful examination of the drawings and reference to other relevant sections of this specification, but generally the scope is as follows:

.1 Blocking, framing and grounds, for all other trades including mechanical.

.2 Framing, nailers, etc., as shown on the structural and architectural drawings.

.3 Nailing grounds for drywall at floor and ceiling, and around openings.

.4 Sub floor sheathing and overlay.

.5 Backboard and blocking for electrical and mechanical equipment.

.6 Exterior Grade Plywood Sheathing.

.7 Wood joints where shown on contract documents.

1.2 Reference

.1 AWPA M2-81, Inspection of Treated Timber Products.

.2 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 CSA-B111-1974, Wire Nails, Spikes and Staples.

.4 CAN/CSA-G154-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.

.5 CAN/CSA-080, Series-M89 Wood Preservation.

.6 CSA-0121-M1978, Douglas Fir Plywood.

.7 CAN/CSA-0141-91, Softwood Lumber.

.8 CSA-0151-M1978, Canadian Softwood Plywood.

.9 NLGA, Standard Grading Rules for Canadian Lumber 1991.

1.3 Quality Assurance

.1 Lumber grading agency: N.L.G.A.

.2 Wood treatment: CSA 080M.

.3 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.4 Plywood identification: by grade mark in accordance with applicable CSA standards.

1.4 Storage, Delivery and Handling

.1 Store clear of ground or other bearing surfaces on blocking to prevent damage from moisture absorption.

.2 Store onsite for minimum amount of time prior to incorporating into building.

.3 Tarp or cover exposed materials for protection from elements.

1.5 Wood Preservation

.1 All exterior blocking, curbs, nailers and interior framing, blocking and other rough carpentry attached to masonry or concrete, shall be pressure treated Wolmanized lumber.

1.6 Rough Hardware

.1 Provide and install requisite rough hardware to frame and fix rough and finished carpentry and include for all proper nails, spikes, screws, bolts, anchors and other ironmongery which may be required.

1.7 Cutting for Other Trades

.1 Execute cutting and framing of woodwork required for installation of work of other trades including heating, plumbing and ventilation, and repair and make good such work after their work is in place.

PART 2 PRODUCTS

2.1 Materials Generally

.1 Materials shall conform to the requirements of the Ontario Building Code, latest edition.

.2 Materials shall be best merchantable lumber, straight and sized and shaped to correct dimensions from nominal sizes noted on the drawings. Lumber shall be selected from well-seasoned stock free from loose resinous knots, shakes, waxed edges, splits, dry rot or other defects which would impair the strength or durability.

.3 Moisture content of lumber for rough carpentry at the time of erection shall not exceed 17%.

2.2 Lumber Materials

.1 Lumber shall be in accordance with the following standards: CAN/CSA-0141 and Standard Grading Rules for Canadian Lumber.

.2 All framing materials to be #2 Spruce; grading standard to the N.L.G.A., well-seasoned and free from shakes, splits, rot mildew or other defects that would impair strength or durability.

.3 Where specified, beams and girders shall be laminated Jack Pine, well-seasoned and free from shakes, splits, rot mildew or other defects that would impair strength of durability.

.4 Framing members requiring wood treatment shall be pressure treated, using the CCA type.

2.3 Furring, Rough Blocking, Framing, Nailing Strips, Rough Bucks, Curbs and Sleepers

.1 Shall be Eastern Spruce or Jack Pine, construction grade. All lumber attached to masonry or concrete and on all exterior walls, parapets, and roof curbs shall be Wolmanized.

2.4 Plywood

.1 Exterior Grade plywood DFP to CSA O121, SHG grade; veneer core, butt edge, unsanded faces; preservative treated, flame retardant and thicknesses as indicated on Drawings.

.2 Where T & G Plywood is specified, it shall be douglas fir with solid fir veneer core.

.3 Where waterproof plywood is specified, it shall be pressure treated Spruce plywood sheathing with solid spruce veneer core.

2.5 Accessories

.1 Fasteners: galvanized steel for exterior, high humidity and treated wood locations plain finish elsewhere.

.2 Anchors: toggle bolt type for anchorage to hollow masonry and gypsum walls. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolts or ballistic fasteners for anchorages to steel and in the joining of laminated beams.

2.6 Wood Preservatives

.1 All wood blocking, nailers, grounds and furring for roof curbs roof dividers, roof expansion joints and parapets shall be treated with "Pentox" manufactured by Osmose Pressure Treated Wood Products Limited, green colour, or equal. Wood blocking and furring on the outside face of exterior walls and wood sleepers supporting subfloors over concrete slabs in contact with grade shall be treated with wood preservative.

.2 Wood treated with preservative by pressure impregnation. Submit information on moisture content after drying, following treatment with water borne preservative.

.3 Submit information listed in AWPA.M2 and revisions specified in CAN/CSA-080 series, Supplementary Requirements to AWPA Standard M2 applicable to specified treatment.

.4 Preservative: to CAN/CSA-080 Series, odourless water borne for clear finish.

.5 Treat cut ends of wood members with field applied preservatives. Comply with AWPA.M2 and revisions specified in CAN/CSA-080 series Supplementary Requirements to AWPA Standard M2.

.6 Flame retardant: To CAN/SCA 080; chemically treated and pressure impregnated; as follows:
- .1 Surface Burning Characteristics (CAN/ULC-S102): flasme spread index less than 25.
- .2 Manufacturer and Product Name: eg. Dricon by Lonza.
- .3 Flame retardant treated materials must bear a ULC classification label.

PART 3 EXECUTION

3.1 Control Joints

.1 Provide and set up in door openings, temporary enclosing partitions to keep out weather when and as required, with fastenings inside only. All doors but one shall be kept shut and it shall be fitted with lock and key. Window openings shall be closed as required.

3.2 Runways, Hoarding Walls, Ladders, Platforms, Walks, interior furnishings/finishing protection for Demolition

.1 Furnish set and maintain temporary stairs, walks, runways, platforms, ramps and ladders throughout project and for use of trades.

.2 Comply with safety regulations and applicable bylaws governing erection of above items. Provide and maintain necessary barriers, guards and rails.

.3 Create hoarding walls and all temporary interior protection using 16mm plywood and 38x140 / 38x89 wood framing members spacing at max. 600mm o.c.

3.3 Wood Rough Blocking

.1 Where indicated and called for on drawings, provide and install continuous wood rough blocking or framing throughout job of sizes noted or required.

.2 Use 38mm thick material unless shown or noted otherwise.

3.4 Site Applied Wood Treatments

.1 Brush apply two coats of preservative treatment on wood in contact with cementitious materials, roofing, and all site sawn ends of P.T. lumber.

.2 Apply preservative treatment in accordance with CSA .080M, and manufacturer's instructions.

3.5 Grounds

.1 Provide and fix grounds throughout building wherever required for this and other trades.

3.6 Nailing Strips

.1 Provide and securely fix nailing strips, blocks and whatever rough carpentry and fixing is required for cupboards and other fitments to be secured to walls. Set accurately and so that they will be completely concealed.

3.7 Strapping and Furring

.1 Strapping shall be 2" (50mm) x 2" (50mm) or 1"(25mm) x 2" (50mm) nominal, securely fixed to walls at locations where plaster or gypsum board on exterior walls are called for on finish schedules. Run horizontal straps bottom and top of each wall. Strapping shall be accurately spaced, true and plumb.

.2 Furr out for plumbing and heating pipes in finished rooms, above cupboards, fitments, where ceilings change level and at locations noted or indicated on drawings, except where metal furring is called for.

.3 Where the spaces between strapping and furring are filled in with insulation or shown on the drawings to be left unfilled, the spaces between the furring strips shall be fire stopped at the floor and ceiling levels and at mid-height and at intervals not exceeding 8 feet (2400mm) horizontally and vertically.

3.8 Installation – Electric and Telephone Backboards

.1 Supply and install 3/4" (19mm) thick backboards of fir plywood, fire pressure treated, solid good 1 side, sanded both sides, in electrical and telephone rooms to sizes indicated on drawings.

.2 Fasten to wall using fasteners and spacing suitable to wall type to provide secure, sturdy installation which will carry equipment load without damaging wall.

3.9 Clean-up

.1 Remove all waste and cuttings from the jobsite as work proceeds.

END OF SECTION

PART 1 GENERAL

1.1 Scope

.1 Metal Cabinet Hardware.

1.2 Related Sections

.1 Metal Fabrications – Section 05 50 00.

.2 Glazing – Section 08 80 00.

1.3 Quality Assurance and Reference Standard

.1 *ANSI/BHMA-A156.9; Cabinet Hardware.*

.13 Employ fully trained mechanics that are regularly employed in this field.

.14 Fabricate millwork by a manufacturer that is a recognized millwork supplier, well experienced in the manufacturing techniques of a millwork shop.

1.4 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Shop drawings:

.1 Shop drawings in accordance with Section 01 33 00

.2 Submit digital copies of drawings only.

.3 Indicate details of construction, profiles, jointing, fastening and other related details.

.4 Indicate all materials, thicknesses, finishes and hardware.

.5 Indicate locations of all service outlets in casework, typical and special installation conditions, and all connections, attachments, anchorage and location of exposed fastenings.

.6 The drawings are not to be photocopied, shop drawings to be in metric, paper size 11”x17”.

.7 Cabinets on a 22.5º angle to have a 25mm filler on each side of the intersection.

.12 Finished dimensions for all appliances to be confirmed prior to commencing work.

.13 Provide filters at appliances if required.

.14 Do not commence work until reviewed shop drawings have been returned and samples approved.

.15 Take critical measurements at the site to facilitate installation, fitting of work and access required in moving millwork into final location. Take such measurements prior

to fabrication of the Work of this Section and in ample time to avoid delays in the Work.

.3 Samples

.1 Samples in accordance with Section 01 33 00

.2 Submit samples: sample size 300 x 300mm of typical finished door panel.

.3 Submit 300mm x 300mm colour samples of each type of laminated plastic selected and wood veneer.

.4 Submit one section of finished millwork for review by the consultant to determine the construction quality prior to manufacturing.

1.5 Quality Assurance

.1 Architectural woodwork shall be manufactured and installed to the specified AWMAC Quality Standards.

1.6 Delivery, Storage, and Handling

.1 Protect casework and millwork against dampness and damage during and after delivery.

.2 Store casework and millwork in ventilated areas, protected from extreme changes of temperature or humidity.

.3 Do not delivery casework and millwork units to site until storage areas are complete and conditions permit, to ensure no damage will occur while in storage.

1.7 Warranty

.1 All millwork shall be warranted from defects in workmanship for a period of two (2) years from Substantial Completion.

PART 2 PRODUCTS

2.1 Cabinetry

.1 See Metal Fabrications – 05 50 00.

2.1 Hardware

.1 All cabinet hardware shall meet or exceed the requirements of ANSI/BHMA-A156.9.

.2 Manufacturers/Suppliers:

.1 CR Laurence.

.2 Richelieu Hardware.

.3 Finishes:

.1 Satin Chrome

.2 32D - Satin Stainless Steel

.4 Door and Drawer Pulls: Richelieu D-Pull, 110 mm overall length with 100mm centre to centre fastening and 35mm projection; eg. Urban Model 221170, by Richelieu, stainless steel.

.5 Cupboard Door Hinges: Stainless steel; Heavy Duty.

.6 Sliding Door hardware:

.1 For Sliding Glass Doors: Chrome Keyed Alike Lock for Cabinet Sliding Glass Doors. Polished Chrome Finish.

.2 Cap Finger Pulls: for each glass section, Finish Satin Chrome.

.7 Sliding Glass Door tracks : Polished Aluminum Roller track, Bottom and Top Track, for two bypass doors, length to suit design on Drawings.

.8 Glass Doors – See Section 08 80 00.

PART 3 EXECUTION

3.1 Reduce dust contamination by:

.1 Fully ensuring adjacent HVAC ducts are sealed prior to cutting

.2 Collecting and bagging dust from tools.

.3 Isolating cutting areas from adjacent workspaces.

.4 Sweeping and/or vacuuming daily.

3.2 Preparation and Protection

.1 Protect work of other trades from damage.

.2 Make good any resulting damage, to the satisfaction of the Consultant, at no additional cost to the owner.

3.7 Installation

.1 Commencement of work implies total acceptance of surface and site conditions.

.2 Set and secure all materials and components in place, rigid plumb and square.

.3 Provide all furring stirps and strapping required fixing millwork and casework to walls, etc.

.4 Provide all filler strips to seal any openings or joints at adjacent surfaces.

.5 All cabinets installed to block walls to be fastened with Tapcons and cup washers.

.6 All cabinets installed to wood studding to be fastened with #10 screws and cup washers.

3.8 Installation Tolerances

.1 Install to a tolerance of 3 mm in 2400 mm for plumb and level (including tops) and with no variations in flushness of adjoining surfaces.

3.9 Adjustment and Cleaning

.1 Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair, replace work.

.2 Clean, lubricate, and adjust hardware.

.3 Clean woodwork on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.10 Protection

.1 Protect architectural woodwork during remainder of construction period to ensure that work will be without damage or deterioration at time of acceptance.

.2 Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, that ensure that woodwork is without damage or deterioration at time of Substantial Performance of the Work.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Batt insulation: Unfaced, mineral-fibre batts.

.2 Semi-rigid insulation; within cavity walls.

.8 Foamed-in-place gap filler insulation.

1.2 Quality Assurance

.1 Execute work of this section using a Subcontractor who has adequate plant, equipment and skilled workers to perform it expeditiously, and is known to have been responsible for satisfactory installations similar to that specified during a period of at least the immediate past 5 years.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Samples: Submit representative samples of each specified insulation material, insulation clips, adhesives, fasteners, tapes and other material for review.

.3 Manufacturer's Product data:

.1 Submit manufacturer's Product data sheets for Products proposed for use in the work of this section.

.2 Submit data and installation instructions for materials and prefabricated devices, providing descriptions sufficient for identification at the Place of the Work.

.3 Submit data from manufacturer’s or independent laboratory indicating compatibility and adhesive results of proposed materials.

.4 Certifications and evidence:

.1 Submit proof of manufacturer/fabricators/installer's specific liability insurance (Products and completed operations) for all aspects of the engineering, design, and installation of components and against failure.

.2 Submit letter of compliance from the structural engineer by whom the engineer certifies that anchors meet design and regulatory requirements.

1.5 Protection

.1 Comply with manufacturer's printed recommendations respecting protection.

.2 Protect polystyrene insulation from extended exposure to sunlight

.3 Repair damage resulting from performance of work of this section in manner acceptable to Consultant.

1.6 Warranty

.1 Warranty work of this section for a period of 2 years starting from the date of substantial performance.

PART 2 –PRODUCTS

2.1 Insulation Materials

.1 Batt insulation: Unfaced, mineral-fibre batts, to CAN/ULC S702.1, Type 1.

.1 Acceptable Products:

.1 Fibrex
.2 Johns Manville.
.3 Owens Corning.
.4 Roxul.

.2 Semi Rigid Mineral Wool insulation board: Mineral Fibre semi-rigid board insulation, manufactured from glass, rock, or slag fibres to CAN/ULC S702.1, Type 1.

.1 Acoustical Performance

.1 Aged Thermal Resistance (ASTM C518): RSI greater than 0.74 per 25mm of thickness.
.2 Eg. CavityRock by Rockwool.

.3 Sound Attenuation Insulation: mineral fibre processed from rock, slag, or 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 Roxul AFB, by Rockwool Group LLC.
.3 Noise Reducer Sound Attenuation Batt, by CertainTeed Canada .

. 4 Rigid insulation: Polyisocyanurate; To CAN/ULC-S704.1, Type 3, Class 3, rigid board closed-cell type.

.1 Acceptable Products:

.1 Soprema, SOPRA-ISO
.2 Owens Corning, FOAMULAR NGX
.3 IKO Industries Ltd.
.4 GAF Materials Corporation.

.5 Foamed-in-place gap filler insulation:

.1 One-component CFC-free polyurethane foam to CAN/ULC S710.1-05.

.2 Two-component CFC-free polyurethane foam to CAN/ULC S711.1-05.

2.2 Accessory Materials

.1 Adhesive: solvent based polymer modified liquid applied membrane, compatible with insulation to be applied, type as manufactured for the attachment of insulation.

.1 Acceptable Products:

.1 Baker Airbloc 21 or 230-21.

.2 Insulation fasteners; soft washer and pin type; direct fasten type: Grey polyethylene washer, corrosion resistant fastener, pin length to suit application for recommended pin embedment depth:

.1 Acceptable Products:

.1 Hilti 'X-SW 60 Pins'.

.3 Insulation fasteners: Impaling clip of galvanized steel with washer retainer, to be adhered to surface to receive board insulation with adhesive, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place. Self-adhesive impaling pins are unacceptable.

.4 Drill-in plastic insulation anchor with oversize head; hammer-in installation.

.1 Acceptable Products:

.1 'IOP Insulation Anchor' by Hilti, length to suit insulation thickness.

.5 Batt insulation restraint: Zinc coated woven wire and mechanical fasteners.

PART 3 –EXECUTION

3.1 General installation Requirements

.1 Comply with requirements of Section 01 83 00.

.2 Install materials in accordance with manufacturer's installation instructions.

3.2 Examination

.1 Take measurements at the Place of the Work to ensure that work is fabricated to fit structure; surrounding construction; around obstructions and projections in place, or as indicated; and to suit locations of services.

.2 Verify that backup construction is aligned for proper installation of work before commencing erection.

3.3 Installation – General

.1 Install insulation in accordance with manufacturer's printed recommendations. Install attachment at rate as required to prevent displacement of insulation boards during construction operations.

.2 Butt joints tightly and offset vertical joints to form an unbroken thermal envelope. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.

.3 Apply insulation to ensure total and complete coverage of surfaces indicated to be insulated, and in direct contact with such surfaces. Unless otherwise specified, apply insulation in single layer of thickness indicated.

.4 Ensure integrity and continuity of insulation at juncture with different types of materials and seal in an acceptable manner.

.5 Do not enclose insulation until it has been reviewed and accepted by Consultant.

3.4 Batt Insulation

.1 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.2 Do not over compress insulation to fit into spaces.

.3 Install continuous woven wire restraint mechanically fastened to steel studs to hold insulation against exterior sheathing materials.

.4 Insulation equal to that specified shall be placed in jamb and header assemblies that will be inaccessible after their installation into wall. Ensure that insulation is kept dry and not compressed.

3.6 Rigid Insulation Application

.1 Edge butter rigid insulation joints with adhesive and trowel flush with insulation face at wall cavity insulation locations.

.2 Butter masonry tie penetrations with adhesive at wall cavity insulation locations.

.3 Secure rigid insulation boards to substrate at rate of 6 fasteners for each 610 x 1220 mm (24" x 48") board minimum, with corrosion resistant mechanical fasteners with oversize heads or 25 mm (1") plastic washers.

3.7 Foamed-in-place Gap Filler Insulation

.1 Install one-component foam in accordance with CAN/ULC S710.2-05 application standard.
.2 Install two-component foam in accordance with CAN/ULC S711.2-05 application standard.
.3 Install at exterior building envelope assemblies to locations as indicated, to cavity and gaps surrounding metal frames.

END OF SECTION

PART 1 - General

1.1 Section Includes

.1 Sheet-Applied Self-Adhesive Air /Vapour Barrier Membrane.

1.2 Quality Assurance

.1 Qualifications: Provide the work of this section, executed by competent installers with minimum 5 years experience in application of Products, systems and assemblies specified and with approval and training of Product manufacturers.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 00.

.3 Conduct quality control in accordance with Section 01 45 00. Independent inspection and testing company shall attend the pre-installation meeting.

.4 Single source responsibility: Materials shall be sourced from one manufacturer including sheet membranes, air barrier sealants, primers, mastics and adhesives.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.4 Mock-up:

.1 Construct minimum 10 m^2 (100 ft2) area of each typical wall assembly installation for each type of Product.

.2 Locate at the Place of the Work as part of final installation. Space installation to include exterior wall panel incorporating window, glazing system and insulation.

.3 Do not proceed until mock-up has been reviewed by Consultant.

.5 Certifications and evidence:

.1 Submit proof of manufacturer/fabricators/installer's specific liability insurance (Products and completed operations) for all aspects of the engineering, design, and installation of components and against failure.

.2 Submit letter of compliance from the structural engineer by whom the engineer certifies that anchors meet design and regulatory requirements.

1.4 Performance Requirements

.1 Performance requirements shall meet building envelope performance requirements in accordance with Section 01900.

1.5 Environmental Requirements

.1 Provide forced air circulation during curing period for enclosed applications.

.2 Low temperature application:

.1 Perform adhesion test for membrane when ambient temperature is below -5 oc.

.2 Proceed with work when temperature is (or predicted) to fall below -5 oc ambient

temperature only with the mutual documented agreement of inspection and testing company, manufacturer and applicator.

.3 Do not perform installation during rainy or inclement weather or on wet or frost covered surfaces.

.4 Provide temporary protection of the applied membrane to prevent mechanical damage or damage from spillage of oil or solvents.

1.6 Delivery, Storage and Handling

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

.2 Store flammable solvent-base liquids away from excessive heat and open flame. Primer contains solvent. Do not use near open flame.

.3 Store surface conditioner at temperature above 5°C to facilitate handling.

.4 Store roll materials on end.

1.7 Warranty

.1 Warrant work of this section for a period of 2 years, in accordance with Section 01 78 00.

.2 The work of this section shall meet the specified building envelope performance requirements during the warranty period.

PART 2 - Products

2.1 Sheet Applied Self-Adhesive Air/Vapour Barrier Membrane

.1 Acceptable Products:

.1 Baker 'Biueskin SA' and 'Biueskin SA LT'.

.2 Carlisle Coatings & Waterproofing 'CCW 705'.

.3 Grace Construction Products 'Perm-A-Barrier Wall Membrane'.

.4 Soprema 'Sopraseal Stick 1100 Summer Grade' and Sopraseal Stick 1100 Winter Grade'.

.5 Tremco 'ExoAir 110LT'.

.6 W.R. Meadows 'Air Shield' and 'Low Temperature Air Shield'.

.2 Description: Composite preformed modified bituminous membrane system consisting of SBS modified asphalt for low temperature flexibility and polyethylene scrim reinforcing, with physical properties as follows:

.1 Thickness: 1.0 mm (40 mils).

.2 Application temperature: as per manufacturer's printed installation instructions.

.3 Elongation: 200% minimum in accordance with ASTM D412-06ae2-modified.

.4 Low temperature flexibility: to -30°C to CGSB 37-GP-56M-1985.

.5 Air leakage: <0.02 Usm^2 @75 Pa to ASTM E2178-03;

.6 Water vapour transmission: 2.8 ng/Pa.s.m^2 in accordance with ASTM E96/E96M-05.

.3 Primer: as recommended by manufacturer of air barrier sheet membrane being Provided in the Work.

.4 Termination mastic: Rubberised asphalt-based mastic with 200 g/1 max. VOC content, as recommended by manufacturer of air barrier sheet membrane being Provided in the Work.

PART 3 - EXECUTION

3.1 Installation

.1 Examine surfaces to receive membranes to assure they are smooth, dry and free from conditions that will adversely affect execution, permanence, or quality of the work of this section.

.2 Do not install air barrier membrane until other work which penetrates membrane has been completed.

.3 Seal around materials penetrating membrane in accordance with manufacturer's printed installation instructions.

3.2 Installation – Sheet Applied-Self Adhesive Type Membrane

.1 Priming:

.1 Apply fluid primer to substrate and allow to dry 1 hour or until tack free. Prime only areas to be covered by membrane within 24 hours. Re-prime surfaces not covered within 24 hours.

.2 Apply primers at manufacturer's recommended rate.

.3 At ambient air temperatures below 5°C, follow membrane manufacturer's written instructions for cold weather application. Do not apply primer or membrane in temperatures that fall outside membrane manufacturer's acceptable application conditions.

.2 Flashing and Corner Reinforcing:

.1 Where applicable, bring flashing a minimum of 150 mm (6") onto horizontal surfaces and a minimum of 200 mm (8") up walls from horizontal elevation shown.

.2 Stagger flashing and membrane seams.

.3 Install flashing to protrusions, expansion joints, control joints and the like. Bring flashing a minimum of 150 mm (6") onto the membrane.

.4 Wrap air barrier membrane into jambs and sills at openings. Terminate membrane at points that will prevent visibility from interior.

.3 Installation:

.1 Install membrane in accordance with manufacturer's printed instructions over flashings and corner reinforcement.

.2 Begin installation at the base of the wall placing top edge of membrane immediately below materials protruding from substrate.

.3 When properly positioned, place against surface by pressing firmly into place. Roll membrane with extension-handled countertop roller immediately after

placement.

.4 Overlap horizontally-adjacent pieces 50mm (2") and roll seams.

.5 Bottom edge shall be slit to fit around reinforcing wires or ties, and membrane shall overlap the membrane sheet below by 50 mm (2"). Roll firmly into place.

.6 Seal around materials penetrating membrane with termination mastic. At end of each working day, seal top edge of membrane to substrate with termination mastic.

.7 Do not allow the rubberised asphalt surface of membrane to come in contact with polysulfide sealants, creosote, uncured coal tar products or EPDM.

.8 Do not expose membrane to sunlight for more than 30 days prior to enclosure.

.9 Apply a bead or trowel coat of mastic along membrane edges, seams, cuts, and penetrations.

.10 Roll membrane with 75 mm (3") wide hand roller.

.11 Tie into adjacent wall systems and roof systems for continuous air barrier at building envelope.

.4 Inspection: Inspect membrane for punctures, misaligned seams and fishmouths, apply additional layer of membrane over affected area, extending minimum of 150 mm (6") beyond damaged area in all directions.

.5 Coordinate proper construction of the roof/wall intersection. to maintain the continuity of the air barrier system from the wall to the roofing membrane system.

3.3 Adjustment

.1 Examine completed air barrier systems, repair and seal breaks in the system to ensure maintenance of its integrity and continuity.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 04 22 00 - Concrete Unit Masonry.

.2 Section 05 12 00 - Structural Steel Framing.

.3 Section 06 16 43 - Gypsum Sheathing.

.4 Section 07 21 00 - Thermal Insulation.

.5 Section 07 21 19.13 - Foamed-in-Place Urethane Insulation.

.6 Section 07 27 00 - Air Barriers.

.7 Section 07 42 93 - Metal Soffit Panels.

.8 Section 07 62 00 - Sheet Metal Flashing and Trim.

.9 Section 07 92 00 - Joint Sealants.

1.2 REFERENCES

.1 ASTM A653/A653M-20: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A755/A755M-18: Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.

.3 CSA S136-16: North American Specification for the Design of Cold-Formed Steel Structural Members.

1.3 SHOP DRAWINGS

.1 Submit Shop Drawings as specified in Section 01 33 00.

.2 Shop Drawings: Project-specific drawings, illustrating:
- .1 Large scale details of members and materials, schedule of elevations, trim and closure pieces; of subgirts, brackets and anchorage devices; of connection and jointing details; of drainage system; and interface with adjacent materials;
- .2 Fully dimensioned layouts for positioning subgirts, brackets and anchorage devices to structures;
- .3 Dimensions and thicknesses;
- .4 Description of materials including catalogue numbers, Products' names and manufacturers' names;
- .5 Finish specifications; and
- .6 Other pertinent data.

.3 Submit documentation of:
- .1 Thicknesses, profiles and descriptions of components used in assembly.
- .2 Engineering calculations verifying assembly has been designed, constructed and attached to withstand forces anticipated for Project, including:
  - .1 Tolerance for bowing,
  - .2 Squareness,
  - .3 Camber, and
  - .4 Thermal resistance criteria required by applicable regulatory requirements.

.3 Ensure calculations are stamped, signed and dated by fabricator's design engineer.

1.4 SAMPLES

.1 Submit samples as specified in Section 01 33 00.

.2 Selection Samples: Duplicate samples of prefinished material for colour selection.

1.5 QUALIFICATIONS

.1 Fabricator's Design Engineer: A professional structural engineer, experienced in designing metal wall panel assemblies, and licensed to practice at Place of the Work.

.2 Fabricator and Installer: A firm specializing in fabricating and installing metal wall panels, having minimum 5 years documented experience, and a member of CSSBI.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Refer to Section 01 53 00.

.2 Deliver and store Products in original wrappings, cartons or containers clearly marked as to type, colour and manufacturer.

.3 Stack bundles on wood blocking, clear of ground, and tilted sufficiently to ensure no water remains on material.

.4 Open bundles on underside to allow drainage from leaks or condensation.

1.7 WARRANTY

.1 Submit extended warranty in accordance with General Conditions of the Contract.

.2 Extended Warranty: For a period of two years, covering damage to building and contents resulting from failure to resist penetration of water.

.3 Provide Manufacturer’s written warranty. Warranty period for finish 40 years after the date of Substantial Completion.

2 Products

2.1 MANUFACTURERS

.1 Manufacturers having Product considered acceptable for use:
.1 Agway Metals Inc.
.2 Flynn Canada Limited
.3 VicWest Steel Inc.

.2 Substitution Procedures: Refer to Section 01 33 00.

2.2 DESIGN CRITERIA

.1 Design for seismic restraint.

.2 Design assembly to accommodate wind loading, weight carrying requirements and wind deflection limitations. Conform to CSA S136.

.3 Design assembly as a drained rain screen assembly.

.4 Design assembly to prevent oil-canning, buckling, bending and rattling of panels under full design loads.

.5 Deflection Limits: Maintain integrity of panels and seals at design loading. Prevent permanent deformation of members caused by applied loads. Prevent deflection that could result in noise, breaking of adhesives or sealants, to cause them to touch other building components, or to break the integrity of the insulation thermal blanket or air/vapour barrier seal.

.6 Design anchors, fasteners, subgirts, and braces to limit structural stress to not more than 50 percent of the allowable stress when maximum load conditions are applied.

2.3 MATERIALS

.1 Metal Wall Panels: To ASTM A755/A755M, Structural Steel (SS) Grade 230, Types 1 and 2; galvanized cold-rolled sheet steel, 0.76 mm thick before galvanizing; 22 mm deep profile, with ribs spaced at 68mm OC; with paint coating; eg. 7/8 Corrugated by VicWest Steel Inc.

.2 Metal Trim and Flashings: To ASTM A755/A755M, Structural Steel (SS) Grade 230, Types 1 and 2; galvanized cold-rolled sheet steel, 0.61 mm thick before galvanizing; bone white paint coating.

.3 Subgirts: 1.22 mm thick galvanized steel shapes; Z-, J-, or Hat-Shaped profiles, sizes as required to suit application.

.4 Panel Fasteners: Stainless steel with exposed fasteners colour matched to cladding.

.5 Closure Strips: Preformed rubber on neoprene. Closures where materials are in continuous contact will be butyl pressure sensitive tape.

.6 Thermal Spacers: ISO Clip by Northern Facade; sizes as indicated on Drawings.

.7 Joint Sealants: Exterior weatherseal sealant, Type Exterior #1 as specified in Section 07 92 00.

2.4 FABRICATION

.1 Shop fabricate material as far as possible.

.2 Layout cutting, punching and forming at Shop Drawing stage to minimize site operations.

2.5 FINISHES

.1 Galvanized Coating on Sheet Steel: To ASTM A653/A653M, Z275 hot dipped zinc alloy coating.

.2 Paint Coating on Sheet Steel: To ASTM A755/A755M, Prepainted with two-coat silicone modified polyester paint system to both interior and exterior faces, eg. Weather XL by Valspar, Colour to be selected by consultant, within the manufacturer's standard colour range.

3 Execution

3.1 PREPARATION

.1 Maintain uniform temperature in work area, adequate for work being performed, as recommended by manufacturer.

.2 Securely install thermal spacers to substrate at spacing indicated on accepted Shop Drawings.

.3 Secure subgirts to thermal spacers as indicated on accepted Shop Drawings.

3.2 INSTALLATION

.1 Layout panels in continuous lengths with no horizontal joints.

.2 Mechanically seam panels with a field-operated machine.

.3 Secure metal panels with concealed fasteners.

.4 Provide proper weatherproof seals at junctions and laps of materials.

.5 Install and seal flashings and closures.

.6 Cut and flash openings in cladding surfaces.

.7 Provide collars, miscellaneous trim or flat areas necessary to accommodate openings and penetrating components.

.8 Reinforce openings and sufficiently strengthen areas to accommodate penetrating components.

3.3 TOLERANCES

.1 Maximum Offset From True Alignment: 0.8 mm between two adjacent panels.

3.4 ADJUSTING

.1 Touch up marks and abrasions as installation proceeds.

.2 Discard dented panels.

.3 Defective materials or workmanship whenever found at any time prior to final acceptance of the Work will be rejected regardless of previous acceptance.

END OF SECTION

1.0 GENERAL

1.1. RELATED SECTIONS

.1 Section 05 31 00 – Steel Decking
.2 Section 06 10 00 – Rough Carpentry
.3 Section 07 21 00 – Thermal Insulation
.4 Section 07 26 00 – Vapour Retarders
.5 Section 07 27 00 – Air Barriers
.6 Section 07 52 16 – Temporary Roof Membrane
.7 Section 07 62 00 – Flashing and Sheet Metal
.8 Section 07 92 00 – Joint Sealants

1.2. REFERENCES

.1 ASTM D4601M-04(2020): Standard Specification for Asphalt-Coated Glass Fibre Base Sheet Used In Roofing.
.2 CSA A123.4-04(2023): 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-M89: Vapour Barrier Sheet, Excluding Polyethylene, for Use In Building Construction.
.6 CAN/ULC-S704.1-2017: Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
.7 CAN/ULC-S706.1-2020: Standard for Wood Fibre Thermal Insulation for Buildings.
.8 ASTM A446/A446M, Specification for sheet steel, zinc coated: Steel Roof Deck.
.9 CAN/CSA 0141-91: Dimension Lumber
.10 CSA 0151-M1978: Canadian Softwood Plywood

1.3. PERFORMANCE REQUIREMENTS

.1 Roofing System: three ply cold-applied built-up roofing system with underlay board, vapour retarder, rigid board insulation, tapered insulation, overlay board, tapered drain sump insulation, composite ply roofing membranes and aggregate surfacing.
.2 Provide Products that are compatible with one another under field conditions, as demonstrated by roofing manufacturer.
.3 Provide watertight roofing system capable of resisting specified uplift pressures, thermally induced movement and exposure to weather without failing during the specified warranty period.
.4 Roofing Membrane System Load-Strain Properties: Provide a roofing membrane identical to component systems that have been successfully tested by a qualified independent testing and inspecting agency to meet the following minimum load-strain properties at membrane failure when tested according to ASTM D 2523:
Tensile strain at failure, at -18 deg C (0 deg F): 2,015N machine direction, minimum;
Tensile strain at failure, at -18 deg C (0 deg F): 1820 N cross-machine direction minimum.

1.4. SUBMITTALS

.1 Make Submittals in accordance with Section 01 33 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.

1.5. CERTIFICATES

.1 Manufacturer Certificates: Signed by roofing manufacturer verifying that installer is approved, authorized or licensed by manufacturer to install specified Products.
.2 Installer Certificates: Signed by installer verifying that they have the specified qualifications described below.
.3 Copy of Manufacturer's 20 Year Warranty.

1.6. TEST REPORTS

.1 Submit test reports as specified in Section 01 33 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 daily inspections.

1.7. 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 protected elastomeric roofing, with minimum 5 years documented experience and approved to apply roofing system by manufacturer.
.3 Conform to CRCA Roofing Specifications and roofing membrane manufacturer's instructions.

1.8. PREQUALIFIED ROOFING CONTRACTORS

.1 Through the OECM agreement, only the prequalified roofing contractors listed below may participate in this solicitation:
  .1 Atlas-Apex Roofing Inc.
  .2 Eileen Roofing Inc.
  .3 Flynn Canada Inc.
  .4 Lafleche Roofing (1992) Ltd.
  .5 Nedlaw Roofing Ltd.
  .6 Nortex Roofing Ltd.
  .7 Provincial Industrial Roofing & Sheet Metal Co. Ltd.
  .8 Semple Gooder Roofing Corp.
  .9 Trio Roofing Systems Inc.

1.9. PRE-INSTALLATION MEETINGS

The manufacturer is to review the specification with the architect prior to tender.

.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 Participants: authorized representatives of the Contractor, Construction Manager, Owner, roofing Subcontractor, roofing manufacturer, and installers of roof accessories and roof-mounted equipment.

.2 Review methods and procedures related to roofing installation, including manufacturer's written installation instructions.

.3 Review construction schedule and confirm availability of Products, Subcontractor personnel, equipment and facilities.

.4 Review deck installation criteria and finishes for conformance with roofing system criteria, including issues of flatness and fastening.

.5 Review structural loading conditions and limitations of roof deck both during and after roofing application.

.6 Review flashing details, special roofing details, roof drainage, roof penetrations, equipment curbs, and other conditions affecting roofing installation.

.7 Review governing regulatory requirements, and requirements for insurance and certificates as applicable.

.8 Review safety requirements, including temporary fall-arrest measures.

.9 Review field quality control procedures.

1.10. DELIVERY, STORAGE AND HANDLING

.1 Participants: authorized representatives of the Contractor, Construction Manager/Owner, Architect, roofing Subcontractor, roofing manufacturer, and installers of roof accessories and roof-mounted equipment.

.2 Review methods and procedures related to roofing installation, including manufacturer's written installation instructions.

.3 Review construction schedule and confirm availability of Products, Subcontractor personnel, equipment and facilities.

.4 Review deck installation criteria and finishes for conformance with roofing system criteria, including issues of flatness and fastening.

.5 Review structural loading conditions and limitations of roof deck both during and after roofing application.

.6 Review flashing details, special roofing details, roof drainage, roof penetrations, equipment curbs, and other conditions affecting roofing installation.

.7 Review governing regulatory requirements, and requirements for insurance and certificates as applicable.

.8 Review safety requirements, including temporary fall-arrest measures.

.9 Review field quality control procedures.

1.11. ENVIRONMENTAL REQUIREMENTS

.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.

1.12. 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 Ready for Takeover.
.3 Manufacturer's Extended Warranty: The Manufacturer shall issue a non-prorated full labour and material warranty for a period of Twenty (20) 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).
.4 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.
    .1 Sealing of flashing seam
    .2 Filling of pitch pockets
    .3 Repairs to blisters and ridges
    .4 Caulking at metal details as required
    .5 Written inspection report
    .6 Removal of light debris from roof
    .7 Cleaning of drain screens

1.13. MAINTENANCE

.1 The Manufacturer shall issue a non-prorated warranty for a period of Twenty (20) Years. All components from the vapour retarder up shall be covered under this warranty.
.2 Warranty shall include inspections in years 2 and 5, 10 & 15 of the warranty. The following duties shall be carried out at no extra cost to the Owner as required, by the Manufacturer.
    .1 sealing of flashing seams
    .2 filling of pitch pockets
    .3 repairs to blisters and ridges
    .4 caulking at metal details as required
    .5 written inspection report
    .6 removal of light debris from the roof and premises
    .7 cleaning of drain screens

.3 Documentation shall be provided that the manufacturer has personnel to carry out above noted warranty requirements and has a history of providing these for a minimum of 5 years.
.4 Upon satisfactory completion, the warranty and all construction information regarding the roof installation shall be placed on an Online Roof Management Program at no additional cost to the Owner.
.5 Prior to the 2-year expiration of the contractor’s warranty, the manufacturer shall carry out an Infra-Red Scan of the roof areas completed under this contract.

1.14. ADDITIONAL WARRANTY SERVICES

.1 All pertinent details regarding this project shall be provided for the owner's database such as:
- .1 Roof assembly types, roof inspection reports, roof specs
- .2 Construction of the roof system including all components
- .3 Inspection schedule (warranty requirements)
- .4 Substantial completion date
- .5 Progress photos on a per roof basis
- .6 Warranty information
- .7 Leak history/sensitivity
- .8 Emergency Leak call service
- .9 Handheld Infra-red analysis reports

2.0 PRODUCTS

2.1. MANUFACTURERS

.1 Manufacturers of cold-applied built-up asphalt roofing systems having products considered acceptable for use. All products supplied for the Multi Ply built-up asphalt roofing systems shall be from a single (one) manufacturer.

2.2. MATERIALS

.1 Primer: non-fibrated, asbestos free, water-based, low-VOC formulation; to CGSB 37-GP-9Ma; Meets the following requirements:
- .1 Asbestos Content, EPA 600/R13/116: None.
- .2 Non-Volatile Content, minimum, ASTM D 2823: 45 percent.
- .3 Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 3 g/L.

.2 Roof Vapour Retarder: Self-Adhering Sheet Vapour Retarder: 1.0 mm- (40 mil-) thick, self-adhered air and vapour control membrane consisting of a self-adhering SBS rubberized asphalt laminated to a tough, slip resistant, cross laminated polyethylene surface film, maximum permeance rating of 0.05 perms when tested to ASTM E96/E96M; cold-applied, with slip-resisting surface and release-paper backing. Provide primer as recommended by vapour-retarder manufacturer.

.3 Thermal Barrier Underlay Board: 15.9 mm thick Type X fiber reinforced gypsum board, to ASTM C1278/C1278M; Securock Gypsum Fiber Roof Board By CGC. Inc.

.4 Roof Insulation: Polyisocyanurate rigid board insulation; maintain a base thickness of 150mm, laid in max. 100MM thick lifts. Type as specified in Section 07 21 00.

.5 Overlay Board: 12 mm thick asphalt-coated six sides, fibreboard, to CAN/ULC-S706, Type II, Grade 1.

.6 Tapered Insulation: Polyisocyanurate rigid board; to CAN/ULC-S704, Type 2, Class 1, closed cell type: As indicated on Drawings.

.7 Roofing Membrane Ply Sheets: 1.5 mm thick polyester-glass-polyester tri-laminate reinforced asphalt-coated sheet; Meeting the following requirements:
- .1 Breaking Strength, minimum, ASTM D 146: machine direction, 28.5 kN/m (164 lbf/in); cross machine direction, 26.0 kN/m (145 lbf/in).
- .2 Tear Strength, minimum, ASTM D 4073: machine direction, 1150 N (260 lbf); cross machine direction,1000 N (230 lbf).

.3 Pliability, 12.7 mm (1/2 inch) radius bend, ASTM D 146: No failures.
.4 Thickness, minimum, ASTM D 146: 1.5 mm (0.060 inch).
.5 Weight, minimum, ASTM D 228: 1.85 kg/sq. m. (38 lb/100 sq. ft.).
.6 Mass of desaturated polyester/glass/polyester mat, ASTM D 228: 0.95 g/sq. m. 3.0 lb/100 sq. ft.).
.7 Asphalt, minimum, ASTM D 228: 488 g/sq. m. (10 lb/100 sq. ft.).

.8 Aggregate Ballast: Washed, commercial grade white Calcite or Dolomite, free of dust or foreign matter, 6-12mm OD, graded to ASTM D 1863.

2.3. ACCESSORIES

.1 Adhesive for Top Layer of Primary Insulation, Tapered Insulation and Overlay Boards: Single-component, solvent free, moisture curing, low VOC, asphaltic urethane adhesive; meeting ULC and tested by Factory Mutual; Meeting the following requirements:
.1 Asbestos Content, EPA 600/R13/116: None.
.2 Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 20 g/L.
.3 Non-Volatile Content, minimum, ASTM D 1644: 98 percent.
.4 Density at 25 deg. C (77 deg. F), minimum: ASTM D 1875: 1.01 kg/L
.5 (8.5 lb/gal).
.6 Elongation at 25 deg. C (77 deg. F), minimum, ASTM D 412: 1200 percent.
.7 T-Peel Strength at 25 deg. C (77 deg. F), minimum: ASTM D 1876: 66 N(15 lbf).
.8 .7 Adhesion Strength in Shear at 25 deg. C (77 deg. F), minimum, ASTM D 816: 552 kPa (80 psi).
.9 .8 Low-Temperature Flexibility, maximum, ASTM D 816: -51 deg. C (-60 deg. F).

.2 Adhesive for Base Layer of Primary Insulation to Vapour Barrier: Two component, solvent free elastomeric urethane adhesive; Low Rise Foam Insulation Adhesive."

.3 Adhesive for Aggregate Ballast and Roofing Membrane Felts: Asbestos-free, cold- process asphalt adhesive; Meeting the following requirements:
.1 Asbestos Content, EPA 600 R-93/116: None.
.2 Volatile Organic Compounds (VOC), maximum, ASTM D 6511: 255 g/L.
.3 Nonvolatile Content, minimum, ASTM D 6511: 70 percent.
.4 Flash Point, minimum, ASTM D 93: 38 deg. C (100 deg. F).
.5 Density at 25 deg. C (77 deg. F), minimum, ASTM D 6511: 1.0 kg/L (7.5 lb/gal).
.6 Uniformity and Consistency, ASTM D 6511: Pass.
.7 Asphalt Content, minimum, ASTM D 6511: 50 percent.

.4 Adhesive for Flashing Membranes and Stripping Ply Adhesive : One-part, solvent- free, asbestos-free, low-odor elastomeric roof mastic specially formulated for compatibility and use with specified roofing membranes and flashings, with the following properties:
.1 Asbestos Content, EPA 600/R13/116: None
.2 Volatile Organic Compounds (VOC), maximum, ASTM D 3960: Less than 20 g/L
.3 Elongation at 25 deg. C (77 deg. F), minimum, ASTM D 412: 300 percent.

.5 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.

.6 Flexible Flashing Membrane: 1.14 mm thick, reinforced EPDM/SBR elastomeric sheeting; Meeting the following requirements:.

.1 Breaking Strength, minimum, ASTM D 751: machine direction 1.55 kN (350 lbf); cross machine direction 1.33 kN (300 lbf).
.2 Tear Strength, minimum, ASTM D 751: machine direction 340 N (75 lbf); cross machine direction 340 N (75lbf).
.3 Elongation at Failure: ASTM D 751: 25 percent minimum.
.4 Low Temperature Flexibility, minimum, ASTM D 2136: -40 deg. C (-40 deg. F).
.5 Thickness, minimum, ASTM D 751: 1.1mm (0.040 inch).
.6 Weight: ASTM D228: 1.4 kg/sq. m. (4.5 oz/sq. ft.).

.7 Stack Flashings: As specified in Section 07 62 00.

.8 Roof Drains: Drains: Prefabricated drains as manufactured by Altra Metal Specialties – Model ABD-CR-X-SS: Aluminum Body Roof Drain complete with clamping ring or as specified

.9 Metal Flashing: As specified in Section 07 62 00.

.10 Starter Strips: Starter strips to be manufactured from the same type of material used for cap and counter flashings and shall be 24 gauge galvanized steel. Starter strips are to be continuous. Exposed starter strips to match prefinished sheet metal in colour.

.11 Cant Strips: purpose made asphalt impregnated wood fibreboard, 75 x 75 mm size. Stripping Membrane: Vinyl-coated fibreglass mesh.

.12 Stripping Ply Adhesive: One-part rubberized elastomer.

.13 Stripping Ply Mastic: Asphalt based, fibrated roof mastic.

.14 Pitch Pan: premanufactured type; 0.61 mm thick galvanized steel sheet, minimum 100 mm high.

.15 Sealant: One part elastomeric urethane based caulking compound to CAN/CGSB 19.13-M87: Silicone based caulking compound to CAN/CGSB 19.13-M87.

.16 Termination Bar: 3 mm thick aluminum bar, 25 mm wide profile, pre-drilled for mechanical attachment.

.17 Copper: 0.8 mm cold rolled copper to ASTM B370-81.

.18 Wood: “Construction” grade light framing and blocking in accordance with the National Lumber Grades Authority Standard Grading Rules 1987. Grade #2 or better. Wood to be pressure treated in accordance with CSA 080.1 – M89.

.19 Wood Preservative: Copper napthenante or pentachlorophenol base. Water repellent wood preservative to CSA 080 – M89

.20 Nails, spikes, staples: to CSA B111. Hot dipped galvanized.

.21 Gas Pipe Supports: Concrete paver placed on extruded polystyrene insulation complete with pressure treated wood blocking. Provide one-piece galvanized pipe clamp, one pipe size larger than gas pipe fastened to wood blocking. Can be used for all pipes up to six-inch nominal pipe size.

.22 Fasteners:
.1 Wood to wood: Minimum #12 corrosion resistant screw of sufficient length to penetrate lower piece 33 mm.
.2 Wood to steel deck: Minimum #12 corrosion resistant screw of sufficient length to penetrate deck 19 mm.
.3 Wood to masonry or concrete: Screws, expansion shields or wall anchors, corrosion resistant of sufficient length to penetrate substrate to a depth recommended by the manufacturer.

3.0 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 12.5 mm thick plywood runways.

.2 Remove all existing roof membrane components down to the deck and remove from the roof surface.

.3 Prime metal and concrete surfaces designated to be covered with asphaltic Products.

.4 Apply primer at an average rate of 4.3 m2/litre. Allow to cure.

.5 Ensure primer does not enter building through cracks and other openings.

3.3. CARPENTRY

.1 Replace areas of obviously rotted and otherwise deteriorated wooden nailers and cant strips.

.2 Augment securement of existing base nailers to underlying structural members to ensure positive attachment prior to roof system installation.

.3 Install plywood sheeting, wood blocking, shims and nailers as required and /or as detailed on drawings.

.4 Fasten wood nailers, blocking, cants and shims with appropriate fasteners at 300 mm on centre in a staggered pattern.

.5 Within 6100 mm of outside corners, install twice as many fasteners per linear foot as installed along remaining roof edges.

.6 Curbs shall be a minimum of 300 mm above the roof membrane.

3.4. THERMAL BARRIER UNDERLAY BOARD

.1 Adhere thermal barrier underlay board to metal deck with approved adhesive at a rate of .4 L/m2. Stagger boards 150 mm.

.2 Install thermal barrier underlay boards with long axis perpendicular to ribs, with end joints fully supported.

.3 Firmly butt each board to surrounding boards. Do not jam or deform boards.

.4 Cut and fit boards where roof deck intersects vertical surfaces.

.5 Provide filler boards every 450 mm in both directions [and secure with minimum two fasteners per board].

.6 Tape joints of thermal barrier underlay board with 50 mm wide tape.

3.5. VAPOUR RETARDER

.1 Prime all areas to receive self-adhered vapour barrier.

.2 Adhere vapour retarder to thermal barrier overlay board.

.3 Overlap vapour retarder minimum 100 mm for side laps and 150 mm for end laps. Seal all laps with adhesive.

.4 Extend vapour retarder under cant strips and blocking. Extend to perimeter and deck protrusions.

.5 Seal roof vapour retarder to wall air/vapour barrier system with flexible flashing membranes to ensure continuity of building air/vapour barrier envelope.

3.6. INSULATION AND OVERLAY BOARD

.1 Install insulation boards to maintain continuity of thermal envelope.
.2 Adhere base layer of roof insulation to vapour retarder with approved adhesive at at a rate of 0.4 -0.6 L/m2.
.3 Adhere subsequent layers of roof insulation to base layers os insulation with approved adhesive at at a rate of 0.4 -0.6 L/m2.
.4 Adhere single layer of overlay board over roof insulation with approved adhesive at manufacturer’s recommended rate of 0.4 -0.6 L/m2.
.5 Stagger boards 300 mm.
.6 Adhere overlay board to base insulation and tapered insulation sumps with approved adhesive at manufacturer’s recommended rate of 0.4 -0.6 L/m2.
.7 Fit insulation tight to roof penetrations.
.8 Firmly butt insulation boards. Do not jam or deform boards.
.9 Stagger joints minimum 300 mm.
.10 Stagger overlay board seams with insulation board seams.

3.7. 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.

3.8. 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 660 mm with first ply, then overlap each succeeding ply 625 mm.
.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 a minimum rate of 1.2 L/m2, 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 150 mm. Stagger end laps 1.0 metres minimum.
.10 Overlap previous day's work 600 mm, as required.
.11 Terminate all ply layers to outer edge of roof perimeter.

3.9. ELASTOMERIC FLASHINGS

.1 Install flashings to ensure the roof is watertight at the end of each Working Day.
.2 Extend flashing membrane minimum 150 mm over roof membrane.

.3 Extend flashing membranes minimum 200 mm up vertical surfaces.
.4 Secure flashings at 200 mm OC. Secure vertical flashings through termination bar.
.5 Overcoat lap edges with end lap stripping adhesive and membrane.
.6 Tie-in leading edge of elastomeric sheet flashing with stripping ply membrane embedded between alternate courses of stripping ply mastic.
.7 Canted Eave
  .1 Extend reinforced elastomeric sheeting over outside face of cant and extend minimum 25 mm below blocking. Mechanically fasten with 38 mm common roofing nails, 200 mm OC.
  .2 Extend reinforced elastomeric sheeting down over cant strip and embed in flashing adhesive from top of cant to at least 150 mm beyond toe of cant onto roof.
  .3 Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends 100 mm and adhere with flashing adhesive.

.8 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 38 mm common roofing nails, 200 mm OC.
  .2 Extend reinforced elastomeric sheeting down over cant strip and embed in flashing adhesive onto roof surface a minimum of 150 mm.
  .3 Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends 100 mm and adhere with flashing adhesive.

.9 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 38 mm and face nail with 38 mm common roofing nails, 200 mm OC.

.10 Flashing At Scuppers
  .1 Fabricate and install new one-piece scupper with downspouts.
  .2 Prior to setting and nailing horizontal flanges of gutter, uniformly trowel a 1.5 mm thick layer of cold flashing adhesive to roofing surface designated to receive metal flange.
  .3 Nail flange to wood blocking 75 mm 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 100 mm and adhere with flashing adhesive. Elastomeric sheeting to cover gravel stop completely and overlap onto adjacent roof a minimum of 150 mm.

.11 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 150 mm beyond toe of cant onto roof surface and 200 mm above the roof surface.
.5 Secure top of elastomeric sheeting to vertical plane with termination bar.
.6 Mechanically fasten 300 mm OC. Overcoat bar with end lap stripping adhesive and membrane.

.12 Building Expansion Joints
.1 Fill joint with loose insulation.
.2 Provide 19 mm thick plywood to top of wood blocking, secured one side only.
.3 Apply foam rubber or 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 150 mm.
.7 Lap sheeting ends 100 mm and adhere with flashing adhesive.

.13 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.
.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 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 200 mm above the roof surface.
.7 Secure top of elastomeric sheeting to vertical plane with a termination bar.
.8 Mechanically fasten 300 mm OC. Overcoat bar with end lap stripping adhesive and membrane.

.14 Area Divider
.1 Install elastomeric sheeting centered over area divider extending onto roof membrane a minimum of 150 mm beyond toe of cant on either side.
.2 Fully adhere sheeting with flashing adhesive. Press sheeting into adhesive.
.3 Ensure complete bond and continuity without wrinkles or voids.
.4 Lap sheeting ends 100 mm and adhere with flashing adhesive.

.15 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 150 mm.
.4 Lap sheeting ends 100 mm and adhere with flashing adhesive.

.16 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 150 mm. Mechanically fasten sheeting on top face of curb.
.3 Lap sheeting ends 100 mm and adhere with flashing adhesive.
.4 If membrane does not completely cover sleeper, secure top edge with a termination bar. Mechanically fasten 300 mm OC. Overcoat bar with end lap stripping adhesive and membrane.

.17 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 100 mm onto adjacent roofing. Remove wrinkles and voids. Lap flashing ply ends 100 mm.

.18 Pitch Pans
.1 Uniformly apply a 3 mm 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 50 mm clearance between projection and side wall.
.4 Fully adhere elastomeric sheeting to flashing surface with flashing adhesive. Cover flange completely. Extend flashing at least 100 mm onto adjacent roofing. Ensure complete bond and continuity without wrinkles and voids. Lap sheeting ends minimum 100 mm.
.5 Fill pitch pan 25 mm from top with pitch pan base filler.
.6 Fill remainder with rubberized elastomer mastic. Crown top of mastic to ensure water run-off.

.19 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 600 x 600 mm 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.

.20 Roof Drain Insert
.1 Cut 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 900 x 900 mm 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.

3.10. SHEET METAL FLASHINGS

.1 Install all sheet metal caps, counter flashings, metal siding and all other roof related metal flashings as required to complete roof installation.
.2 Form profiles as required to suit site conditions.
.3 Sheet metal flashing work shall be carried out in accordance with the best standard practices; with joints locked, cleated, caulked as required and exposed edges hemmed.
.4 Mitered corners shall be straight and true with flat surfaces free of distortion and free of face nailing.
.5 Install sheet metal work per CRCA standards and as specified on detail drawings.
.6 Provide underlay beneath all sheet metal flashings except where membrane flashings have been installed.
.7 Provide continuous starter strips where indicated or required. Fasten starter strips a minimum of 300 mm on center to substrate.
.8 Secure sections of metal in "S- lock" joints, and allow for sufficient expansion and contraction between each piece.
.9 Provide continuous termination bar along top of membrane flashing where such flashings terminate at the base of a wall. Fasten termination bar 300 mm on center to substrate.
.10 Secure metal counter flashing a minimum of 300 mm above roof membrane. Use fasteners of sufficient length to penetrate at least 25 mm into substrate.
.11 Reglets that are not of sufficient height are not to be reused. New reglets are to be cut at a suitable height and are to be a minimum of 13 mm wide and 19 mm deep.
.12 Fabricate scuppers from copper in accordance with CRCA standard flashing detail.

3.11. SEALANTS

.1 Install caulking in accordance with manufacturers latest recommendations.
.2 Provide polyethylene backer rod for reglets greater than 13 mm wide and 19 mm deep, prior to installing caulking compound.
.3 Tool finish to the satisfaction of the Owners.

3.12. SURFACING

.1 Flood coat roof surface with cold-process asphalt adhesive, applied at a rate of 2.4 L/m2.
.2 Immediately broadcast aggregate ballast into cold-adhesive at a rate of 20 kg/m2, covering flood coat completely.
.3 Do not use power buggies or heavy equipment to distribute ballast.
.4 Rake out aggregate to a neat, even surface.

3.13. FIELD QUALITY CONTROL

.1 Contractor Inspection: Prior to application of 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 50 mm beyond damaged area in all directions, and seal seams.
.3 Manufacturer's Field Service: Arrange for manufacturer's technical representative to regularly inspect the roofing application and confirm that the roofing system instal- lation is in strict accordance with manufacturer's recommendations.

3.14. CLEANING

.1 Clean drains, gutters and downspouts of debris, ensuring free drainage.
.2 Clean adjacent roof surfaces, levels and ground level areas of debris and excess Products.

3.15. PROTECTION

.1 Adequately protect products and work from damage by weather, traffic and other causes.
.2 At the end of each Working Day, seal exposed edges of roofing membrane to be watertight.
.3 Protect adjacent Work from damage. Repair damage.

END OF SECTION

1 GENERAL

1.1 Section Includes

.1 Roof Membrane for Temporary Waterproof Membrane, Applied to existing Deck, prior to Roof Deck removals.

.2 Work in this Section is to be Performed During June 2026, weekends and evenings.

1.2 Related Sections

.1 Selective Demolition – Section 02 41 00.

1.3 Compatibility

.1 All waterproofing materials will be provided by the same manufacturer.

1.4 Quality Assurance and Environmental Management

.1 The manufacturer of elastomeric bitumen products will provide proof of ISO 9001 and ISO 14001 Certifications.

1.5 Contractor Qualifications

.1 See Prequalification list – Section 00 21 14.

1.6 Materials Storage and Delivery

.1 All materials will be delivered and stored in their original packaging, in conformance with the requirements described in the manufacturer's technical documentation.

.2 At all times, materials will be adequately protected and stored in a dry and properly ventilated area, away from any welding flame or spark, and sheltered from the elements and any harmful substances.

.3 Store adhesives and solvent-based mastics at a minimum of 5 °C (41 °F).

.4 Materials delivered in rolls will be carefully stored upright; flashings will be stored to avoid wrinkling, buckling, scratches or any other possible damage.

.5 Avoid gathering construction materials on the roof, which may affect the structural integrity by imposing loads exceeding what is admissible.

1.7 Fire Protection

.1 Prior to the start of work, conduct a site inspection to ensure its safety in order to minimize fire risks and hazards.

.2 Respect safety measures recommended by the related local authorities.

.3 At the end of each workday, use a heat detector gun to spot any smouldering or concealed fire. Job planning must be organized to ensure workers are still on location at least […] hour[s] after welding works. An inspection must be performed by an employee of the roofing contractor who specializes in this kind of job at the end of works and, if necessary, with the help of a member of the fire protection service of the city.

.4 Never apply the torch directly to flammable materials.

.5 Throughout roofing installation, maintain a clean site and have a fire hose (when possible) and at least one ULC-approved Class A, B or C fire extinguisher, charged and in perfect operating condition, within 6 m (20 ft) of each torch. Respect all safety measures described in technical data sheets of sealants. Welding torches must never be placed near combustible or flammable products, nor be used where the flame is not visible or cannot be easily controlled.

1.8 Warranties

.1 The Roof is considered Temporary during Construction. No warranty is available.

2 PRODUCTS

2.1 Manufacturers

.1 Soprema.

.2 IKO Canada.

.3 Henry Company.

2.2 Membranes

.1 Base Sheet Membrane for Field Surface

.1 Description: Roofing membrane composed of SBS modified bitumen and a glass mat reinforcement. The surface is sanded, the underside is Self Adhesive. The surface must be marked with three (3) chalk lines to ensure proper roll alignment.

.2 The base sheet side lap is provided with DUO SELVEDGE technology]

.3 Specified product: Eg. SOPRAFLASH STICK DUO by SOPREMA or Equivalent.

.2 Base Sheet Membrane for Flashings and Parapets

.1 Description: Membrane composed of SBS modified bitumen and glass mat reinforcement. The surface is sanded and the underface is covered with a release protection film. The surface shall be marked with three (3) chalk lines to ensure proper roll alignment.

.2 Specified product: Eg. SOPRAFLASH STICK DUO by SOPREMA or Equivalent.

2.3 Primers

.1 Primer for Self-Adhesive Membranes

.1 Description: Primer composed of SBS synthetic rubber, adhesive resins and volatile solvents. Used as primer to improve the adhesion of self-adhesive membranes.

.2 Specified product: Eg. ELASTOCOL STICK by SOPREMA.

3 EXECUTION OF WORK

3.1 Surface Examination and Preparation

.1 Surface examination and preparation must be completed in conformance with instructions in the membrane manufacturer's technical documentation.

.2 Before roofing work begins, the owner's representative and roofing foreman will inspect and approve deck conditions (including slopes and wood grounds) as well as flashings at parapets, roof drains, plumbing vents, ventilation outlets and other construction joints. If necessary, a non-conformity notice will be issued to the contractor so that required corrections can be carried out. The start of roofing work will be considered as acceptance of conditions for work completion.

.3 Do not begin any portion of work before surfaces are clean, smooth, dry, and free of ice and debris. Use of calcium or salt is forbidden for ice or snow removal.

.4 Be sure plumbing, carpentry and all other works have been duly completed.

.5 No materials will be installed during rain or snowfall.

3.2 Method of Execution

.1 New Temporary Roof membrane system is to be installed as the old roof removals proceed, section by section.

.2 Only remove existing roofing to the same extents as can be roofed in with the new temporary waterproof membrane daily.

.3 Work in this section is to be performed in June, after hours and weekends.

.4 Roofing work must be completed in a continuous fashion as surfaces are readied and as weather conditions allows it.

.5 It's preferable to seal all joints that are not covered by a cap sheet membrane the same day. A second cap sheet cannot be installed if any moisture is present in joints.

.6 Ensure waterproofing of roofs at all times, including protection during installation work by other trades and protection as work is completed (e.g. vents, drains, etc.).

3.3 Site Protection

.1 Protect the exposed surfaces of finished work to avoid damage during roof installation and material transportation. [Install walkways made of rigid boards over installed roofing materials to enable passage of people and transport of products.] Assume full responsibility for any damage.

3.4 Preparation Work – Concrete Deck

.1 Prepare surfaces according to manufacturer's and local authorities' recommendations. Surfaces to be waterproofed with elastomeric bitumen membrane must have a Concrete Surface Profile (CSP) of 2 to 5 (*CSP as per the International Concrete Repair Institute*).

3.5 Application of Primer

.1 Wooden, metallic, concrete, and masonry surfaces or gypsum insulation substrate will receive a coat of primer at a rate of 0.15 to 0.25 L/m^2 (no primer is required for factory-painted metals). All surfaces to be primed must be free of rust, dust or any residue that may hinder adherence. Primed surfaces must be covered with the roofing membrane as soon as possible (on the same day for self-adhesive membranes).

3.6 Installation of Self-Adhesive Base Sheet on Field Surface

.1 Unroll base sheet onto substrate, taking care to align the edge of the first selvedge with drain centre (parallel to roof edge).

.2 Remove the silicone release film to adhere the membrane to the substrate. Remove the protective film from the side lap strip.

.3 Each selvedge will overlap the previous one along lines provided for this purpose, and will overlap by 25 mm (1 in) at the ends. Because of the nature of this system, for this type of base sheet, joints can be aligned (no offset) to facilitate the installation of the reinforcing strip.

.4 Adhere the first 60 mm (2.5 in) of the self-adhesive side laps using a membrane roller, then heat-weld the last 40 mm (1.5 in) (self-adhesive, heat-welded side laps).

.5 Seal end laps with a [330-mm (13-in)] [240-mm (9.45-in)] wide protection strip centered on the joint.

.6 Each selvedge will overlap the previous one along lines provided for this purpose, and overlap by 150 mm (6 in) at the ends. Space end laps by a minimum of 300 mm (12 in).

.7 Apply even pressure with a membrane roller to ensure good adherence and waterproofing of overlaps.

3.7 Installation of Self-Adhesive Base Sheet on Flashings and Parapets

.1 Demolish as work progresses existing Roof parapet metal flashings, and any wood constructions.

.2 Before applying membranes, always burn the plastic film from the section to be covered if there is an overlap (inside and outside corners and field surface). For sanded base sheet membranes, apply primer for self-adhesive membrane on the area to be covered at the foot of the parapets.

.3 Apply base sheet flashing only after primer coat is dry.

.4 Install base sheet by 1m (3.25 ft) wide strips

.5 Each selvedge will overlap the previous one along lines provided for this purpose, and by 150 mm (6 in) at the ends. Membranes for flashings must be spaced at least 100 mm (4 in) with respect to the cap sheet membranes on the field surface, to avoid areas of excessive membrane thickness.

.6 Cut off corners at end laps of areas to be covered by the next roll.

.7 Position the pre-cut membrane. Remove 150 mm (6 in) of the silicone release film to hold the membrane in place at the top of the parapet.

.8 Then, gradually peel off the remaining silicone release film, pressing down on the membrane with an aluminum applicator to ensure good adhesion. Use the aluminum applicator to ensure a perfect transition between the flashing and the field surface. Smooth the entire membrane surface with a membrane roller for full adhesion.

.9 Install a reinforcing gusset at all inside and outside corners.

.10 Always seal overlaps at the end of the workday.

.11 Avoid the formation of wrinkles, swellings or fishmouths.

PART 1 GENERAL

1.1 Scope

.1 All flashing and sheet metalwork, unless specifically noted on the drawings to be by others, shall be carried out by the subcontractor responsible for the work of this section.

1.2 Quality Assurance

.1 A firm specializing in fabricating and installing sheet metal flashing and trim in accordance with SMACNA standard practices and details - most current Edition (Sheet Metal and Air Conditioning Contractors National Association Inc.)

1.3 Submittals

.1 Submit typical 12" (300mm) long sample of flashing indicating design method of locking and method of anchoring and corner section fabricated from materials specified in accordance with Section 01 33 00.

1.4 Warranty

.1 All work performed and materials supplied under this Section to be warranted from defects for a period of two (2) years from Substantial Completion.

1.5 Inspection and Testing

.1 Inspection and testing of this Work is included in inspection and testing of roofing and roof insulation.

PART 2 PRODUCTS

2.1 Materials

.1 Metal Flashing - Galvanized Steel, shall be Minimum 22 ga. (.76mm) prefinished galvanized sheet steel supplied in flat sheet stock, colour to be selected from Vicwest or Agway; up to three Colours as selected by consultant. Allow for adjustment of material thickness to suit Architects colour selection.

.2 Nails: Chromium/Nickel, No.12 x 25 mm flat headed, annular threaded stainless steel.

.3 Cleats, Starter Strips and Backup Plates: Same metal and thickness as metal flashing; cleats minimum 1-1/2" (38mm) wide and interlocked with metal flashing; starter strips, continuous. Backup plates minimum 12" (300mm) wide where adjacent lengths of cap flashing meet, fabricated of same material thickness and finish as cap flashing.

.4 Screws, Bolts and Expansion Shields: Nonferrous metal compatible with adjacent surfaces. Exposed fastenings; same materials as metal surfaces through which they penetrate. Use cadmium plated screws with round heads suitable for soldering for galvanized Work.

.5 Solder: ASTM B32-70, 95% block tin and 5% pig lead.

.6 Flux: Commercial hydrochloric acid cut with zinc, or l0%-20% solution of orthophosphoric acid in water, for use with galvanized Work.

.7 Sealant: One component polysulphide sealant, CAN2-l9-l3-M82.

.8 Flashing Paint: Primer 910-02 by Henry Company Canada; quick drying asphaltic base paint.

PART 3 EXECUTION

3.1 Fabrication

.1 Where possible, shop fabricate flashing components in accordance with applicable requirements of SMACNA.

.2 Carry out fabrication in clean shops, located away from areas where carbon steel is torch cut, ground, or cut with abrasive wheels to ensure that carbon steel dust will not be embedded in prefinished surfaces. Clean tools and dies which have been used on carbon steel prior to fabrication to prevent contamination of surface with carbon steel dust.

.3 Form sheet metal on bending brake. Perform shaping, trimming and hand seaming on bench, where practicable, using proper sheet metal working tools.

.4 Form sections square, true and accurate to size. Flashings shall be free from distortion, waves, twists, buckles or other defects detrimental to appearance and performance.

.5 Make allowances for thermal movement when forming, installing, interlocking and soldering sheet metal Work to avoid buckling, fullness of metal straining of joints or seams. Maximum length of flashing pieces; 8 ft. (2400mm). Double back exposed edges at least 1/2" (12mm)

.6 Fabricate flashings, copings, closures, plastic boxes, pipe sleeves and flashings for roof mounted equipment to details shown, unless otherwise indicated.

.7 Wipe and wash clean, soldered joints immediately after joint is soldered to remove acid.

.8 Where soldered joints are absolutely necessary and where approved for use in prepainted metal, clean paint off both surfaces before soldering for minimum area necessary.

3.2 Installation

.1 Carry out Work in accordance with industry standard sheet metal practice with joints lapped, locked, cleated with "S" cleats and caulked or soldered as required. Hem exposed edges 1/2" (12mm). Type of joints used shall be adequate for various conditions, subject to approval.

.2 Fabricate exposed fastening, where used, in such a manner as to prevent water penetration at point of fastening.

.3 Provide starter strips where indicated or required to present true, non-waving, leading edge. Anchor to backup to provide rigid, secure installation.

.4 Make end joints where adjacent lengths of metal flashing meet using 12" (300mm) long backup flashing secured in place before installing flashing. Apply beads of caulking compound on face of backup plate to seal ends of metal flashing. Leave 1/2" (12mm) wide

space between end of adjacent lengths of metal flashings. Fabricate backup of same material and finish as metal flashing with which it is being used. Make backup plate exact profile of flashing allowing for thickness of flashing joints.

.5 Form metal fascia with inner edge extended over fascia top and down cant to meet roof top. Nail with roofing nails and neoprene washers at 12" (300mm). Avoid placing nails in face of fascia, through membrane or flashing.

.6 Interlock counter flashing pieces with prepainted metal base flashing and fold locking seam into position ensuring complete sealing. Continue counter flashing down to hemmed and sprung position at base of cant and junction of roof top.

.7 Provide underlay of resin sized paper under sheet metal installed over masonry, concrete or wood. Lay underlay dry as sheet metal Work is installed. Secure in place and lap joints 4" (100mm).

.8. Lock joints and caulk to provide weathertight seal.

.9 Imperfections in sheet metal Work such as holes, dents, creases, or oil-canning is cause for rejection.

.10 Repair damaged sheet metal Work, wash entire installation down, and leave in neat condition.

.11 Provide all flashings required for proper execution and completion of the Work in acceptable manner including metal flashing around mechanical and other equipment occurring on roof.

3.3 Touch Up and Clean Up

.1 Repair or replace any damaged material to the approval of the Architect.

.2 Touch up minor paint abrasions with touch-up paint.

.3 Clean flashing by dry-wiping.

.4 Remove all surplus and waste materials and leave the work site in a clean and tidy condition.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Firestopping and smoke sealing shall be installed at all penetrations of fire rated separations between room spaces. This includes floors, walls and ceilings. Shall also be installed where fire ratings are noted on the fire separation drawing.

.2 Firestopping and smoke seals within mechanical and electrical assemblies (i.e. inside ducts, dampers and bus ducts) shall be provided as part of the work of Division 21 through Division 28 respectively. However firestopping and smoke seals around the outside of such mechanical and electrical assemblies, shall form part of the work of this section.

.3 All divisions whose work requires it to be firestopped and/or smoke sealed, such as Division 21 through Division 28, must use the same source products. The General Contractor shall ensure that these Divisions comply with this requirement.

.4 All firestopping materials to be the same colour for ease of instruction.

1.2 References

.1 CAN4-S115M - Standard Method of Fire Tests of Firestop Systems.

.2 ASTM E814 - Standard Method of Fire Tests of Through-Penetration Firestops.

1.3 Quality Assurance

.1 Work of this section shall be performed by a Subcontractor approved by the firestopping manufacturer and who has equipment and skilled tradesmen to perform the work expeditiously; and has completed work similar to that specified during the immediate past five years.

1.4 Regulatory Requirements

.1 Provide certificate of compliance from the manufacturer of the smoke seal and firestopping products.

1.5 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

1.6 Delivery, Storage and Handling

.1 Deliver and store materials in a dry, protected area, off ground in original, undamaged, sealed containers with manufacturer's labels and seals intact, and in accordance with manufacturer's instructions.

1.7 Project/Site Conditions

.1 Application temperature for multi-component foams and water-based products is critical. Consult manufacturer' data.

.2 Do not apply materials when temperature of substrate material and ambient air is below five degrees C.

.3 Maintain this minimum temperature before, during, and for three days after installation of materials.

1.8 Sequencing and Scheduling

.1 Sequence work to permit installation of firestopping and smoke seal materials after adjacent work is complete and before closure of spaces.

.2 Coordinate inspection visits by manufacturer's representative on completion of work but prior to closure of spaces.

1.9 Extended Warranty

.1 Submit a warranty of the firestopping installation specified in this Section covering a period of an additional five years beyond the expiration of the warranty period specified in the General Conditions of the Contract, including materials and application. Replacement of firestopping shall include removal of defective materials, preparation for and application of new material, and the repair and making good of damaged adjacent materials.

.2 Defective firestopping installation shall include, but not be restricted to, joint leakage, hardening, cracking, crumbling, melting, bubbling, shrinkage, running, sagging, loss of adhesion, loss of cohesion, and staining of adjoining or adjacent finished materials or surfaces.

PART 2 PRODUCTS

2.1. Materials

2.2 All materials for firestopping and smoke seals shall be supplied either by AD Fire Protection Systems Inc. or 3M Canada and whichever supplier is selected, all materials for all of the work shall be supplied by them and used by all trades. AD Products are referred to in the following systems, however 3M equivalents are equally acceptable.

2.3 System 1 - Firestopping at penetrations, flexible seal - A/D Firebarrier Seal, or A/D Silicon Firebarrier Sealant over A/D Firebarrier Mineral Wool Firestopping Insulation; for filling voids around multiple penetrations.

2.4 System 2 - Firestopping at penetrations, rigid seal - A/D Firebarrier Mortar; for filling gaps around non-moving penetrations.

PART 3 EXECUTION

3.1 Examination

.1 Examine surfaces to receive work of this section and report any defects which may affect the work of this section.

.2 Verify that openings are ready to receive the work of this section.

.3 Confirm compatibility of surfaces to receive firestopping and smoke seal materials.

.4 Beginning of installation means acceptance of substrate.

3.2 Preparation

.1 Prepare sample joints for approval by the manufacturer's representative for each type of firestopping condition. Approved installations shall become part of the finished work.

.2 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.

.3 Prepare surfaces in contact with firestopping materials and smoke seals to manufacturer's instructions.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

.5 Install damming materials as required.

.6 Install clips and retainers for mineral wool insulation where required.

3.3 Application

.1 Install firestopping and smoke seal material and components in accordance with ULC listing 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.

.3 Apply to uniform density and texture in sufficient thickness to achieve rating.

.4 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing. Damming materials not to be removed.

.5 Tool or trowel exposed surfaces to a neat finish where required.

.6 Remove excess material promptly as work progresses and upon completion.

.7 Protect installed material until cured or set.

3.4 Examination and Certification

.1 On completion of the work but prior to closing in and concealing with ceilings etc., call for inspection by the manufacturer's representative who is required to approve and certify this work. Certification to be provided to Architect.

3.5. Schedule

.1 Service penetrations around mechanical ductwork and noncombustible piping, rigid electrical conduit and other assemblies penetrating fire separations and load bearing ground floor partitions.
  .1 Elastomeric seal and backup/forming material.
  .2 Firestop system rating: F.

.2 Service penetrations around combustible piping penetrating fire separations and load bearing ground floor partitions.
  .1 Intumescent mastic elastomer.
  .2 Firestop system rating: F.

.3 Service penetrations around multiple flexible cables penetrating fire separations and load bearing ground floor partitions.

  .1 Elastomeric seal and backup/forming material.
  .2 Firestop system rating: FT.

3.6 Cleanup

.1 Remove excess materials and debris from site, and clean adjacent surfaces immediately after application.

END OF SECTION

PART 1 GENERAL

1.1 Scope

.1 Provide and supply all caulking and sealants as required by the drawings and specified herein, and all materials, incidentals and equipment required to complete this work.

.2 Unless specifically called for by another section, caulk or seal all junctions as shown on the drawings and all openings which normally require caulking, including but not being limited to the following: Joints between wood and masonry, all joints between metal and masonry, joints between masonry and drywall, metal and drywall, control joints and expansion joints and generally all joints between dissimilar materials.

1.2 Submittals

.1 Submit Shop Drawings and samples for the Work of this Section in accordance with Section 01 33 00.

1.3 Warranty

.1 All work performed and materials supplied under this Section to be warranted from defects for a period of two (2) years from Substantial Completion.

PART 2 PRODUCTS

2.1 Manufacturers

.1 Dow Chemical Company.
.2 General Electric.
.3 Master Builders Solutions Canada, Inc.
.4 Tremco.
.5 Mapei.

2.2 Materials

.1 Weatherseal Sealant (Exterior #1): To ASTM C920, Type S, Grade NS, Class 35, Use NT, M, A and O; one-part, moisture curing, low modulus polyurethane sealant; accommodating joint movement of plus or minus 35 percent, with a 30- to 90- minute skin time; eg. Dymonic FC by Tremco, colours as selected by Consultant.

.2 Weatherseal Sealant – High Movement (Exterior #2): To ASTM C920, Type S, Grade NS, Class 50, Use NT, T, M, A and O; one-part, medium modulus, low VOC, UV stable, non-sag polyurethane sealant; accommodating joint movement of plus 100 percent and minus 50 percent, with a 120 minute skin time; eg. Dymonic 100 by Tremco, colours as selected by Consultant.

.4 Interior Sealant – General Purpose / Acoustical: To CAN/CGSB-19.17-M; one-part, siliconized acrylic latex, mildew-resistant, accommodating joint movement of plus or minus 12-1/2 percent; eg. Tremflex 834 by Tremco, colours as selected by Consultant.

.5 Interior Sealant – Mildew-Resistant: To ASTM C920, Type S, Grade NS, Glass 25, Use NT, G, A, and O; one-part, acetoxy silicone sealant; complete with integral fungicide; eg. Tremsil 200 by Tremco, colours as selected by Architect.

.6 Interior Sealant – Floor Tiling: Premium grade, sanded siliconized acrylic; Keracaulk S by Mapei, colours to match adjacent tile grout colours.

.7 Interior Sealant – Wall Tiling: Premium grade, unsanded siliconized acrylic; Keracaulk U by Mapei, colours to match adjacent tile grout colours.

.8 Backer Rod: Open cell polyethylene foam core wrapped in a closed cell polyethylene skin.

.9 Bond Breaker: Pressure-sensitive tape recommended by sealant manufacturer to suit application.

.10 Materials shall be delivered to job site in sealed containers with manufacturer's original labels attached and accompanied by certification of compliance with specification.

.11 Materials shall be stored and used in strict accordance with manufacturer's printed instructions.

.12 Colour of sealant or caulking shall be as selected by the Architects. Sealant colour for masonry control joints shall closely match colour of blockwork.

.13 Anti-tack agent shall be applied over all beads of mono to ensure dust-free surface.

PART 3 EXECUTION

3.1 Quality of Work

.1 All sealants shall be applied by skilled applicators.

.2 Work shall be of highest quality and in compliance with the specifications.

.3 Examine all surfaces prior to application and notify General Contractor and Architect of any conditions detrimental to satisfactory application. Proceeding with this work will imply acceptance of existing conditions.

3.2 Preparation

.1 All joints or channels shall be cleaned and free from dirt, oil, grease, moisture, loose mortar or other foreign matters.

.2 Metal surfaces shall be wiped with Xylol or MEK and then dried.

.3 Masonry surfaces shall be cleaned with a wire brush and then blown clean. Any waterproofing treatments contaminating the joint must be completely removed.

.4 Where joints are 10mm (3/8") wide, they shall be backed to within 10mm (3/8") of the surface.

3.3 Application

.1 Apply sealant with handgun or air gun under sufficient pressure and through nozzle openings of such a diameter to so that a full bead of sealant is run into the joint and fills the opening completely.

.2 All beads shall be tooled immediately after application to ensure firm and full contact with the inner face of the joint.

.3 Do not apply any caulking when temperature is below 4 degrees C. (40 degrees F.).

.4 Caulk between all dissimilar materials.

3.4 Work Included

.1 Clean out and caulk joints on inside between door and window frames and masonry.

.2 Caulk under all metal door thresholds, bedding them in Tremco Dymonic 100.

.3 Caulk joints between block walls and plaster or drywall screed at ceilings, between plastic laminate counter tops and wall, with Tremco Dymonic in non-wet areas, and with Tremco Proglaze White in all wet area such as showers and washrooms.

.4 Caulk joints between windows and adjoining materials;

.5 Caulk between all dissimilar materials.

3.5 Making Good

.1 Any joints which have been adulterated by foreign material such as sawdust, sand etc. prior to set up, or joints which are uneven or crudely applied, shall be completely removed, the joint cleaned and be recaulked.

3.6 Inspection

.1 This contractor shall notify the Consultants when the caulking work is ready for inspection and no work shall be covered or concealed until approved. Samples of colours shall be applied to small (1 metre) panels for examination by Consultant.

3.7 Cleaning

.1 Remove all excess materials and smears adjacent to joint as work progresses.

.2 Remove off site all surplus materials and equipment and debris associated with this work as it is complete.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Insulated Metal Doors.

1.2 RELATED SECTIONS

.1 Section 08 12 13 – Hollow Metal Frames.

.2 Section 08 71 00 - Hardware: door hardware.

.3 Section 09 90 00 - Painting & Finishing: Field painting of doors.

1.3 REFERENCES

.1 Canadian Steel Door and Frame Manufacturer's Association: Manufacturing Standard for Steel Doors and Frames.

.2 Canadian Steel Door and Frame Manufacturer's Association: Manufacturing Specifications for Steel Doors and Frames.

.3 Canadian Steel Door and Frame Manufacturer's Association: Canadian Fire Labelling Guide for Steel Doors and Frames.

.4 Canadian Steel Door and Frame Manufacturer's Association: Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

.5 ANSI/NFPA No. 80-1999: Fire Doors and Windows.

.6 CAN/CGSB-82.5-M88: Insulated Steel Doors.

.7 Underwriters Laboratories of Canada: List of Equipment and Materials.

.8 CAS W59-03: Welded Steel Construction (Metal Arc Welding).

.9 CAN/CGSB-1.40-97: Anticorrosive Structural Steel Alkyd Primer.

.10 CAN/CGSB-82.5-M88: Insulated Steel Doors.

1.4 SUBMITTALS

.1 Submit shop drawings and product data to requirements of Section 01 33 00.

.2 Indicate on shop drawings door elevations, internal reinforcement, closure method, location of cut outs for hardware, glazing and louvres, and finish.

.3 Provide product data on standard door construction.

1.5 QUALITY ASSURANCE

.1 Conform to requirements of Canadian Steel Door and Frame Manufacturers Association standards.

.2 Welding: to CSA W59.

.3 Installed frame and door assembly to conform to National Fire Protection Association requirements for fire rated class indicated in schedule.

2 Products

2.1 MANUFACTURERS

.1 Manufacturers of steel doors having *Product* considered acceptable for use:
- .1 S. W. Fleming.
- .2 Baron Metal Industries.
- .3 Artek Door Limited.
- .4 Daybar.

2.2 MATERIALS

.1 Doors: steel sheet faces 1.5 mm thick, flush design; to CAN/CGSB-82.5-M.

.2 Door Insulation: 45 mm thick rigid urethane; RSI value of 1.96.

.3 Reinforcements: galvannealed steel, thicknesses as follows:
- .1 Flush Bolt, Lock and Strike Reinforcement: 1.5 mm
- .2 Hinge Reinforcements: 3.5 mm.
- .3 Door Closer and Holder Reinforcements: 2.8 mm.

.4 Bituminous Coating: Fibred asphalt emulsion.

2.3 FABRICATION

.1 Fabricate doors to CAN/CGSB-82.5-M and to the standards and specifications published by the Canadian Steel Door and Frame Manufacturer's Association.

.2 Provide continuous faces free from joints, tool markings and abrasions; with hardware reinforcement plates welded in place.

.3 Welding: to CSA W59. Grind exposed welds smooth and flush. Fill open joints, seams, and depressions with filler or by continuous brazing or welding. Grind smooth to true sharp arrises and profiles. Sand to a smooth, true, uniform finish.

.4 Fabricate fire-rated doors in accordance with Canadian Fire Labelling Guide for Steel Doors and Frames as published by the Canadian Steel Door and Frame Manufacturer's Association.

.5 Fabricate doors to accommodate scheduled glazing. Secure glazing stops to doors with counter sunk oval head sheet metal screws.

.6 Prepare doors for heavy weight oversize butt hinges, cylindrical locksets, rim and concealed vertical rod / mortise lock case exit devices, magnetic locks, surface door closers and concealed overhead stops. Conform to approved finish hardware schedule.

.7 Blank, mortise, reinforce, drill and tap doors to receive templated hardware, as required. Coordinate with Section 08 71 00.

.8 Completely fill exterior door cores with insulation.

.9 Sound deaden interior doors with impregnated kraft honeycomb core laminted to inside panel face. Completely fill door cores.

.10 Reinforce door edges with channel reinforcing. Tack weld seam between faces and door edges. Bevel stiles minimum 3 mm.

.11 Close top edge of exterior door with inverted steel channel closure. Seal joints watertight.

2.4 FINISHING

.1 Wipe Coat Galvanizing: 92 g/m^2 zinc coating to ZF00.1.

.2 Galvannealed Coating: streak-free matte grey appearance, to ASTM A653M, ZF75 coating designation, minimum 75 g/m² zinc-iron coating.

3 Execution

3.1 INSTALLATION

.1 Install doors to requirements of Canadian Steel Door and Frame Manufacturers Association standards.

.2 Install door grilles.

3.2 TOLERANCES

.1 Maximum Diagonal Distortion After Installation: 1.5 mm measured with straight edge, corner to corner.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Provision of all labour, materials, equipment and incidental services necessary to supply all steel (hollow metal) doors, frames, and screens.

.2 This section shall provide all factory fabrication, hardware preparation, and accessories specified herein.

1.2 REFERENCE STANDARDS

.1 ASTM A1008/A1008M; Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability.
.2 ASTM A653/A653M; Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-IronAlloy-Coated (Galvannealed) by the Hot-Dip Process.
.3 ASTM A924/A924M; Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
.4 ANSI/BHMA A156 Series; Hardware.
.5 CSA-G40.20/G40.21; General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.6 CSA W59; Welded Steel Construction (Metal Arc Welding).
.7 CAN4-S104; Fire Tests of Door Assemblies.
.8 CAN4-S105; Fire Door Frames.
.9 CAN/ULC-S102; Standard Method of Test for Surface Burning Characteristics of BuildingMaterials and Assemblies.
.10 CAN/ULC-S702; Standard for Mineral Fibre Thermal Insulation for Buildings.
.11 CAN/ULC-S704; Standard for Thermal Insulation, Polyurethane and Polyisocyanurate,Boards, Faced.
.12 CAN/ULC-S770; Standard for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulation Foams.
.13 Canadian Steel Door and Frame Manufacturers' Association, (CSDFMA) Canadian Manufacturing Specifications for Steel Door and Frames, 1990.
.14 CAN/CGSB-1.181; Ready Mixed Organic Zinc-Rich Coating.
.15 CGSB 41-GP-19Ma; Rigid Vinyl Extrusions for Windows and Doors.
.16 NFPA-80; Fire Doors and Fire Windows.
.17 UL Building Materials Directory.
.18 ULC List of Equipment and Materials, Volume 2.
.19 ITS/WH Certification Listings.

1.3 REQUIREMENTS OF REGULATORY AGENCIES

.1 Steel fire rated doors and frames shall be labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 and CAN4- S105 for ratings specified or indicated.

.2 Install labelled, fire resistance rated, steel doors and frames in accordance with NFPA-80 except where specified otherwise.

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 inthe 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.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, glazed and louvred openings, arrangement of hardware and fire ratings.

.3 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and finishes.

2 PRODUCTS

2.1 MATERIALS

.1 Steel Sheet: Cold-rolled, commercial grade steel sheet, Type A, to ASTM A1008/A1008M1.519mm base metal thickness;

.1 Hot-dip Galvanized/Galvannealed: zinc-coated to ASTM A653/A653M, coating designation Z275.

.1 Primer: Zinc-rich rust inhibitive type to CAN/CGSB-1.181.

2.2 ACCESSORIES

.1 Door Bumpers: Single stud rubber/neoprene type.

.2 Exterior Top Caps: Rigid PVC extrusion conforming to CGSB 41-GP-19Ma.

.3 Frame Thermal Breaks: Rigid PVC extrusion conforming to CGSB 41-GP-19Ma.

2.3 FABRICATION

.1 General

.1 Fabricate frames as detailed, to CSDFMA Specifications forCommercial Steel Doors and Frames, except where specified otherwise.

.2 Blank, reinforce, drill and tap doors and frames for all hardware. Mortised cutoutsshall be protected with steel guard boxes.

.3 Reinforce frames for surface mounted hardware.

.4 Formed edges shall be true and straight with a minimum radius for the thickness of steel used.

.5 Provide for appropriate anchorage to floor and wall construction. Each wall anchor shall be located immediately above or below each hinge reinforcement on the hinge jamb and directly opposite on the strike jamb.

.6 For rebate opening heights up to and including 1525mm, provide two anchors, and an additional anchor for each additional 760mm or fraction thereof.

.7 Frames in existing concrete, masonry or steel shall be provided with anchors located not more than 152mm from top and bottom of each jamb, and intermediate anchors at 660mm o.c. max.

.8 All screw anchors for frames shall be Robertson flat head type and fully countersunk.

.9 Each door opening shall be prepared for rubber stud door silencers, three (3) for single doors, two (2) for double doors.

.10 Factory-apply touch up primer to galvanized steel doors and frames where coating has been removed during fabrication.

.11 Provide all required internal steel frame reinforcement to ensure structural rigidity and integrity, including connections to nearest building structure elements.

.12 Door faces of all steel doors shall be fabricated without visible seams, free of scale, pitting, coil brakes, buckles and waves.

.13 Construct stile and rail doors in same manner as flush doors.

.14 Construct matching transom panels or inactive leaves in same manner as doors.

.15 Longitudinal edges of interior doors shall be mechanically interlocked, adhesive assisted with edge seams tack welded, filled and sanded flush with no visible seam.

.16 Lock and hinge edges shall be beveled 3mm in 50mm unless hardware or door swing dictates otherwise.

.17 Top and bottom of doors shall be provided with inverted, recessed, 1.519mm steel end channels, welded to each face sheet at 152mm on center maximum.

.18 Provide 1.519mm closer reinforcement channels at top of all doors (interior and exterior).

.2 Frames

.1 General

.1 Fabricate frames from tension leveled steel to ASTM A924, galvanized to ASTM A653/653M, Commercial Steel (CS), Type B.

.2 Interior Frames

.1 Fabricate from 1.6mm base metal thickness.

.2 Interior frame product shall be supplied set-up and welded.

.3 Corner joints shall be accurately mitered and tightly fitted with integral door stops mitered or butted when assembled.

.4 Corner joints shall be welded on the inside of the profiles' returns and faces for set-up and welded frames.

.5 Joints at mullions, transom bars, sills or center rails shall be coped accurately, butted and tightly fitted, with faces securely welded, matching corner joint faces.

.6 Frame product shall be fabricated with integral door stops having a minimum height of 16mm.

.7 Glazing stops shall be square, formed 0.912mm steel, 16mm minimum bevelled height channel, accurately fitted, butted at corners and fastened to frame sectionswith #6 x 31mm flat head countersunk scrulox (self-drilling) type screws at 300mm on center maximum. Stops shall be 20mm high at all labelled frames.

.8 Locate glazing stops on room side of screens, not corridor side.

.9 Where required due to site access, as indicated on schedules, when advised by the contractor responsible for co-ordination or installation, or when shipping limitations so dictate, frame product shall be fabricated in sections for splicing in the field.

.10 Field spliced jambs, heads and sills shall be provided with 1.519mm steel splice plates securely welded into one section, extending 100mm minimum each side of splice joint.

.11 Field splices at closed sections (mullions or center rails) shall be 1.519mm steel splice angles securely welded to the abutting member. Face of splice angle shall extend 100mm minimum into closed sections when assembled.

.12 Field splice joints shall be welded, filled and ground to present a smooth uniform surface.

.13 On factory-assembled frame product, each door opening shall be provided with two (2) temporary steel jamb spreaders welded to the base of the jambs or mullions to maintain proper alignment during shipping and handling. Spreaders shall be removed prior to anchoring of frame to floor.

.14 Each door opening shall be prepared for single stud door silencers, three (3) for

single door openings, two (2) for double door openings. Silencers shall be shipped loose for installation after finish painting.

.15 Hardware Preparation

.1 Frame product shall be blanked, reinforced, drilled and tapped for fully templated mortised hardware only, in accordance with the final approved schedule and templates provided by the hardware supplier.

.2 Frame product shall be factory blanked and reinforced only for mortised hardware that is not fully templated.

.3 Frame product shall be reinforced only for surface mounted hardware.

.4 Drilling and tapping for surface mounted hardware or mortised hardware not templated shall be done at the time of installation.

.5 Frames shall be prepared for 114mm standard weight hinges (minimum).

.6 Hinge and pivot reinforcements shall be 3.416mm steel minimum reinforcing, high frequency type shall be provided.

.7 Strike reinforcements shall be 1.519mm steel minimum.

.8 Reinforcements for surface mounted hardware, concealed closers and holders and flush bolts shall be 2.657mm steel minimum.

.9 Mortised cutouts shall be protected with 0.759mm steel minimum guard boxes.

.10 Where electrically or electronically operated hardware is specified on schedules or details, or the final approved schedule and templates provided by the hardware supplier, hardware enclosures and/or junction boxes where indicated on templates shall be provided and inter-connected with CSA-approved 13mm diameter conduit and connectors.

.16 Anchorage

.1 Frame product shall be provided with anchorage appropriate to floor, wall and frame construction.

.2 Each wall anchor shall be located immediately above or below each hinge reinforcement on the hinge jamb and directly opposite on the strike jamb, except as indicated below.

.3 Frame product installed in unit masonry partitions shall be provided with 4.0mm diameter steel wire anchors, 1.214mm steel adjustable stirrup andstrap or "T" type anchors as conditions dictate.

.4 Where frame product is installed prior to construction of the adjacent wall, each jamb shall be provided with 1.519mm steel floor anchors. Each anchor shall be provided with two (2) holes for mounting to the floor and shall be securely welded to the inside of the jamb profile

designed so as not to permit thermal transfers from exterior to interior surfaces of the frame sections.

.5 All visible frame anchor screws shall be Robertson flat head countersunk type.

.6 Frame product installed in steel stud and drywall partitions shall be provided with 0.912mm steel snap-in or "Z" type stud type anchors.

.7 Jambs of frames in previously placed concrete, masonry or structural steel shall be punched and dimpled to accept machine bolt anchors, 6.4mm diameter, located not more than 152mm from the top and bottom of each jamb. Anchor preparations and guides shall also be located immediately above or below the intermediate hinge reinforcings and directly opposite on the strike jamb. Each preparation shall be provided with 1.519mm anchor bolt guides.

.8 After sufficient tightening of the anchor bolt, the head shall be welded so as to provide a non-removable application. Welded bolt and dimple shall be filled and ground to present a smooth uniform surface, prior to finish painting.

.9 Where indicated on schedules or details, channel extensions shall be provided from the top of the frame assembly to the underside of the structure above. Extensions shall be fabricated from 2.657mm steel formed channels, mounting angles and adjusting brackets, with mounting angles welded to the inside of frame head. Formed channels, adjusting brackets and fasteners shall be shipped loose. Channels shall be mechanically connected to mounting angles and adjusting brackets with supplied fasteners on site.

.10 For fire labeled frames, each strike jamb shall be provided with an additional snap-in anchor in each face, to be installed above or below the strike reinforcement. Each head for fire labeled pairs shall be provided with two (2) snap-in anchors, to be installed in the head faces at thecenter of the rabbet opening width.

.17 Finishing

.1 Remove weld slag and spatter from exposed surfaces.

.2 All tool marks, abrasions and surface blemishes shall be filled and sanded to present smooth and uniform surfaces.

.3 On exposed surfaces where zinc has been removed during fabrication, frame product shall receive a factory applied touch-up primer.

2.4 SIZES AND TOLERANCES

.1 Widths of door openings shall be measured from inside of frame jamb rabbet with a tolerance of +1.6mm - 0.8mm.

.2 Heights of door openings shall be measured from the finished floor (exclusive of floor coverings) to the head rabbet of the frame with a tolerance of ± 1.2mm.

.3 Unless builders' hardware dictates otherwise, doors shall be sized so as to fit the above openings and allow a 3mm clearance at jambs and head. A clearance of 19mm between the bottom of the door and the finished floor (exclusive of floor coverings) shall be provided. Tolerances on door sizes shall be ± 1.2mm.

.4 Manufacturing tolerances on formed frame profiles shall be ± 0.8mm for faces, door stop heights and jamb depths. Tolerances for throat openings and door rabbets shall be ± 1.6mm and ± 0.4mm respectively. Hardware cutout dimensions shall be as per template dimensions, +0.4mm, - 0.

2.5 HARDWARE LOCATIONS

.1 Hardware preparations in frame product shall be as noted below and locations on doors shall be adjusted for clearances specified above.

.2 Top of upper hinge preparation for 114.3mm hinges shall be located 180mm down from head, transom mullion or panel as appropriate. The top of the bottom hinge preparation for 114.3mm hinges shall be located 310mm from finished floor as defined above. Intermediate hinge preparations shall be spaced equally between top and bottom cutouts.For dutch door frames, top and bottom hinge locations shall be as above, with the tops of intermediate hinges located at 930mm and 1403mm from finished floor.

.3 Strike preparations for unit, integral, cylindrical and mortise locks and roller latches shall be centered 1033mm from finished floor. Strikes for deadlocks shall be centered at 1220mm from finished floor. Strikes for panic or fire exit hardware shall be located as per device manufacturer's templates.

.4 Push and/or pulls on doors shall be centered 1070mm from finished floor.

.5 Preparations not noted above shall be as per hardware manufacturer's templates.

.6 Hardware preparation tolerances shall comply with ANSI A156 Series standards.

3 EXECUTION

3.1 INSTALLATION

.1 General

.1 Install all doors and frames in accordance with NFPA-80.

.2 Doors

.1 Install doors in accordance with manufacturer's instructions and templates.

.2 Install hardware in accordance with hardware templates, manufacturer's instructions and Section 08 71 00.

.3 Provide maximum clearances at edges of doors as follows:
- .1 Between door and frame at head and jambs: 3mm.
- .2 At meeting edges pairs of doors and at mullions: 3mm.
- .3 At transom panels, without transom bars: 3mm.
- .4 At sills without thresholds: 16mm maximum above finish floor.
- .5 At sills with thresholds: 3mm above threshold.

.4 Adjust operable parts for correct function.

.5 Install louvres securely in doors.

.3 Frames

.1 Set frames plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 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 1220mm wide. Remove temporary spreaders after frames are built-in.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.5 Install all frame reinforcing where indicated or required for structural rigidity.

3.2 FINISH REPAIRS

.1 Touch up with primer galvanized finish damaged during installation.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Insulated steel sectional overhead doors.

.2 Hardware.

.3 Electric operators and controls for new and existing Overhead doors.

1.2 RELATED SECTIONS

.1 Section 03 30 00 - Cast-in-Place Concrete.

.2 Section 04 22 00 - Surface-Bonded Concrete Unit Masonry.

.3 Section 05 50 00 - Metal Fabrications.

.4 Section 06 10 00 - Wood Framing.

.5 Section 07 92 00 - Joint Sealants.

.6 Section 09 90 00 - Painting and Coating.

.7 Section 26 05 00 - Common Work Results for Electrical.

1.3 REFERENCES

.1 American National Standards Institute (ANSI):
- .1 ANSI/DASMA 102 - Specifications for Sectional Overhead Type Doors.
- .2 ANSI/DASMA 105 - Test Method for Thermal Transmittance and Air Infiltration of Garage Doors.
- .3 ANSI/DASMA 108 - Standard Method for Testing Sectional Garage Doors, Rolling Doors, and Flexible Doors: Determination of Structural Performance Under Uniform Static Air Pressure Difference.
- .4 ANSI/DASMA 115 - Standard Method for Testing Sectional Doors, Rolling Doors, and Flexible Doors: Determination of Structural Performance Under Missile Impact and Cyclic Wind Pressure.

.2 ASTM International (ASTM):
- .1 ASTM A123 - Standard Specification for Zinc (hot-dipped galvanized) coatings on iron and steel products.
- .2 ASTM A229 - Steel wire, oil-tempered for mechanical springs.
- .3 ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .4 ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .5 ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- .6 ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- .7 ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.
- .8 ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage

Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

.9 ASTM E330 - Structural performance of exterior windows, curtain walls, and doors by uniform static air pressure difference.

.10 ASTM E413 - Classification for Rating Sound Insulation V62221

1.4 DESIGN / PERFORMANCE REQUIREMENTS

.1 Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.

.1 Design pressure: Standard wind load of 9.39 psf/0.45 kPa.

.2 Design pressure: Wind load of 14.62 psf/0.70 kPa.

.3 Design pressure: Wind load of 20.88 psf/1.0 kPa.

.2 Wiring Connections: Requirements for electrical characteristics.

.1 110 volts, single phase, 60 Hz.

1.5 SUBMITTALS

.1 Submit under provisions of Section 01 33 00.

.2 Product Data: Manufacturer's data sheets on each product to be used, including:

.1 Preparation instructions and recommendations.

.2 Storage and handling requirements and recommendations.

.3 Installation methods.

.3 Shop Drawings: Clearly show and describe in detail, detailed door assemblies and adjacent construction, including elevations, sections and details of door, track, hardware and operating components, dimensions, gauges, finishes and relationship of door, track, hardware, and operating components to adjacent construction.

.4 Operation and Maintenance Data.

1.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum of five years documented experience.

.2 Installer Qualifications: Authorized representative of the manufacturer with a minimum of five years documented experience.

.1 Installation shall be only by the specified manufacturer or an authorized representative for the region.

.3 Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

.4 Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc./ULC/CSA acceptable to authority having jurisdiction as suitable for purpose specified.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Store products in manufacturer's unopened packaging until ready for installation.

.2 Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

.3 Store materials in a dry, warm, ventilated weathertight location.

1.8 PROJECT CONDITIONS

.1 Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.9 WARRANTY

.1 Manufacturer’s 2 year warranty against defects in materials and workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURERS

.1 Acceptable Manufacturers:

.1 Richards-Wilcox Canada.

.2 Garaga Inc.

.3 Overhead Door Corporation.

.4 Wayne Dalton Corporation.

2.2 INSULATED STEEL SECTIONAL OVERHEAD DOORS

.1 Richards-Wilcox Canada Thermatite Model T-175MR / T175 50mm.

.1 Door Assembly: 50mm thick, thermally broken design; Metal/foam/metal sandwich panel construction.

.2 Size: See Drawings. Door is to be 1 inch (25 mm) higher than finished door opening and extend 1 inch (25 mm) beyond jamb on either side of finished door opening width.

.3 Section Joints: 1/4 inch (6.3 mm) shiplap, with thermal break.

.4 Face Sheet Profile: Multi-Rib pattern with a non-repeating random stucco surface texture.

.5 Exterior Steel: Pre-painted 0.019 inches (0.48 mm), hot-dipped galvanized.

.6 Interior Surface: Rib pattern with a non-repeating random stucco surface texture.

.7 Interior Steel: Pre-painted 0.016 inches (0.41 mm), hot-dipped galvanized.

.8 End Stiles: End Caps: 16 gauge (1.6 mm) hot dipped galvanized steel.

.9 Standard Springs: 10,000 cycles.

.10 High-Usage Package: Provide with optional high-usage package.

.11 Insulation: Foamed in place CFC-free and HCFC-free polyurethane, fully encapsulated.

.12 Thermal Value: R=16.00 ft2h F/Btu.

.13 Colors: Exterior, Manufacturer's standard White.

.14 Colors: Interior, Manufacturer's standard White.
.15 Wind load Design: ANSI/DASMA 102 standards to meet applicable code.
.16 Hardware: Zinc coated steel hinges and fixtures. Ball bearing rollers with hardened steel races.
.17 Lock:
  .1 Interior mounted slide lock.
.18 Seals:
  .1 Standard continuous, replaceable dual seals between sections.
  .2 Bottom seal: 3 inch (76 mm) vinyl retained in aluminum extrusion.
  .3 Top seal: PVC/Vinyl type.
  .4 Jamb seal: Dual fin vinyl/steel.
.19 Track: Provide as recommended by manufacturer to suit loading required and clearances available.
.20 Operation: Electric.

2.3 HARDWARE

.1 Counter-Balance System:
  .1 Spring assembly: Oil tempered torsion springs:
    .1 Minimum 100,000 cycles
  .2 Spring: Sized to suit the cycles.
  .3 Shaft: 32 mm solid CRS shaft with full-length keyway.
  .4 Wire Rope: Aircraft type 7x19 construction with a safety factor of 5:1 minimum.

.2 Hardware: Include all the required hardware and zinc plated fasteners.
  .1 Hinges: Linear style 12 gauge (2.75 mm) galvanized steel.
  .2 Track 3 inches (75 mm): Rolled formed 12 gauge (2.7 mm) galvanized steel.
    .1 Mounting: ADCA: Continuous adjustable track angle ADCA. Bolted type, field adjustable to ensure weather tight seal, fabricated from 13 gauge (2.4 mm) commercially galvanized steel, designed to provide continuous track support for full opening height.
    .2 Mounting: Clip Angle: Pre-punched angle and clips designed for field bolting, adjustable to ensure weather tight seal and serviceability, the angles are fabricated from 0.093 inch (2.4 mm) commercially galvanized steel.
    .3 Mounting: Bracket: Track brackets. Bolted type field adjustable to ensure weather tight seal, rib reinforced, stamped from 0.123 inch (3.1 mm) thick commercially galvanized steel.
    .4 Track Hangers: Perforated type 1-1/4 inches by 1-1/4 inches (32 mm by 32 mm) angles, roll formed from 14 gauge (2.0 mm) thick commercially galvanized steel.
    .5 Horizontal Track Curve: 16 inch (406 mm) radius.
    .6diameter, with ten 5/16 inch (8 mm) ball bearings, and 7/16 inch (11 mm) diameter roller axels.
    .7 Roller Brackets: Fabricated from commercially galvanized steel. Graduated type design to suit the slope in the vertical track to ensure weather tight seal. Thickness as follows:14 gauge (2.4 mm).
  .3 Horizontal angle: Full length.
  .4 Locking: Interior slide bolt.
  .5 Bumper leaf springs.
  .6 Across-the-door-bar latch inside only: Complete with night lock and interior handle. Electric interlock is required on electrically operated doors.
  .7 Double end roller brackets and long stem rollers.
  .8 Chain hoist: Chain and sprocket type design, 3:1 reduction.

.9 Follow the Roof Pitch: Install track to follow roof pitch for standard and high lift doors.
.10 Track guards. 3/16 inch (4.8 mm) steel, 60 inches (1520 mm high).
.11 Pull chain with spring.

2.4 ELECTRIC OPERATORS AND CONTROLS

.1 Pulse DC500 Direct Drive (1/2 HP): DC electric motor directly coupled to a hollow shaft (30:1 reduction) worm gear reducer designed to install over keyed door shaft.
.1 Motor: Continuous duty 0.5 HP, 90 V DC, 1750 rpm motor.
.2 Operator: Suitable for 110 to 240 V, 1 PH, and 60 Hz power supply and shall have integral absolute encoder to control the door travel.
.3 Controls: Programmable wall mountable UL325 compliant NEMA 4X control panel with LCD display and OPEN-CLOSE-STOP buttons on cover, 24V DC control voltage, containing the back-up battery pack to operate the door in case of power failure, logic circuit board. Pulse with modulation programming to provide soft-start soft-stop, dynamic brake, and speed control. Cycle counter, dual upper limit for partial opening, time delay on reverse and programmable close timer, terminal blocks for external activating and reversing devices. Includes the following:
.1 Photo Cell: NEMA 4 photo cell for mounting across the opening wired to reverse the door closing in case it detects an obstruction.
.2 Safety Edge: Wireless, Featheredge on leading edge of bottom section wired to reverse the door closing in case it detects an obstruction.
.3 Remote push button station: NEMA 4, three buttons OPEN-CLOSE-STOP bush button station for remote location.
.4 Keyswitch operation.

2.5 FABRICATION

.1 Fabricate the work true to dimensions detailed and square, and to the reviewed shop drawings, free from distortion and defects detrimental to the appearance and performance.

.2 Verify the door opening dimensions prior to the fabrication of the doors.

.3 Doors shall be 1 inch (25 mm) higher than finished openings and extend 1 inch (25 mm) beyond jamb on either side of finished opening width.

.4 Shop and field connections shall comply with CAN/CSA S16.1-M.

.5 Accurately fit joints and intersecting members with adequate fastenings.

3 EXECUTION

3.1 EXAMINATION

.1 Do not begin installation until the openings have been properly prepared.

.2 Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

.3 Verify electric power is available and of correct characteristics.

.4 If preparation is the responsibility of another installer, notify Architect of unsatisfactory

preparation before proceeding.

3.2 PREPARATION

.1 Clean surfaces thoroughly prior to installation.

.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

.2 Install doors, tracks and operating equipment complete with necessary hardware, weather-stripping, anchors, hangers, brackets, and accessories, in accordance with manufacturer's printed instructions.

.3 Assemble and erect work plumb, true, square, straight, level, and accurate as per Drawings and reviewed shop drawings.

.4 Isolate metals where necessary to prevent corrosion due to contact with dissimilar metals and between metals, masonry and concrete. Use bituminous paint or butyl tape or as recommended, in writing, by the door manufacturer.

3.4 ADJUSTMENT AND DEMONSTRATION

.1 Lubrication: Upon completion of erection of units and operating equipment, lubricate moving parts before operation. Grease sprockets, bearings, cables, link chains and guides. Use lubricant as recommended by the manufacturer.

.2 Demonstration: Test-operate and adjust doors to perform smoothly, free from warp, twist, or distortion. Demonstrate the operation to the satisfaction of the Architect at the same time of acceptance of the completed work.

3.5 PROTECTION

.1 Do not permit construction traffic through overhead door openings after adjustment and cleaning.

.2 Protect installed products until completion of project.

.3 Touch-up damaged coatings and finishes and repair minor damage before Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Supply of finishing hardware including but limited to all hardware for hollow metal and or wood doors, aluminium doors, and other doors as noted herein.

.2 The Hardware Supplier shall provide assistance to the Contractor on all matters pertaining to the Work of the Section.

.3 The Hardware Schedule shall be prepared by an acceptable hardware supplier (see item 1.2) and shall be provided to the Contractor who shall coordinate the Work of this Section.

.4 With the exception of the teacher closets locksets; all architectural millwork hardware shall be supplied and installed, including the teacher closet lockset by the Millwork Subcontractor per Section 06 40 00 – ARCHITECTURAL MILLWORK.

.6 The Contractor shall take delivery of hardware, furnish receipts, and store it in a safe place, systematically, according to the hardware list. The Contractor must check all items received and be entirely responsible for its custody after delivery to the job.

.7 The General Contractor shall install all finishing hardware and signs required for a complete job, in accordance with the manufacturer's directions and the Architect's instructions. Holes and locksets shall be made the exact and proper size and the Contractor will be required to replace doors which are damaged by poor and improper hardware installation.

.8 Power door operators, and Press to Lock supply and installation.

1.2 Acceptable Hardware Suppliers

.1 Upper Canada Speciality Hardware (905) 940-8358

.2 Knell's Door and Hardware (519) 743-4344

.3 JPW Systems (519) 474-9797

1.4 Related Work Specified Elsewhere

.1 Section 08 12 13 – HOLLOW METAL FRAMES

1.5 References

.1 Architectural Finish Hardware shall conform to the following as a minimum standard:

.1 CAN/CGSB-69.18-M, Butts and Hinges;

.2 CAN/CGSB-69.19-M, Exit Devices;

.3 CAN/CGSB-69.20-M, Door Controls, Closers;

.4 CAN/CGSB-69.21-M, Auxiliary Locks and Associated Products;

.5 CAN/AGSB-69.22-M, Architectural Door Trim;

.6 CAN/CGSB-69.29-M, Template Hinge Dimensions;

.7 CAN/CGSB-69.24-M, Door Controls - Overhead Holders;

.8 CAN/CGSB-69.29-M, Mortise Locks and Latches;

.9 CAN/CGSB-69.91-M, Closer Hold or Release Devices;

.10 CAN/CGSB-69.99-M, Self-Closing Hinges and pivots;

.11 CAN/CGSB-69.94-M, Materials and Finishes.

.12 CSA-HA Series, CSA Standards for Aluminium and Aluminium Alloys.

.13 CAN/ULC-S533-1987, Egress Door Securing and Releasing Devices.

.14 NFPA80, Standard for Fire Doors and Fire Windows, 2010 Edition.

1.6 Schedules

.1 Refer to door schedule on sheet A802 in architectural drawings.

1.7 Quality Assurance and Regulatory Agencies

.1 The supply of the Work contained in this Section shall be made by recognized architectural finishing hardware and or Subcontractors being well experienced in the supply finishing hardware and supply and installation.

.2 Hardware provided shall comply with codes and requirements of all governing authorities, and as specified.

.3 Provide hardware items with characteristics which will provide specified fire ratings, and conform to exit requirements of all governing authorities. Install only U.L.C. or U.L.I. listed hardware for all fire rated closures.

1.8 Performance Requirements

.1 Locks and Panic Hardware on fire rated doors shall be U.L.C. listed and labelled.

1.9 Submittals

.1 Architectural Finishing Hardware Schedule:

.1 Contractor to submit six (6) copies of the architectural finishing hardware schedule and product data of each product to be used on the project to the Consultant for review and approval. The architectural finishing hardware schedule shall list type, selected manufacturer's name and number, location and finish for all hardware, and complete cross reference to Door and Hardware Schedules.

.2 Once the architectural finishing hardware schedule is reviewed by the Consultant, the Contractor shall release the architectural finishing hardware schedule and product data to the architectural finishing hardware, aluminium door, power door and hollow metal door and pressed steel frame Subcontractors along with all required architectural finishing hardware templates. Contractor to furnish promptly to the applicable trades all templates and ¡formation required for proper preparation for all applications of hardware, n ample time to facilitate the progress of the Work.

.3 As requested by the Consultant, furnish samples of each architectural finishing

hardware item.

.4 The Contractor shall prepare and submit for review, a detailed keying schedule recognizing the Owner requirements which shall be determined after award of the Contract.

.2 Maintenance Instructions:

.1 Instruct the Owner's designated representative in proper care and preventative maintenance of all hardware to assure longevity of operation.

.2 Provide three (3) copies of descriptive information, operating, adjustment, and maintenance instructions, and "As-Built" record of location of each hardware group, spare parts list, and other pertinent information.

.3 Provide the information suitably identified in accordance with requirements of Section 01 78 00 - OPERATING AND MAINTENANCE DATA.

.4 Include servicing frequencies, instructions for adjustment and operation applicable to each type of component or hardware, and name, address and telephone number of nearest authorized service representative.

1.10 Product Handling

.1 Package each item of hardware individually, complete with all trim and necessary fastenings, and accessories, including wrenches, keys, and other appurtenances required to ensure correct installation. Mark each item as to contents and appropriate use in specified groups.

.2 All items of hardware subject to handling when installed shall be provided with an easily removable covering to protect against scratches, abrasions, coating with dissimilar finish materials on adjacent surfaces, and tarnishing.

.3 All aluminium door hardware to be itemized and packaged separately. Contractor to hand over finishing hardware to aluminium door supplier for installation.

1.11 Templates

.1 Provide to associated trades, and one (1) copy to Consultant, necessary copies of all templates, template information, installation instructions and details necessary to enable the preparation for, and installation of finish hardware in accordance with Door Hardware Institute Recommended Procedures. Submit templates arranged and marked coincident with specified hardware designations.

1.12 Coordination

.1 Coordinate work of this Section to ensure all information and material is promptly provided, to ensure orderly and expeditious progress of Work, and to comply with schedule for completion of all phases of Work.

.2 Assist in organizing hardware storeroom and provide qualified staff to correctly categorize, mark, and arrange each item in groups to enable efficient dispensing in specified hardware groups for each door to installation trades.

.3 Be responsible for coordination of hardware with doors, frames and other surfaces in which direct contact is made. This function shall include a review and acceptance of all hardware information on steel door and frame shop drawings, aluminium and stainless steel entrance shop drawings, overhead door shop drawings, and any other shop drawings affected by hardware supplied under this section. Return such drawings with review stamp and signature to applicable manufacturers with five (5) days of receipt.

.4 Provide qualified staff on site promptly to assist installation trades subsequent to being requested and to ensure that hardware is being correctly installed.

1.14 Warranty

.1 All work performed and materials supplied under this Section to be warranted from defects for a period of two (2) years from Takeover. Door closers to have a warranty against defect and poor workmanship for a period of 5 years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 Materials - General

.1 Architectural finishing hardware shall be supplied in strict accordance to the Architectural Finish Hardware Schedule attached to the Contract Documents. Hardware finish of different manufacturers shall be uniform in all respects.

.2 Provide all items complete with fastening devices necessary to ensure a neat and secure installation.

.3 One manufacturer's products shall only be used for similar items.

.4 The Contractor shall ensure that the hardware specified is suitable in both dimension and function for the intended purpose. The Contractor shall advise the Hardware Consultant and Consultant of discrepancies or omissions.

2.2 Materials - Specific

.1 Refer to Hardware Schedule.

.2 Miscellaneous

.1 Provide new cylinders to owners’ existing keying system.

PART 3 - EXECUTION

3.1 Examination

.1 Before furnishing any hardware, carefully check drawings of Work requiring hardware, verify door swings, door and frame materials and operating conditions, and assure that hardware will fit Work to be attached.

.2 Check shop drawings and frame and door lists affecting hardware type and installation, and verify to correctness thereof, or advise of required revisions. Check that doors, frames and panels requiring additional support are reinforced.

.3 Point out special requirements to installer. Make final adjustment of hardware, in particular closer arms, valves and locksets; all to work properly.

.4 Adjustments and inspection of initial closers shall be witnessed by Consultant. Provide adequate 48 hours notice and staff to reach satisfactory conclusion to witnessed tests.

3.2 Installation

.1 Install architectural finish hardware, including wiring, conduits and controls in accordance with shop drawings and manufacturer's instructions.

.2 Architectural finish hardware shall be installed to manufacturers' standard heights unless noted below or as defined by the requirements of the O.B.C. or as shown on the Contract Document drawings

3.4 Demonstration

.1 Demonstrate to the Owner the operation and maintenance requirements for the equipment of this section.

3.5 Field Quality Control

.1 Inspect the installation of finish hardware on an agreed frequency.

.2 Advise the Consultant in writing of any Work being performed which will prejudice the installation or correct operation of any item of hardware.

.3 Upon completion of installation of hardware, hardware supplier shall arrange and conduct, in company of Owner, Consultant and Contractor, inspections to verify that all hardware is installed, adjusted and functioning satisfactorily, complete with required trim and accessories, and fastenings are adequately secured and accepted. Where necessary, recommend adjustments of such items as closer arms, valves, door holders and latch and locksets. Report all comments in writing to Owner, Consultant and Contractor.

.4 Any and all substitutions of specified products which do not meet conditions of this specification shall be removed from site and replaced with those products specified at no additional cost to Owner.

END OF SECTION

2090 Shirley Drive Kitchener Ontario N2B 0A3
Phone: (519) 578.1000 Toll Free: (800) 265.8959 Fax: (519) 578.3262

Schedule of Finish Hardware

ARCHITECT/DESIGNER: MARTIN SIMMONS SWEERS ARCHITECTS INC.
200-113 BREITHAUPT ST.
KITCHENER ON N2H 5G9
PHONE - 519-745-4754
FAX - 519-745-0061

CONTRACTOR:

PHONE -
FAX -

PROJECT: WRDSB - SOUTHWOOD SECONDARY SCHOOL
30 SOUTHWOOD DR
CAMBRIDGE ON
8014

PROJECT CONSULTANT:

PREPARED:

REVISED:

Scan to check out our website

www.knells.ca

DOOR INDEX

Mark	Heading #	Mark	Heading #	Mark	Heading #
D01	001				

Hardware Finishes

Finish	Description
26D	SATIN CHROMIUM
626	SATIN CHROMIUM PLATED
689	POWDER COAT, ALUMINUM
ALUMINUM	ALUMINUM
CLEAR	CLEAR ANODIZED
MILL	MILL FINISH
US32D	SATIN STAINLESS STEEL

HARDWARE SCHEDULE - CODE # 8014

WRDSB - SOUTHWOOD SECONDARY SCHOOL

30 SOUTHWOOD DR

Heading # 001

1 SGL DOOR D01 ROOF TO UPPER GENERAL PURPOSE ROOM 210 110º RH

965 x 2032 x 45 HMD Door/ HMF Frame NON-RTD Door/NON-RTD Frame

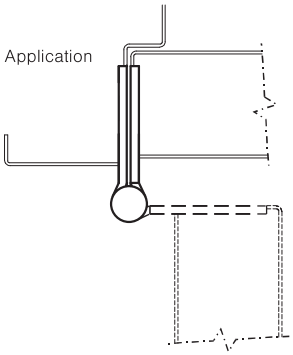
3	HINGE, 4 1/2, HVY WT	TA786 4-1/2 X 4	26D	MCK
1	CYLINDRICAL LOCK WITH THRU BOLTS STOREROOM	ND80P6D X SPA X 13-247 X 10-025 X SCHLAGE C	626	SCH
1	OVERHEAD STOP/HOLDER, SURFACE	904S	US32D	GLY
1	CLOSER	4040XP.RWPA.689.SRT	689	LCN
1	WEATHER STRIPPING	W-1 X 17-2	MILL	KNC
1	DOOR SWEEP	W-13S X 38	CLEAR	KNC
1	THRESHOLD	CT-10 X 38	ALUMINUM	KNC
1	KEYING	MASTERKEY CYLINDER (MASTERKEYING CYLINDER BY G & A)		G&A

Three Knuckle Heavy Weight Series

Recommended for use on high frequency and/or heavy wood or metal doors in schools, hospitals or other public buildings where heavy traffic is experienced.

- Heavy weight hinges should be used on all extra heavy doors or those exposed to high frequency use
- Use for the common flush door/frame/wall application
- Beveled Edge - where doors are beveled on hinge side specify TA5386 or TA5786
- For available finishes see page 28
- Decorative flat tips are available on 4½" and 5"

TA386
TA786



No.	ANSI Cross Reference	Base Material	Weight
TA386	A5111	Stainless	HVY
TA386	A2111	Brass	HVY
TA786	A8111	Steel	HVY

Specifications

Inches	mm	Gauge	No. of Holes	Fasteners	
				Machine	Wood
4½" x 4"	114.3 x 101.6	.180	8	½ x 12-24	1¼ x 12
4½" x 4½"	114.3 x 114.3	.180	8	½ x 12-24	1¼ x 12
5" x 4½"	127 x 114.3	.190	8	½ x 12-24	1¼ x 12
5" x 5"*	127 x 127	.190	8	½ x 12-24	1¼ x 12
6" x 5"*	152.4 x 127	.203	10	½ x ¼-20	1½ x 14
6" x 6"*	152.4 x 152.4	.203	10	½ x ¼-20	1½ x 14

* Not available in Brass Base material.

Steel & Stainless Approved for NFPA 80 fire rated openings

Options:

Code	Description
NRP	Non-Removable Pin
RC	Round Corner – ¼" radius furnished unless specified otherwise
HT	Hospital Tip
SSF	Safety Stud Feature
QC	ElectroLynx® Hinge – 4, 8 or 12 wire available
CC	Concealed Circuit – 4, 8 or 12 wire available
CC-18	Concealed Circuit –2, 4, 6, 8 or 10 wire available (2-18AWG wires and the remainder 28AWG wires)
MM	Magnetic Monitoring
FT	Flat Tip
BT	Ball Tip
RT	Round Tip
GT	Grooved Tip
LT	Lined Tip
KT	Knurled Tip

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ND MECHANICAL

Applications

The ND Series' functional and trim offerings are the most expansive of the Schlage cylindrical lock portfolio. This extremely versatile lock is made to handle the abuses of heavy use in any commercial setting. Options include best-in-class lock status indication ideal for classroom security and ligature-resistant options for the healthcare market.

Because ND uses an ANSI door prep common across cylindrical locks, it is ideal for both new construction and retrofit upgrades.

Key Features

- Significantly exceeds ANSI/ BHMA A156.2 requirements for Grade 1 cylindrical locks
- 25 mechanical functions plus eight that feature Vandlgard® locked lever protection
- Nine lever designs, two rose designs, status indication and ligature-resistant trim options
- Nine standard finishes, plus an antimicrobial coating option
- Supports Conventional, FSIC, and SFIC cylinder formats plus high-security UL 437 options
- Multiple key systems available – open, patented, restricted, and geographically exclusive
- Support for 10 non-Schlage cores (see cylinder section)

ND WIRED ELECTRIFIED

Applications

Electrified locks complement mechanical ND Series where wired electronic access control solutions are desired. They can be applied as part of a network or independently with a remote access switch such as may be used for a reception area.

Electrified ND locks are ideal for high-traffic areas where line power ensures continuous operation. They are most easily incorporated into new construction where electrified door prep, conduit hinges, and wiring is planned for the building.

Key Features

All mechanical features plus:

- Combines mechanical strength with the convenience of electronic access control
- Auto-detects 12V or 24V DC
- Selectable EL/EU operation
- Four electrified functions
- Low 0.24 amp max current draw allows multiple locks on a single power supply
- Low 0.01 amp holding current eliminates "hot levers" in electrically locked applications
- Modular Request-to-Exit (RX) can be added at any time

NDE WIRELESS ELECTRONIC

Applications

NDE mobile enabled wireless locks are designed to affordably extend electronic access control deeper into the building beyond traditional perimeter and high security openings.

The NDE is ideal for both commercial new construction and retrofit. Facilities can benefit from the enhanced security, efficiency, and convenience of upgrading to electronic credentials.

Key Features

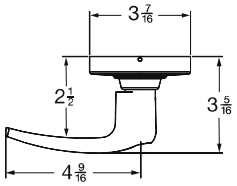
All mechanical features[1] plus:

- Interior push button with indication for storeroom, office, privacy and apartment functionality
- Compatible with Bluetooth, NFC, smart, or proximity credentials
- Integrated credential reader, door position sensor, and request-to-exit (RX) switch
- Built-in Bluetooth® enables wireless configuration from smart phones/tablets
- Functions in offline or No-Tour mode or as a networked lock with either periodic check-ins or real-time management
- Up to 2 years of battery life

1. NDE wireless electronic is not available in 613 finish.

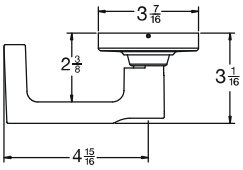
Lever Designs & Finishes

Athens (ATH)



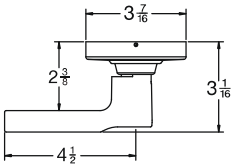
Cores *KIL, FSIC, SFIC, L-CO, L-SA, J-CO6, J-ME, J-SA, J-YA6*

Boardwalk (BRK)[1]



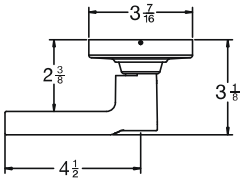
Cores *KIL, FSIC, SFIC*

Broadway (BRW)



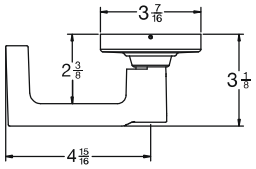
Cores *KIL, FSIC, SFIC*

Latitude (LAT)



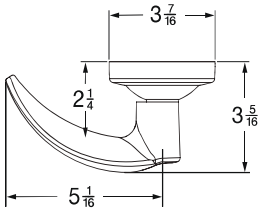
Cores *KIL, FSIC, SFIC*

Longitude (LON)[1]



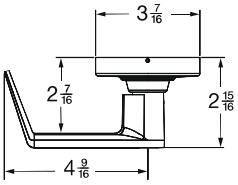
Cores *KIL, FSIC, SFIC*

Omega (OME)[1]



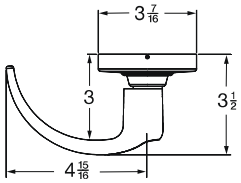
Cores *KIL, FSIC, SFIC*

Rhodes (RHO)[1]



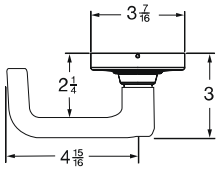
Cores *KIL, FSIC, SFIC, L-CO, L-SA, J-CO6, J-CO7, J-ME, J-SA, J-YA6, J-YA7*

Sparta (SPA)[1]



Cores *KIL, FSIC, SFIC, L-CO, L-SA, J-CO6, J-ME, J-SA, J-YA6*

Tubular (TLR)[1]



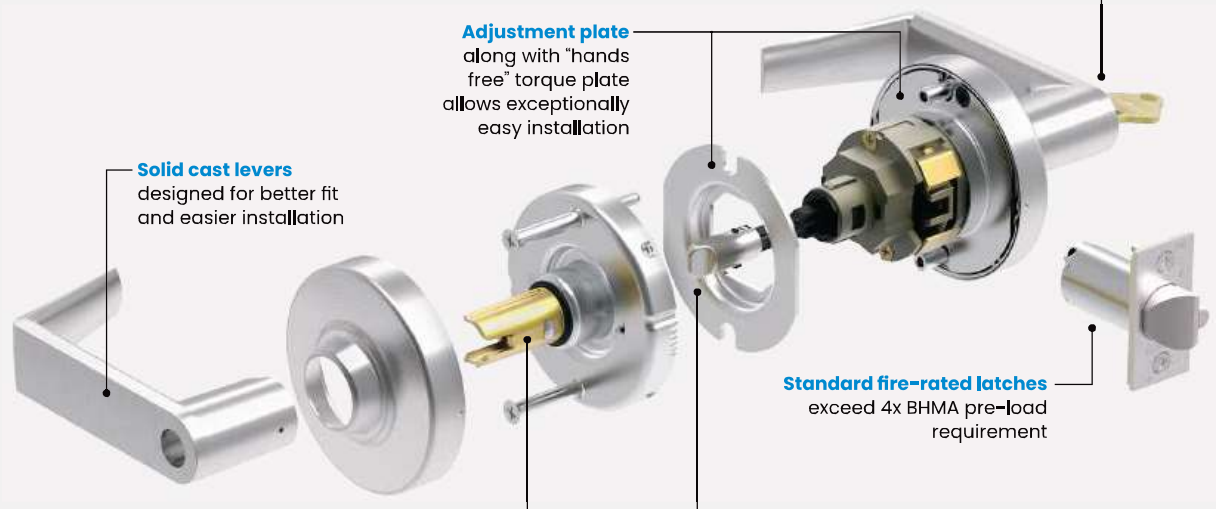
Cores *KIL, FSIC, SFIC, L-CO, L-SA, J-CO6, J-ME, J-SA, J-YA6*

Finishes

605	606	612	613[2]	619	622	625	626/626AM	630[3]	643e
Bright Brass	Satin Brass	Satin Bronze	Oil Rubbed Bronze	Satin Nickel	Matte Black	Bright Chrome	Satin Chrome/ Antimicrobial	Satin Stainless Steel	Aged Bronze

1. Boardwalk, Longitude, Omega, Rhodes, Sparta, and Tubular levers comply with California state code for return within 1/2" of door face.
2. NDE wireless electronic locks not available in 613 finish.
3. Available on HSLR trim only.

ND Mechanical



Quality You Can See and Feel

Strength and durability are more than numbers, you can actually feel it in the lock — in the weight and movement of the lever and in the lasting beauty of the finish. Expect exceptional durability from ND Series.

- Tested to over 16 million cycles with near zero droop or wobble in the lever (16x the BHMA requirement)
- Latch retraction with 200 lb preload for confident operation in warped and preloaded doors (4x BHMA requirement)
- Prevents access even when subjected to torque loads up to 3,100 in-lbs (2.6x the BHMA standard)
- Withstands pry bar attacks of 1,600 lbs (8x BHMA requirement)
- Withstands 100 sledgehammer blows (20x BHMA requirement)

The Added Benefits of Layered Key System Security

A strong lock is only part of the security equation for mechanical locks–proper key security is equally important.

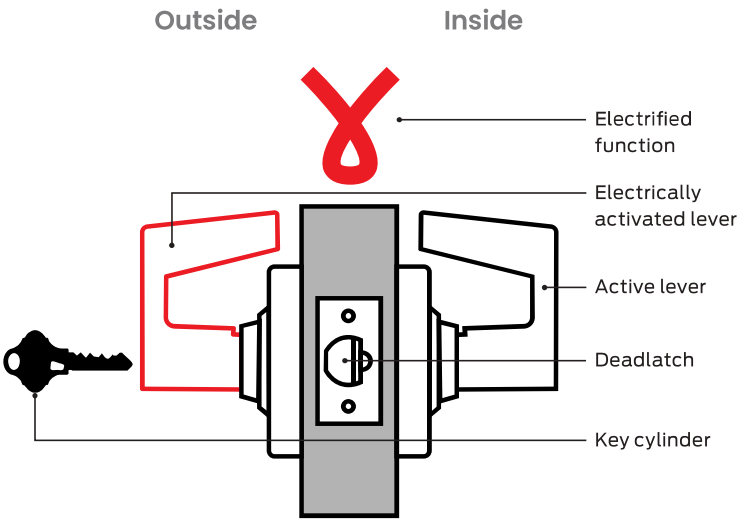
- Patented Everest 29™ cylinders prohibit unauthorized key duplication at local retail stores
- Dealer and end user restricted, geographically exclusive Primus cylinder options for advanced key control
- Available compatibility with 10 different non-Schlage key systems

Key Features

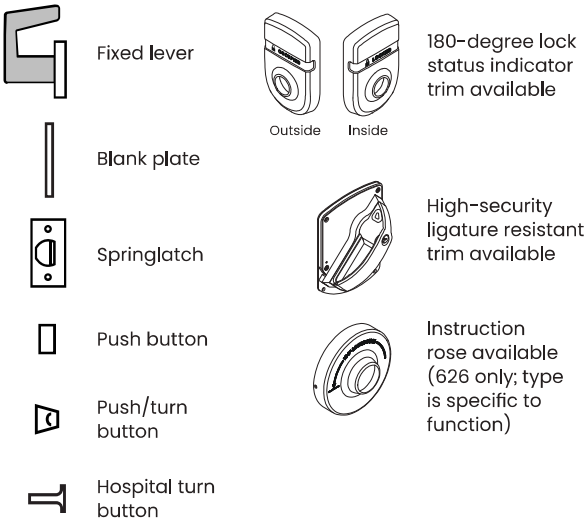
ND Series offers Schlage's widest array of finishes, styles and functions available in a cylindrical lock.

- 25 mechanical, cylindrical functions plus eight that feature Vandlgard® locked lever protection
- Nine standard finishes, plus an antimicrobial coating option
- Nine ADA compliant lever options
- Status indication and ligature-resistant trim options
- BAA compliant
- Locks are ANSI/BHMA Grade 1 certified
- Available with lead lining
- UL Listed 3-hour fire rated
- Perfectly suited to the ALX Series Grade 2 cylindrical locks
- Supports Conventional, FSIC, and SFIC cylinder formats plus high-security UL 437 and competitive core options
- Multiple key system options include open, patented, restricted, and geographically exclusive

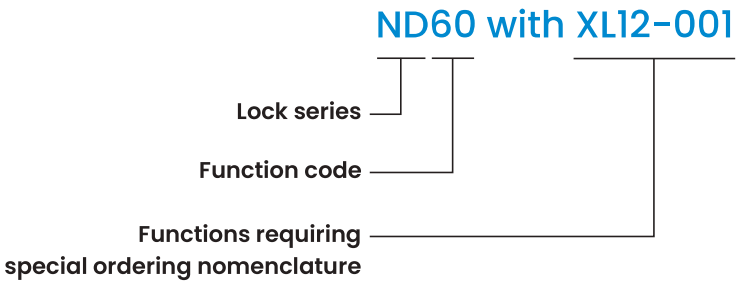
Legend



Key



Product Identification Guide



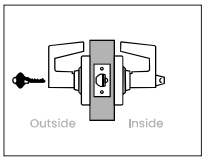
Vandlgard® functions.

Some functions feature Vandlgard locked lever protection. It allows the outside lever to rotate freely up and down when locked to limit the ability of vandals to apply excessive force to the chassis helping to prevent damage to internal components.

Keyed Functions

Schlage **ANSI**
ND53 **F109**

Entrance lock



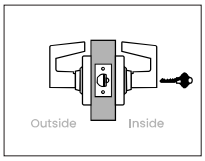
- Lever with key cylinder outside; push/turn button in lever inside; deadlatch
- In unlocked state latch is retracted by either lever
- Outside lever is made inoperative by pushing button or pushing and turning button on inside lever; key outside does not lock
- **Pushed button unlocking:** key outside or rotating inside lever retracts latch and releases button unlocking outside lever
  Pushed/turned button unlocking: key outside or rotating inside lever retracts latch but does not unlock outside lever; rotate inside button to start position to allow button release and unlocking by key or by rotating inside lever
- Inside lever always free for immediate egress

Caution: Egress without fully releasing the push/turn button can result in lock-out situations.

Note: Locks ordered with indicator trim fit 1-3/4" doors. Sold separate spacer kits allow application to doors 1-3/8" to 1-11/16".

Schlage **ANSI**
ND60 with XN12-001 **-**

Vestibule lock with interior unlocking only

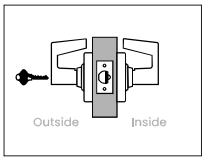


- Lever outside; lever with key cylinder inside; deadlatch
- In unlocked state latch is retracted by either lever
- Outside lever is locked or unlocked by key inside
- Inside lever always free for immediate egress

To order, specify function and note XN12-001 as a special option.

Schlage **ANSI**
ND70 **F84**

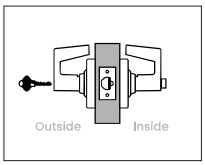
Classroom lock, exterior lockdown only



- Lever with key cylinder outside; lever inside; deadlatch
- In unlocked state latch is retracted by either lever
- Outside lever is locked or unlocked by key outside
- Inside lever always free for immediate egress

Schlage **ANSI**
ND73 **F90**

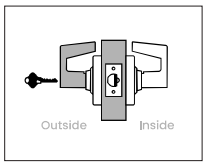
Corridor lock



- Lever with key cylinder outside; push button in lever inside; deadlatch
- In unlocked state latch is retracted by either lever
- Outside lever is made inoperative by pushing button on inside lever or by key outside
- **When locked by pushed button:** rotating inside lever retracts latch and releases button unlocking outside lever; closing door also unlocks preventing lock-out
  When locked by key: rotating inside lever retracts latch but outside lever remains fixed until unlocked by key outside
- Inside lever always free for immediate egress

Schlage **ANSI**
ND80 **F86**

Storeroom lock

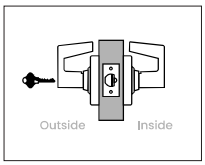


- Lever with key cylinder outside; lever inside; deadlatch
- Outside lever always fixed; latch retracted by inside lever
- Key in outside lever retracts latch only
- Inside lever always free for immediate egress

To order configured with Request to Exit (RX), specify RX under special options.

Schlage **ANSI**
ND81 **F86**

Accessible storeroom lock



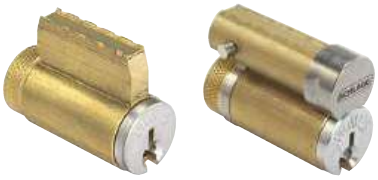
- Lever with key cylinder outside; lever inside; deadlatch
- Outside lever is always fixed when key is not present; latch retracted by inside lever
- Key outside turned counter-clockwise retracts latch; 180-degree clockwise rotation of key allows outside lever to retract latch
- Inside lever always free for immediate egress

To order configured with Request to Exit (RX), specify RX under special options.

Cylinders & Key Systems

A strong lock is only part of the security solution—proper key control is equally important. Schlage offers extensive options to meet the security needs of the specific project.

Cylinders



Conventional (KIL) & Full Size Interchangeable Core (FSIC) Cylinder Options[1]

- 6-pin large format keying (standard)
- 7-pin small format keying (A2 pinning) available in SL cylinders
- 6-pin available in Schlage Classic Obverse and Everest 29 S and T keyway families plus supported legacy keyways
- Primus security upgrades offer geographic exclusivity
- Primus UL 437 listed high-security cylinders are capable of withstanding extreme physical attack

Small Format Interchangeable Core (SFIC) Cylinder Options[2]

- 7-pin small format keying (A2 pinning)
- Available in Schlage Everest 29 R and legacy Everest B restricted keyway families[2]

SL Format Cylinders

- Same A2 pinning style as SFIC cylinders but in Conventional and FSIC formats
- Enables an Everest 29 R or Everest B keyway facility to gain Primus XP program security

1. Everest 29 S123 keyway is the default keyway on all Schlage locks unless specified otherwise.
2. Restricted keyway cores require authorization from the end user.

Key Systems

Everest 29 Keyway Families

- Patented through 2029
- Available restricted keyway families provide a higher level of administrative security
- Can be integrated into an existing legacy Everest key system
- Upgradeable to Primus XP and UL 437 levels of security

Classic Obverse Keyway Family

- Open keyway – keys are duplicated and available without ordering formalities
- Upgradeable to Primus RP and UL 437 levels of security

Legacy Keyway Families

- Patent expired keyway families include legacy Everest, Quad, Numbered and Reversed
- Everest and Quad are upgradeable to Primus XP and UL 437 cylinders to regain patent and key control protection for critical points of entry

Cylinder Options

When ordering a configured lock, specify cylinder type in the product ordering string as shown on page 36. The chart below shows part numbers when ordering Schlage cylinders and tailpieces separately.

For These Keyed Functions:

ND25 x 70
Classroom exit lock

ND25 x 80
Storeroom exit lock

ND50 (ND91 Vandlgard)
Entrance/office lock

ND53 (ND92 Vandlgard)
Entrance lock

ND60 (ND93 Vandlgard)
Vestibule lock

ND60 with XN12-001
Vestibule lock with interior unlocking only

ND66
Store lock

ND70 (ND94 Vandlgard)
Classroom lock, exterior lockdown only

ND70 x 80
Classroom by storeroom lock

ND72 with XN12-002 (ND72 with XN12-003 Vandlgard)
Communicating lock

ND73 (ND97 Vandlgard)
Corridor lock

ND78 (ND98 Vandlgard)
Classroom security lock (180-degree lockdown)

ND80 (ND96 Vandlgard)
Storeroom lock

ND81
Accessible storeroom lock

ND82
Institution lock

ND85
Faculty restroom lock

ND80EL/EU (ND96EL/EU Vandlgard)
Storeroom lock, electrically locked/ unlocked outside lever

NDEB

NDEBSi

Specify keyway and plug face finish when ordering cylinders as parts (606, 622, 626, or 643e).

1. Available for Athens, Rhodes, Sparta and Tubular levers only.
2. Available for Rhodes levers only.

Conventional (KIK/KIL) Cylinders

Cylinder type	Sold separate part number	Pins	Cylinder mechanism
P, P6	23-065	5, 6	Pin and tumbler (P6 is default)
Z	91-018	7	SL cylinder (restricted Everest 29R or Everest B)
L	20-765	6	Primus
L	20-565	6	Primus UL 437 high security
L	20-765-RP	6	Primus RP Classic Obverse keyways
L	20-565-RP	6	Primus RP UL 437 high security
L	91-718-XP	7	Primus XP SL (restricted Everest 29R and Everest B keyways)
L	20-565-XP	6	Primus XP (restricted Everest 29S or T and Everest C or D keyways)
L	91-518-XP	6	Primus XP UL 437 high security
L-CO[1]	–	6	Lever is made to fit Corbin Russwin® CR2000-034 KIL cylinder
L-SA[1]	–	6	Lever is made to fit Sargent 6 and 10 line KIL cylinders

Interchangeable Cores

Cylinder type	Sold separate part number	Pins	Cylinder mechanism
R	23-030 23-031 (no logo)	6	FSIC pin and tumbler (default)
M	91-161 91-162 (no logo)	7	FSIC SL cylinder (restricted Everest 29R or Everest B)
M	91-861-XP 91-862-XP (no logo)	7	FSIC Primus SL (restricted Everest 29R and Everest B keyways)
J	20-740 20-741 (no logo)	6	FSIC Primus
J	20-740-XP 20-741-XP (no logo)	6	FSIC Primus XP
J-CO6[1]	–	6	Lever is made to fit Corbin Russwin® 8000 LFIC
J-CO7[2]	–	7	Lever is made to fit Corbin Russwin® 8000-7 LFIC
J-MED[1]	–	6	Lever is made to fit Medeco 32 Series FSIC
J-SA[1]	–	6	Lever is made to fit Sargent 6300 LFIC
J-YA6[1]	–	6	Lever is made to fit Yale 1210 or Medeco 31 FSIC
J-YA7[2]	–	7	Lever is made to fit Yale 1220 FSIC
T	23-030-ICX	6	FSIC refundable construction core – color coded
G	80-037	7	SFIC combinated (Everest 29R) (default SFIC)
H	80-035	6	SFIC refundable construction core – color coded

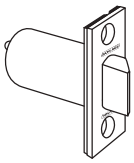
Latches & Strikes

Latches

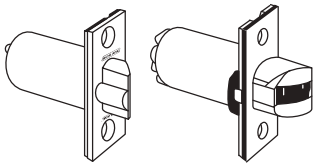
ND latches are adjustable for flat or bevel edged doors, and are finished to match the lock trim. All ND Series latches have 1/2" throw and 1" housings except the anti-friction fire door latch, which has a 3/4" throw. Please see the Schlage pricebook for more options including extended backset strikes (up to 5") and rabbited latch and strike kits.

	Part Number	Backset	Description
Springlatch	13-248	2-3/4"	Square corner, 1-1/8" x 2-1/4" (default springlatch)
	14-010	3-3/4"	Square corner, 1-1/8" x 2-1/4"
Deadlatch	14-047	2-3/8"	Square corner, 1-1/8" x 2-1/4"
	14-048	2-3/8"	Square corner, 1" x 2-1/4"
	13-247	2-3/4"	Square corner, 1-1/8" x 2-1/4" (default deadlatch)
	14-042	2-3/4"	Anti-friction fire door latch (3/4" throw)
	14-028	3-3/4"	Square corner, 1-1/8" x 2-1/4"

Springlatch



Deadlatch



3/4" throw anti-friction deadlatch for pairs of fire doors

Strikes

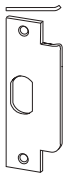
The ND Series is available with both T-Strike and ANSI strikes in a variety of lip lengths to accommodate different door preps.

	Part Number	Available Lip Lengths[1]	Description
T-strike	10-013 xx	1-1/8" 1-1/2"	T-strike, square corner, with strike box, 1-1/8" x 2-3/4". For ND and wired ND only.
	10-016	1-1/8"	T-strike, square corner, with deep strike box, for fire door latch. 1-1/8" x 2-3/4". For ND and wired ND only.
	10-132 xx	1-1/8" 1-1/2"	T-strike, square corner, with strike box, DPS magnet, 1-1/8" x 2-3/4". For NDE only.
	10-133	1-1/8"	T-strike, square corner, with deep strike box, DPS magnet, for fire door latch. 1-1/8" x 2-3/4". For NDE only.
ANSI	10-025 xx	1-3/16" 1-3/8" 1-1/2"	ANSI, no box, 1-1/4" x 4-7/8" (1-3/16" lip is default strike). For ND and wired ND only.
	10-130 xx	1-3/16" 1-3/8" 1-1/2"	ANSI, no box, DPS magnets, 1-1/4" x 4-7/8" (1-3/16" lip is default strike). For NDE only.
	K510-066	–	Box for ANSI strike.

1. Specify lip length (xx) as LIP1-1/8 for 1-1/8", LIP1-1/2 for 1-1/2", etc.

T-strike
(10-013)
1-1/8" x 2-3/4" x 3/32"

ANSI strike - default
(10-025)
1-1/4" x 4-7/8" x 3/32"



ND Series Ordering Instructions

To order ND Series products, attribute values should be provided in the same sequence shown below. Each value should be separated by a period.

Example

Inside lever design different than outside

ND80	.	P6	.	8RO	.	626	.	RHO
2		3		4A		4C		5A

		Required for all lock orders		Outside style			Inside style						Door dimensions			Options										Keying		
	Brand	Series + Function	Cylinder type (keyed functions only)	Outside lever design	Outside rose design	Outside finish	Inside lever design	Inside rose design	Inside finish	Handing (HSLR or Indication trims)	Latch	Strike	Door thickness	Extended	Strike lip length	Latch extension	Box for ANSI strike	Pack cylinders loose (PLC)	Trim options	Breakaway Rhodes lever	Special options	Screw option	Request to Exit (RX)	Buy American Act compliant	Keying code	Keyway	Pack keys independently
	1	2	3	4A	4B	4C	5A	5B	5C	6	7	8	9A	9B	9C	10A	10B	10C	10D	10E	10F	10G	10H	10I	11A	11B	11C

Only required if specifying less rose.

Only required if specifying different than outside style.

Only required when deviating from the products default. Specify only the deviated attribute(s).

Only required when deviating from the product default. Specify only the deviated attribute(s).

Detail		
1	Brand	Specify SCH for Schlage (required only when specifying a product Less "LLL" any attribute).
2	Series + Function	Specify ND + function choice from list
3	Cylinder type (specify code for keyed functions only)	**Conventional cylinders** **P6** 6-pin cylinder (default) **P** 6-pin cylinder, keyed 5 **Z** Everest SL cylinder, 7-pin **L** Less Schlage cylinder **C** Less double cylinder **FSIC – Full size interchangeable core** **R** FSIC, 6-pin **T** FSIC – Construction Core **M** Everest SL – FSIC, 7-pin **J** Less Schlage FSIC **SFIC – Best® style, small format interchangeable cores** **G** SFIC 7-pin **H** Refundable Construction SFIC **BDC** Disposable Construction SFIC **B** Less SFIC Other options feature levers made to fit competitive cylinders (see page 34 for complete list).
4	Outside style	**4A:** input lever code **4B:** required only if specifying less rose **4C:** input ANSI finish code
5	Inside style	Specify only if different than outside design choices or if specifying a product Less (LLL) any attribute
6	Handing	When ordering HSLR or Indication trims, specify: **LH** Left Hand; **LHR** Left Hand Reverse; **RH** Right Hand; **RHR** Right Hand Reverse
7	Latch	Leave blank or specify part number if different from default latchbolt 13-247: 2-3/4" backset-with 1-1/8" x 2-1/4" square corner faceplate
8	Strike	Leave blank or specify part number if different from default strike 10-025: ANSI, no box, 1-1/4" x 4-7/8"
9	Door dimensions	Specify only attributes that deviate from these defaults: **9A:** 1-3/4" thickness **9B:** EE (Extended equally) **9C:** 1-3/16" lip
10	Options	Specify desired additional options: **10A:** 43-005 (5" backset extension) **10B:** K510-066 **10C:** PCL **10D:** Indicator message or instruction rose options – see price book **10E:** Breakaway Rhodes lever is dependent on type (closed, KIL, FSIC, or SFIC) – see price book **10F:** XN12-012 (standard trim chassis spacers) or XN12-307 (lead lining) **10G:** TORX **10H:** RX (functions ND10, ND12, ND80, ND81, and ND96) **10I:** BAA
11	Keying	Specify desired additional options: **11A:** Keyed Different (KD) **11B:** Specify only if different from default of Everest 29 S123 (Conventional and FSIC cylinders) or, if master keyed, Everest 29 S145 (Conventional and FSIC) and R125 (SFIC) **11C:** Specify only when requesting that keys be packed independently.

NDE Wireless Electronic Lock Ordering Instructions

NDEB - P6 - SPA - 626 - LAT - XXX - XX-XXX - XXXXXXXX - XXX - S123

1	2	3	4	5	6	7	8	9	10
Series	Lever Cylinder	Outside: Lever Style	Outside: Finish	Inside (optional): Lever Style	Inside (optional): Finish	Backset & Latch	Strike	Dim	Additional Details

Selections correspond with the numbers above. See price book for specific configuration options.

Detail		
1	Series	Specify NDEB: Mobile enabled cylindrical lock with configurable functions Specify NDEBSi: Mobile enabled cylindrical lock with configurable functions that fully support the security application area of HID® credential types
2	Lever cylinder	Conventional P6 6-pin cylinder (default) Z Everest SL cylinder, 7 pin L Less cylinder FSIC – Full size interchangeable core R FSIC, 6-pin J Less FSIC T FSIC – Construction Core SFIC – Best® Style, Small format interchangeable core G SFIC 7-pin B Less SFIC H Refundable Construction SFIC BDC Disposable Construction SFIC Other options feature levers made to fit competitive cylinders (see page 34 for complete list).
3	Outside lever style	Input lever code: ATH (Athens), BRK (Boardwalk), BRW (Broadway), LAT (Latitude), LON (Longitude), OME (Omega), RHO (Rhodes), SPA (Sparta), TLR (Tubular), or tactile warning options
4	Outside finish	Input ANSI finish code: 605 (Bright Brass), 606 (Satin Brass), 612 (Satin Bronze), 619 (Satin Nickel), 622 (Matte Black), 625 (Bright Chrome), 626 (Satin Chrome), 626AM (626 with antimicrobial), 643e (Aged Bronze)
5	Inside lever style	Specify only if different than outside style
6	Inside finish	Specify only if different than outside finish
7	Backset & latch	Leave blank or specify part number if different from default latchbolt 13-247: 2-3/4" backset, deadlatch, square corner, 1-1/8" x 2-1/4"
8	Strike	Leave blank or specify part number if different from default strike 47267101: ANSI, no box, 1-1/4" x 4-7/8"
9	Dim (strike lip length)	Leave blank or specify part number if different from default 1-3/16" lip
10	Additional details (keying)	Specify only if different from these defaults: Keyed Different (KD); Everest 29 S123 (Conventional and FSIC cylinders) or, if master keyed, Everest 29 S145 (Conventional and FSIC) and R125 (SFIC)

4040XP Series

The 4040XP Series is LCN's most popular door closer—and for good reason. This durable non-handed, surface-mounted heavy-duty closer, is designed for the most demanding high-use-and-abuse applications as well as for easy installation and maintenance.

Features

Certifications	Grade 1 - ANSI A156.4, UL 10C, ADA, 100 hour salt spray, meets BAA - Buy American Act
Body construction	▪ Patent-pending positive stop ▪ Patent-pending regulation valve indicators ▪ Independent speed adjustments ▪ QR code for instructions and support ▪ Cast iron body ▪ Full complement bearing ▪ 1 ½" diameter piston ▪ Double heat treated pinion journal
Fluid	All weather liquid X fluid
Handing	Non-handed
Templating	Peel-n-Stick templates - 2 ¼" x 5" mounting hole pattern
Size	Adjustable spring size 1-6, includes LCN Green Dial
Warranty	30 years

Cover	▪ Redesigned snap-fit plastic cover (PC) with improved retention fit, standard ▪ Metal Cover (MC), optional
Fasteners	Self reaming and tapping screws (SRT)
Mounting	Hinge (pull side), top jamb (push side), parallel arm (push side)
Arms	Regular arm
Finishes/colors/ powder coat	▪ 622 Matte black ▪ 689 Aluminum ▪ 690 Statuary bronze ▪ 691 Light bronze ▪ 693 Black ▪ 695 Dark bronze ▪ 696 Brass ▪ Custom colors optional
	▪ Optional SRI primer - powder coat only ▪ Optional plated finishes

Special templates | Customized installation templates or products may be available to solve non-standard applications. Contact LCN Product Support for assistance.

Mounting						Finish		Cover		Cylinder			Arm function*							
Hinge (pull) side	Top jamb (pull)	Top jamb (push)	Parallel arm	Stop face	Powder coat	Plated	Plastic	Metal	Non-handed	Non-sized	Accessibility	Delay Action***	CYLAVB**	Regular (double)	Standard (single)	Hold Open	Fusible Link	EDA/HEDA	CUSH/HCUSH	SCUSH/SHCUSH	Double Egress
■	■	■	■	■	■	■	■	■	■	■	♿	■	■	120°	■	120°	■	180°	110°	110°	■

■ Available
■ Not available

♿ Closer available with less than 5.0 lbs. opening force on 36" door.
* Maximum opening/hold open point with standard template.
** Advanced Variable Back Check.
*** Delay feature incorporates standard 4040 cylinder (not XP).

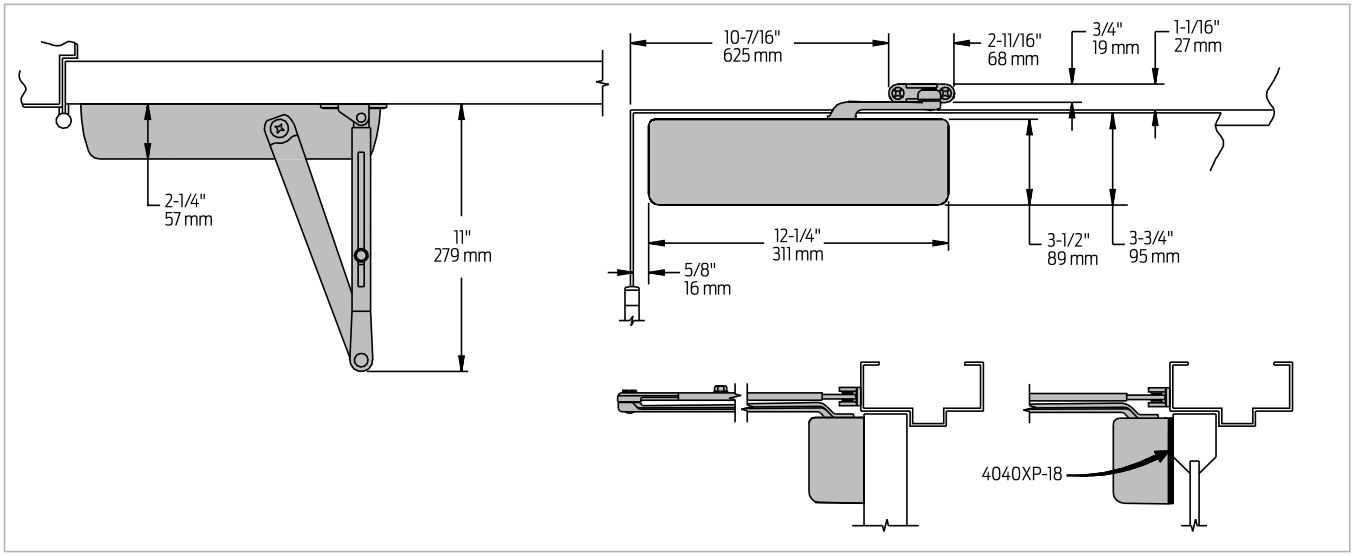
Adjustments

There are several design features that make installation or adjustment of the 4040XP easier and more intuitive.

- **LCN Green Dial** provides a visual reference of the spring power setting, taking the guesswork out of spring power adjustments.
- **Additional adjustments** can be made to the back check, main, and latch regulation valves which are labeled for easy identification.
  - Labels correspond to a diagram with door swing zones located on the closer body.
- **Patent-pending positive stop feature** on all regulation valves. The improved staking feature prevents the screw from being backed out and causing accidental damage to the product.
  - The patent-pending regulation valve indicators provide visual color indicators of how far a screw is backed out—the more visible the component, the faster the speed.
  - This makes adjustments simpler and more intuitive.
- **New QR code** that provides on-the-spot access to interactive installation and maintenance instructions and tech support.

Mounting details

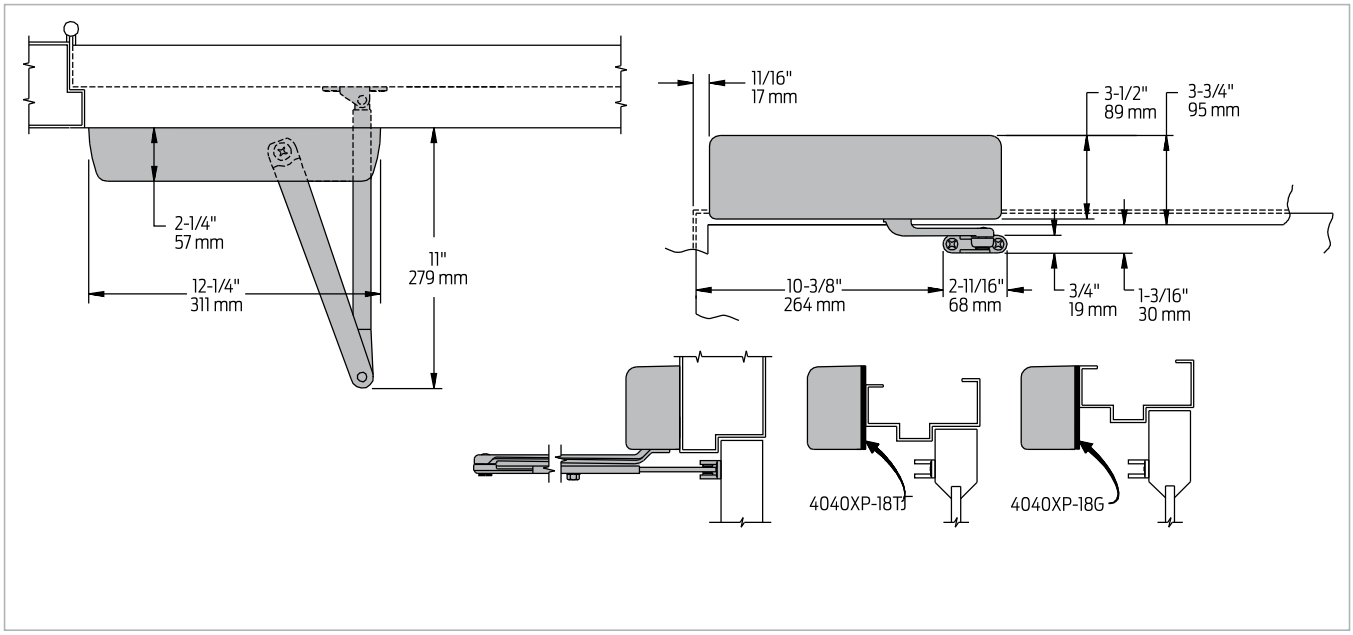
Hinge (pull) side mounting



Butt hinges	Should not exceed 5" (127 mm) in width
Auxiliary stop	Recommended at hold open point or where a door cannot swing beyond 120°
Reveal	Should not exceed 3/4" (19 mm) for Regular or Hold Open Arm
Top rail	Less than 3 3/4" (95 mm) requires plate, 4040XP-18; Plate requires 2" (51 mm) minimum
Clearance	2 3/8" (60 mm) behind door required for 90° installation
Delay action	▪ Incorporates standard 4041 cylinder ▪ Delays closing from 120° to 70° ▪ Delay time adjustable up to approximately 1 minute
Maximum opening	▪ Templating allows up to 120° ▪ Hold open points 90° up to 120° with Hold Open Arm

Mounting details

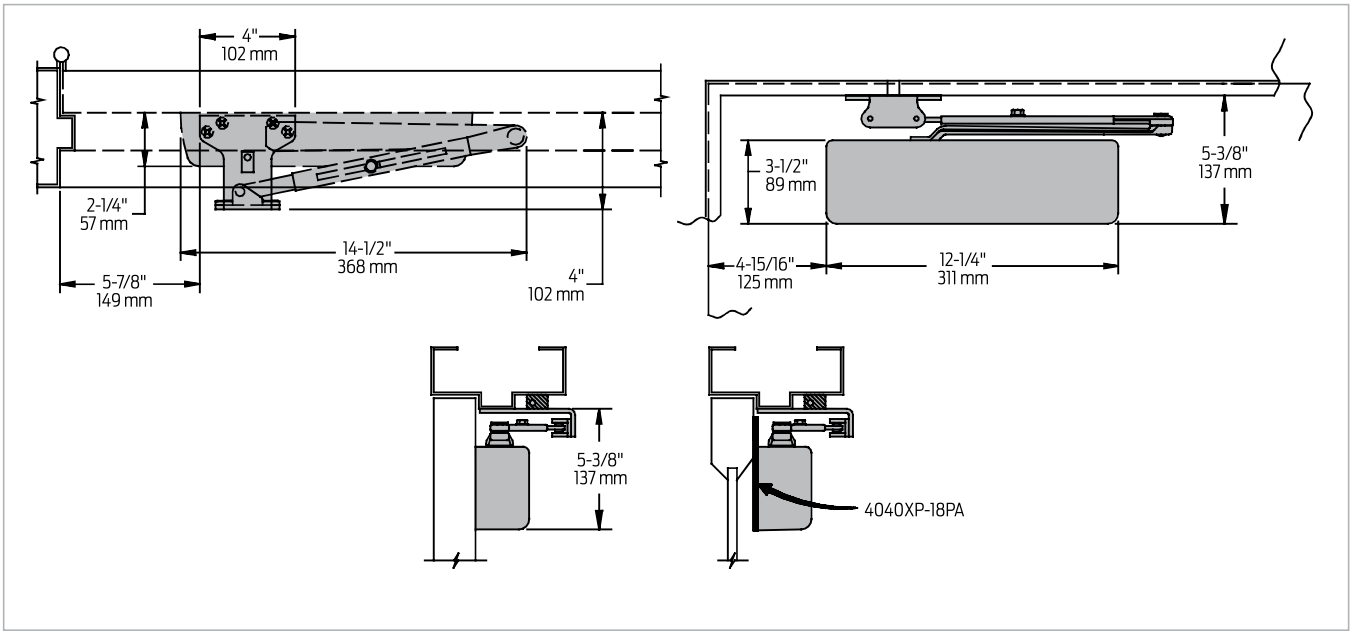
Top jamb (push) side mounting



Butt hinges	Should not exceed 5" (127 mm) in width		
Auxiliary stop	Recommended at hold open point or where a door cannot swing beyond 120°		
Reveal	Arm type	Reveal	Max opening
	Regular Arm	2 9/16"	Up to 120°
	Long Arm	4 13/16"	Up to 120°
	Hold Open Arm	2 9/16"	Up to 120°
	Hold Open Long Arm	8"	Up to 120°
Top rail	▪ Requires 1 1/4" (32 mm) minimum ▪ 2 1/4" (57 mm) minimum with closer on plate, 4040XP-18TJ ▪ 3" (76 mm) minimum with closer on plate, 4040XP-18G		
Head frame	▪ Less than 3 1/2" (89 mm) requires plate, 4040XP-18TJ ▪ With flush ceiling, use plate, 4040XP-18G. Either plate requires 1 3/4" (44 mm) minimum		
Maximum opening	▪ Templating allows up to 120° ▪ Hold open points 85° up to 120° with Hold Open Arm		
Delay action	▪ Incorporates standard 4041 cylinder ▪ Delays closing from 120° to 70° ▪ Delay time adjustable up to approximately 1 minute		

Mounting details

Parallel arm (push) side mounting



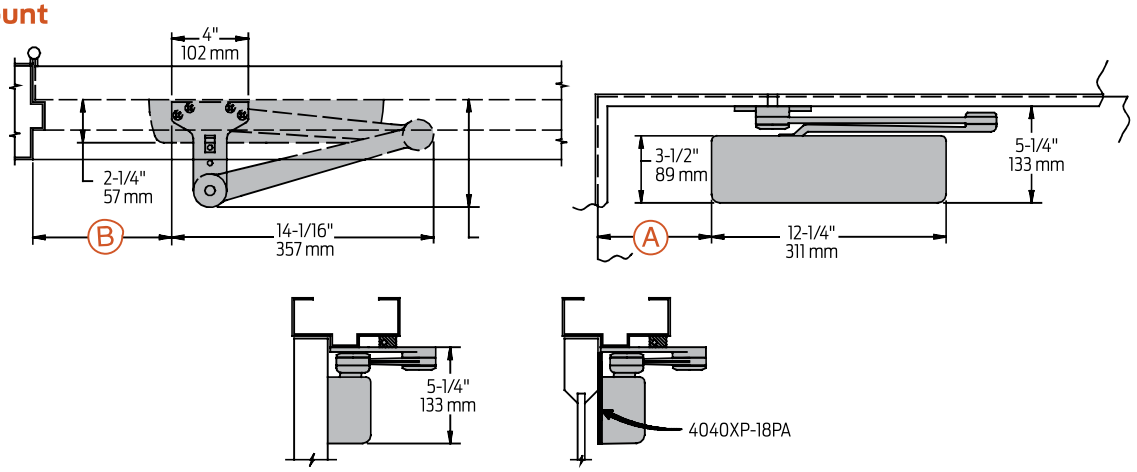
Butt hinges	Should not exceed 5" (127 mm) in width
Auxiliary stop	Recommended at hold open point, where the door cannot swing 180°, or where Cush-n-Stop Arm is not used
Reveal	Should not exceed 7/32" (6 mm)
Top rail	Less than 5 3/8" (137 mm) measured from the stop requires plate, 4040XP-18PA. Plate requires 2" (51 mm) minimum from the stop.
Head frame	Flush or rabetted requires PA shoe adapter, 4040XP-419
Stop width	Minimum 1" (25 mm). CUSH arm requires minimum 1 1/2" (38 mm)
Blade stop	Clearance requires 1/2" (13mm) blade stop spacer, 4040XP-61
Clearance	▪ 4040XP-62PA shoe is 4" (102 mm) from door face ▪ EDA shoe projects 5 1/2" (140 mm) from door face ▪ CUSH shoe projects 6" (152 mm) from door face
Delay action	▪ Incorporates standard 4041 cylinder, without XP cylinder ▪ Delays closing from 120° to 70° ▪ Delay time adjustable up to approximately 1 minute
Maximum opening	▪ 180° opening/hold open points with all except CUSH arms ▪ 110° opening/hold open with CUSH arms

Notes:
- Optional mounting requires PA shoe, 4040XP-62PA for regular or Hold Open Arms
- Add prefix "P" to closer description (eg. P4040XP)
- P4040XP closer includes 4040XP-201 fifth hole spacer to support PA shoe

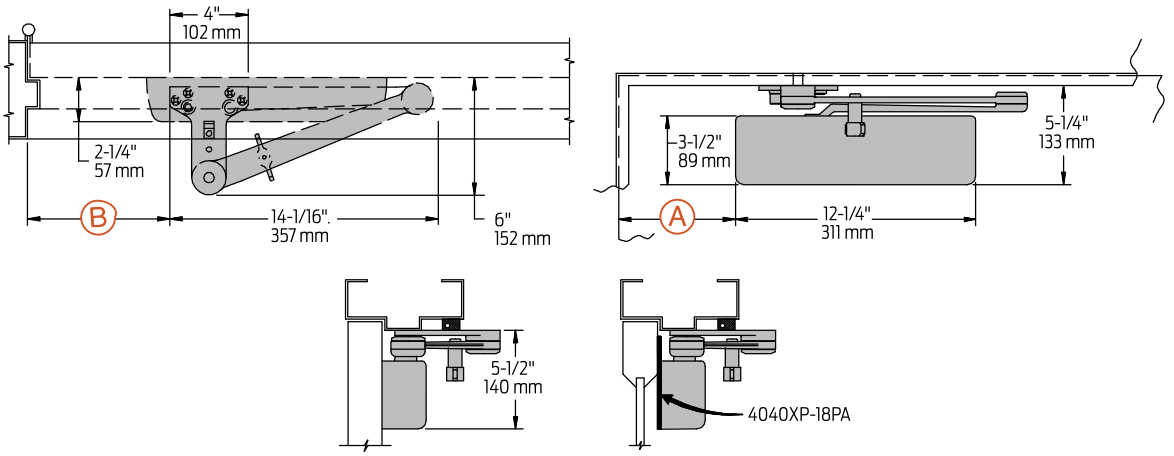
Mounting details

EDA and CUSH mounting

EDA mount



CUSH mount



Clearance	4040XP-62EDA is 5 1/2" (140 mm) from door face; 6" (152 mm) for CUSH	
Head frame	Flush or rabetted requires CUSH flush panel adapter, 4040XP-419	
CUSH Arm	Requires shoe support, 4040XP-30 for fifth screw anchorage where reveal is less than 3 1/16" (78 mm)	
Delay action	▪ Incorporates standard 4041 cylinder, without XP cylinder ▪ Delays closing from maximum opening to; 115° with 180° template, 95° with 110° template, 85° with 100° template, 75° with 90° template (delay time adjustable up to approximately 1 minute)	
Maximum opening	EDA arm can be templated for points at:	CUSH arms can be templated for opening/hold open point at:
	110°: A = 6 3/8" (162 mm) B = 7 3/4" (197 mm)	85°: A = 7 15/16" (202 mm) B = 9 1/8" (232 mm)
	or 180°: A = 2 7/8" (73 mm) B = 4 1/4" (108 mm)	90°: A = 7 3/16" (183 mm) B = 8 1/2" (216 mm)
	Hold open points up to maximum opening with HEDA arm	100°: A = 6 1/16" (154 mm) B = 7 1/4" (184 mm)
		or 110°: A = 5 1/16" (129 mm) B = 6 3/8" (162 mm)

Notes:
- 4040XP Series closers ordered with EDA or CUSH arms include 4040XP-201 fifth hole spacer to support the shoe
- SCUSH stop points are approximately 5° more than templated stop point
- Hold open at templated stop points

Accessories

Cylinders

4040XP-3071
Cast iron cylinder assembly (CYL)
- Non-handed
- Heavy duty

4041-3071 DEL
Delay Action Cylinder (CYLDEL)
- Used for delayed action closing
- Non-handed
- Heavy duty

Covers

4040XP-72
plastic cover (PC)
- Non-handed
- Includes 4040XP-54 snap-on cover clip
- Redesigned patent-pending snap-fit cover with improved retention fit

4040XP-72MC
metal cover (MC)
- Handed
- Required for plated finishes and custom powder coat finishes
- Optional

Arms

4040XP-3077
Regular Arm (REGARM)
- Non-handed
- Mounts pull side or top jamb with shallow reveal P4041 closer includes PA shoe, 4040XP-62PA required for parallel arm mounting

4040XP-3077L
Long Arm (LONG)
- Non-handed
- Includes long rod and shoe, 4040XP-79LR for top jamb mount
- Optional

4040XP-3077ELR
Extra Long Arm (XLONG)
- Non-handed
- Includes extra long rod and shoe, 4040XP-79ELR for top jamb mount with deep reveal
- Optional

4040XP-3049
Hold Open Arm (H)
- Non-handed
- Mounts pull side or top jamb with shallow reveal, hold open adjustable shoe
- 4040XP closer includes 4040XP-62PA shoe required for parallel arm mounting
- Optional

4040XP-3049L
Hold Open Long Arm (HLONG)
- Non-handed
- Includes long head and tube, 4040XP-3048L for top jamb mount
- Optional

4040XP-3077EDA
Extra Duty Arm (EDA)
- Non-handed
- Features forged, solid steel main and forearm for potentially abusive installations
- Optional

4040XP-3049EDA
Hold Open Extra Duty Arm (HEDA)
- Handed
- Parallel arm features forged, solid steel main and forearm for potentially abusive installations
- Hold open function is adjusted at the shoe
- Optional

4040XP-3077EDA/62G
Extra Duty Arm with 62G Thick Hub Shoe (EDAW62G)
- Non-handed
- Features forged, solid steel main and forearm for potentially abusive installations
- 62G shoe provides additional blade stop clearance
- Optional

4040XP-3049EDA/62G
Hold Open Extra Duty arm with 62G Thick Hub Shoe (HEDA62G)
- Handed
- Features forged, solid steel main and forearm for potentially abusive installations
- 62G shoe provides additional blade stop clearance; hold open function is adjusted at the shoe
- Optional

4040XP-3077CNS
Cush-n-Stop Arm (CUSH)
- Non-handed
- Features solid forged steel main arm and forearm with stop in soffit shoe.
- Optional

4040XP-3049CNS
Hold Open Cush-n-Stop Arm (HCUSH)
- Non-handed
- Hold open function with templated stop/hold open points
- Handle controls hold open function
- Optional

Accessories

Arms (cont.)

4040XP-3077SCNS
Spring Cush-n-Stop Arm (SCUSH)
- Non-handed
- For potentially abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe
- Optional

4040XP-3049SCNS
Spring Hold Open Cush-n-Stop Arm (SHCUSH)
- Non-handed
- For potentially abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe
- Handle controls hold open function
- Optional

Installation accessories

4040XP-18
Plate
- Required for hinge side mount where top rail is less than 3 3/4" (95 mm)
- Requires minimum 2" (51 mm) minimum top rail

4040XP-18G
Plate
- Locates top jamb mounted closer flush with top of head frame face in flush ceiling condition
- Requires 1 3/4" (44 mm) minimum head frame

4040XP-18TJ
Plate
- Centers top jamb mounted closer vertically on head frame where face is less than 3 1/2" (89 mm). Plate requires 1 3/4" (44 mm) minimum head frame

4040XP-18PA
Plate
- Required for parallel arm mounting where top rail is less than 5 1/2" (140 mm), measured from the stop
- Requires 2" (51 mm) minimum top rail

4040XP-62PA
PA shoe
- Required for parallel arm mounting

4040XP-30
CUSH shoe support
- Provides anchorage for fifth screw used with CUSH arms, where reveal is less than 3 1/16" (78 mm)
- Optional

4040XP-61
Blade stop spacer
- Required to lower parallel arm shoe to clear 1/2" (13 mm) blade stop
- Optional

4040XP-419
PA flush panel adapter
- Provides horizontal mounting surface for parallel arm shoe on single rabbeted or flush frame
- Optional

4040XP-62A
Auxiliary shoe
- Requires a top rail of 7" (178 mm)
- Shoe replaces -62PA for parallel arm mounting of regular arm with overhead holder/stop
- Optional

4040XP-54
Snap-on cover clip
- Used to secure 4040XP-72 plastic cover to cylinder body

Ordering information

How-to-order 4040XP Series closers

1. Select finish

☐ Standard powder coat _____
Matte Black (622), Aluminum (689), Dark Bronze (695), Statuary Bronze (690), Light Bronze (691), Black (693), or Brass (696)

Closer will be shipped with:
- Standard cylinder
- Standard cover
- Regular arm
- Self reaming and tapping screws
(unless options listed below are selected)

Closer options

Cylinder
☐ Delay Action Cylinder (CYLDEL)

Cover
☐ Metal (specify right or left hand)(MC)

Finish
☐ Custom powder coat (RAL) _____
(handed metal cover required)
☐ Plated finish, US _____
(handed metal cover required)
☐ SRI primer
(use with powder coat finishes only)

Arm
☐ Regular Arm (REGARM)
☐ Regular Arm with Parallel Arm Bracket (RWPA)
☐ Regular Arm with 62A Auxiliary Shoe (RW62A)
☐ Long Arm (LONG)
☐ Extra Long Arm (XLONG)
☐ Hold Open Arm (H)
☐ Hold Open with Parallel Arm Bracket (HWPA)
☐ Hold Open Long Arm (HLONG)
☐ Extra Duty Arm (EDA)
☐ Extra Duty Arm with 62G Thick Hub Shoe (EDAW62G)
☐ Hold Open Extra Duty Arm (HEDA)
☐ Cush-n-Stop Arm (CUSH)
☐ Hold Open Cush-n-Stop Arm (HCUSH)
☐ Spring Cush-n-Stop Arm (SCUSH)
☐ Spring Hold Open Cush-n-Stop Arm (SHCUSH)

Optional screw packs
☐ Through Bolt[1] Self Reaming and Tapping Screws (TBSRT)
☐ Wood and Machine Screws (WMS)
☐ Through Bolt[1] Wood and Machine Screws (TBWMS)
☐ Torx Machine Screws (TORX)
☐ Through Bolt[1] and Torx Machine Screws (TBTRX)

Installation accessories
☐ Plate, 4040XP-18
☐ Plate, 4040XP-18TJ
☐ Plate, 4040XP-18G
☐ Plate, 4030-18PA
☐ CUSH shoe support, 4040XP-30
☐ Blade stop spacer, 4040XP-61
☐ Auxiliary shoe, 4040XP-62A
☐ PA flush panel adapter, 4040XP-419

Special template
☐ ST- _____

1. Specify door thickness if other than 1 3/4".

Table of sizes

- 4040XP cylinders are adjustable from size 1 through size 6 and is shipped set to size 3
- Closing power of 4040XP Series closers may be adjusted 50%

Exterior (and vestibule) door width

24" 610mm	30" 762mm	36" 914mm	42" 1067mm	48" 1219mm
size 3	size 4	size 5	size 6	

*4040XP → Minimum door width

Interior door width

24" 610mm	30" 762mm	38" 965mm	48" 1219mm	54" 1372mm	60" 1524mm
size 2	size 3	size 4	size 5	size 6	

*4040XP → Minimum door width

→ Indicates recommended range of door width for closer size.
* Adjustable Size 1 thru 5.

Reduced opening force 4040XP Series closers

CAUTION! Any manual door closer, including those certified by BHMA to conform to ANSI Standard A156.4, that is selected, installed and adjusted based on ADA or other reduced opening force requirements may not provide sufficient power to reliably close and latch a door.

Refer to Automatic Operators catalog for information on systems that meet reduced opening force requirements without effecting closing power.

Door width	36"	42"	48"
8.5* lbs.	4040XP	4040XP	4040XP
5.0* lbs.	4040XP	4040XP	4040XP

* Maximum opening force.

Finishes

Standard powder coat finishes

LCN powder coating provides superior protection against the effects of weather conditions and is an environmentally friendly process. The high quality finish is chip resistant. Corrosion resistance surpasses 100 hours salt spray testing (four times the industry standard). Non-metallic components also provide the same high resistance to the effects of the elements. All LCN products must be shipped with a finish.

LCN standard finishes (ANSI/BHMA number):

622 Matte Black Paint

689 Aluminum Paint

690 Statuary Bronze Paint

691 Light Bronze Paint

693 Gloss Black Paint

695 Dark Bronze Paint

696 Brass Paint

Optional custom powder coat finishes

LCN offers custom powder coating to provide a custom appearance and all the corrosion resistance of standard powder coat finishes at a nominal additional cost. LCN uses the RAL numbering system for the 150+ custom colors available. Contact your local RSO representative for a brochure showing the available custom colors.

Note: Custom powder coat finishes require a metal cover.

Optional plated finishes

Visible components such as metal covers, arms, fasteners, and finish plates are plated to match the selected finish. Surface mounted tracks are powder coated to compliment the plated finish. Hidden assemblies such as cylinders, tracks, and mounting plates are supplied with a powder coated finish. Plated finishes require handing of closers.

Plated finishes:

616 Satin Bronze, Blackened
632 Bright Brass
633 Satin Brass
639 Satin Bronze
646 Satin Nickel
651 Bright Chrome
652 Satin Chrome

Special Rust Inhibitor (SRI) process

For installations where a higher level of protection against weather conditions, or the effects of a potentially corrosive atmosphere is required, LCN offers a Special Rust Inhibitor (SRI) process. Ferrous metal components receive an SRI pretreatment and a standard powder coat finish of your choice, or a custom powder coat finish for a nominal additional cost. Closers treated with the SRI process exceed the 100 hour protection level available with standard LCN powder coated finishes. For details, contact your local RSO representative or the LCN factory.

Standard anodized finishes

LCN Senior Swing and Benchmark electromechanical automatic operators are offered with an anodized finish. Anodizing is an electrochemical process that thickens and toughens the protective oxide on aluminum metal.

LCN anodized finishes:

628 Aluminum, Clear Anodized
710 Dark Brown, Anodized

Materials

The LCN offering consists of well-made, reliable, long-lasting products that work in real-life applications. In addition to the mechanical advantages derived from proven designs, much of the durability of the closer and arm system is directly related to the materials used in their manufacturing.

Precision machined cast iron cylinders and forged steel pistons work together because of the compatibility of their basic elements. Heat-treated pinions and pistons spread the load over a large gear tooth system to better handle the wear and stress of millions of operating cycles. Upper and lower full complement pinion bearings provide the support and load capacity required by the design of the closer. All-weather fluid, Liquid X, reduces the amount of adjustments and maintenance needed and ensures consistent performance through every season.

Forged steel main arms are a durable alternative to lower-cost stamped steel arms. Specially designed shoe and elbow joints help each closer fit securely onto a variety of opening applications. A state-of-the-art, powder coat process delivers a high quality, corrosion resistant finish on all metal parts in popular architectural finishes.

Through state-of-the-art equipment, processes and people, we believe LCN will continue to provide the best solutions for our customers.

90 Series surface overhead door holders/stops

90 Series heavy-duty

Glynn-Johnson 90 Series holders and stops are the most rugged models available for heavy-duty applications. The channel is surface-mounted to the door, most often with sex bolts, and the jamb bracket is surface mounted to the jamb, requiring minimal door and frame preparation.

These versatile units can be used in conjunction with most surface-applied door closers. The provided templates allow for variable mounting positions, ranging from 85º to 110º hold-open/stop angle. These templates are designed for installation in almost all types of doors, including doors with conventional butt-type hinges or specialty hinges.

Four models:

- 90H Series hold-open model
- 90S Series stop-only model
- 90F Series friction hold-open model
- 90SE Series special stop-only model

Five sizes:

- Simple
- Standardized
- Each model is available in five sizes

Three options:

- J—Angle jamb bracket
- SHIM—Blade stop shim kits
- SOC—Pin-in-socket security screw package

Unmatched convenience:

- Non-handed
- Improved compatibility with door closers
- Single-acting doors
- Interior/exterior applications
- Durable
- Easy to install
- Improved corrosion resistance
- Function conversion kits available

Materials and finishes

In 300 Series stainless steel, brass and steel substrates, these models are available in the largest selection of finishes in the industry. Stainless steel models offer the highest resistance to corrosion. Available in the following finishes:

Finish	Description
US3	Polished brass
US4	Satin brass
US10	Satin bronze
US10B	Oil rubbed bronze
US32	Polished stainless steel
US32D	Satin stainless steel
SP4	Powder coat brass
SP10	Powder coat bronze
SP28	Powder coat aluminum
SP313	Powder coat dark bronze
SPBLK	Powder coat black
652	Chrome-like coating

Models

Glynn-Johnson 90 Series door holders and stops provide long-lasting protection for doors, frames and hardware. All models incorporate a heavy-duty channel/slide-arm design and offset jamb bracket. This unique design allows for simple field modification of functions, should user requirements change.

90H Series hold-open

(Suffix H) Hold-open models provide a convenient method of holding the door open at a predetermined position for short or long periods of time, permitting an unobstructed traffic flow through the opening. The hold-open function can easily be turned on or off by simply rotating the serrated knob on the bottom of the channel. This knob engages the hold-open mechanism, allowing the door to be held open at a predetermined position ranging from 85º to 110º. When the knob is flipped over, it acts as a stop and shock absorber.

The tension on the hold-open mechanism can be adjusted using a phillips screwdriver to offset air currents or other exterior conditions. The hold-open tension adjustment is located on the top of the slider in the channel.

90S Series stop-only

(Suffix S) When the hold-open function is not a requirement, stop-only models provide a reliable method of door control. Stop-only models provide the same shock-absorbing capability as hold-open models. The stop-only model may be used on fire doors.

90F Series friction hold-open

(Suffix F) Friction hold-open models are ideal for patient room doors, wardrobe and closet doors or similar applications where multiple hold-open positions are desired. The friction tension can be adjusted through the top of the channel using an allen wrench. The friction tension adjustment is located on the top of the slider in the channel. The SE option cannot be added to an existing unit. It must be factory ordered.

90SE Series special stop-only

(Suffix SE) When stop-only models are used in conjunction with single-point, hold-only electronic door closers, the stop-only function may be ordered without the shock-absorbing mechanism. Used as an auxiliary stop, these models prolong the life of the closer. The stop location is adjusted using an allen wrench on the stop block located in the channel.

Note: Caution should be taken when using this option in other applications, as the elimination of the shock-absorbing spring can put added stress on the door and frame.

Application Information

UL Classification

The 90 Series stop-only models are classified by Underwriters Laboratories (UL) as miscellaneous fire door accessories. This classification applies to use on either hollow metal fire doors or wood fire doors. These units may be used on doors of any rating. As a reminder, the miscellaneous fire door accessories (GVUX) section is defined by UL as: "Miscellaneous fire door accessories are intended in the individual listings. The accessories have been investigated to determine that when installed in accordance with the manufacturer's instructions, the accessories do not adversely affect the fire rating of the fire door and/or fire door frames."

Dead-stop templating

Dead-stop templating is recommended for applications where a wall or similar obstruction is placed at an opening angle of 110° or less (i.e., doors that open back-to-back). Dead-stop templating can be applied to hold-open, stop-only and friction models. The dead-stop position is the point at which the shock-absorbing spring is fully compressed. Therefore, when dead-stop templating is used, the initial degree of opening will be 5° to 7° less than the dead-stop opening.

Example: If the holder is templated to a 100° dead stop, the door will hold open at an angle between 93° and 95° but no further than 100°.

Note: Do not use dead-stop templating on the 90SE Series since there is no shock-absorbing spring.

Environmental considerations

Environmental factors should always be considered when specifying overhead holders and stops. Doors that are positioned on a building's exterior or subject to corrosive conditions should be equipped with a holder constructed primarily of stainless steel or brass materials. For interior applications, steel is acceptable, though brass substrates generally provide a more attractive architectural-grade finish.

Options

Suffix J (angle jamb bracket)

An angle jamb bracket is available for converting standard models to hinge-side or flush transom mounting. The angle jamb bracket affixes to the standard jamb bracket. If ordered with the unit add suffix J. If needed separately order 90J by finish needed.

Suffix SOC (pin-in-socket security screws)

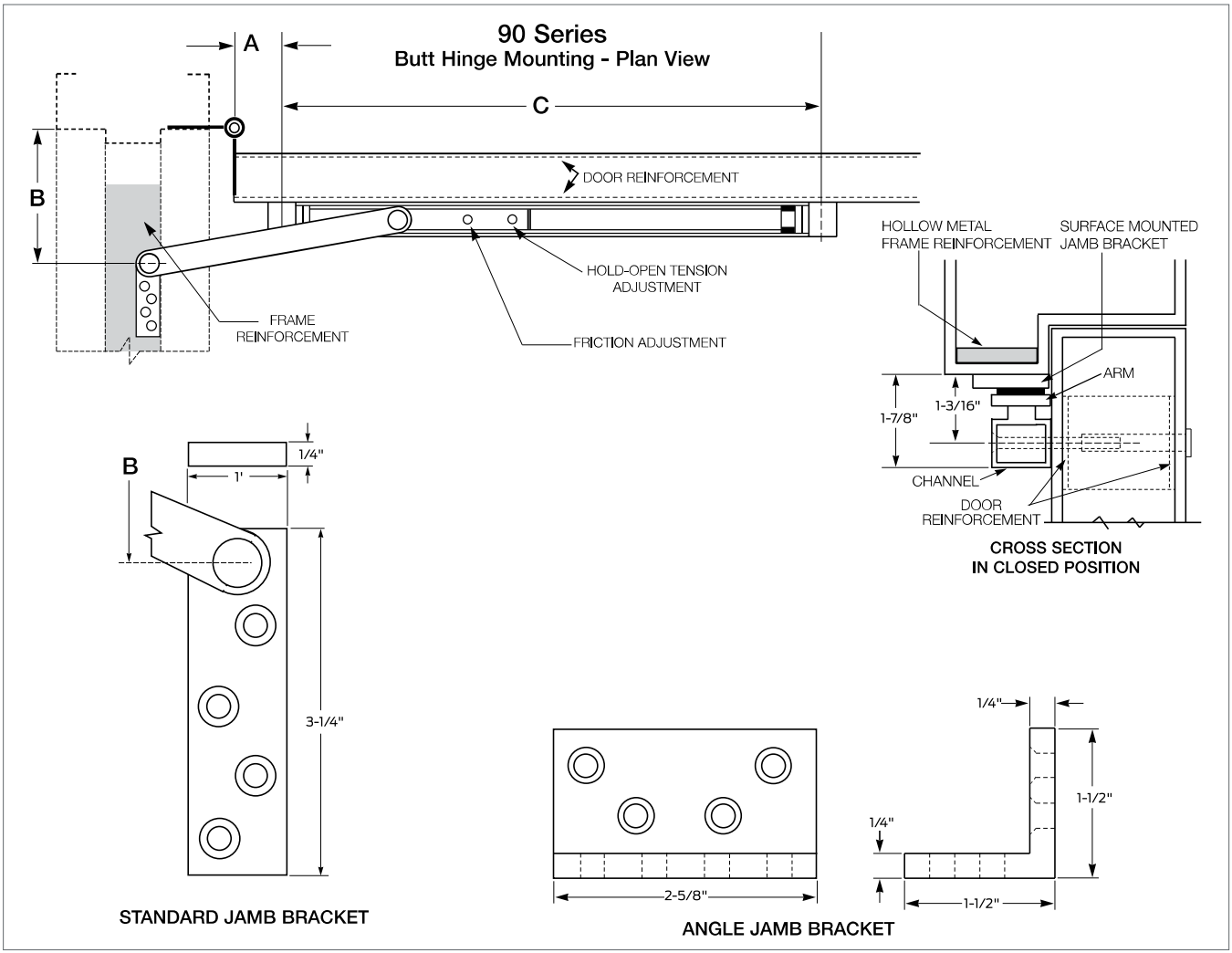
A screw package with pin-in-socket screws for mounting the door bracket and the jamb bracket is provided instead of the standard screw package.

Suffix SHIM (blade stop shims)

Shim kits are available in 3 sizes
90 SHIM1 is a 1/4" shim kit
90 SHIM2 is a 1/2" shim kit
90 SHIM3 is a 3/4" shim kit

If ordered with overhead, add suffix SHIM (1, 2 or 3). If needed separately order 90 SHIM (1, 2 or 3)–finish.

90 Series surface overhead door holders/stops



90 Series sizing chart

Butt/offset pivots

Size	Door opening	Stop only	Hold open	Friction
1	-	-	-	-
2	23 1/16" - 27"	902S	902H	902F
3	27 1/16" - 33"	903S	903H	903F
4	33 1/16" - 39"	904S	904H	904F
5	39 1/16" - 45"	905S	905H	905F
6	45 1/16" - 51"	906S	906H	906F

Center hung

Door opening	Stop only	Hold open	Friction
-	-	-	-
27 1/16" - 33"	902S	902H	902F
33 1/16" - 39"	903S	903H	903F
39 1/16" - 45"	904S	904H	904F
45 1/16" - 51"	905S	905H	905F
51 1/16" - 59"	906S	906H	906F

Note: This chart illustrates the most common types of hinging and door opening sizes.
For unusual door details, contact Glynn-Johnson for availability.

BHMA/ANSI, A156.8 and Fed. spec. cross reference

G-J model	BHMA*	Fed. spec.
902-906 H	C02511	1161
902-906 S	C02541	1161A
902-906 F	C02531	-

* First numeral (0) designates optional material.

To specify:
Brass material, change 0 to 1 (i.e. C12511)
Stainless steel material, change 0 to 5 (i.e. C52511)
Steel material, change 0 to 8 (i.e. C82511)

The template information on this page is for reference only and is not intended to serve as an installation template.
For more information, reference the Template Directory in the Document Library at us.allegion.com.

How to order

90 — 4 — H — US32D — J

Overhead Series:

90	

Size (door opening using butt or offset pivots):

2	(23 1/16"–27")
3	(27 1/16" –33")
4	(33 1/16"–39")
5	(39 1/16"–45")
6	(45 1/16"–54")

Function:

H	Hold-open
F	Friction hold-open
S	Stop-only
SE	Special stop-only

Finishes:

US3	Polished brass
US4	Satin brass
US10	Satin bronze
US10B	Oil rubbed bronze
US32	Polished stainless
US32D	Satin stainless steel
SP4	Powder coat brass
SP10	Powder coat bronze
SP28	Powder coat aluminum
SP313	Powder coat dark bronze
SPBLK	Powder coat black
652	Chrome-like coating

Options:

J	Angle jamb bracket
SHIM	Blade stop shims
	SHIM 1 1/4" kit
	SHIM 2 1/2" kit
	SHIM 3 3/4" kit
SOC	Pin-in-socket security screws

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Compatibility information	30

Finishes

Finish no.	**Description**
US3	Polished brass
US4	Satin brass
US10	Satin bronze
US10B	Oil rubbed bronze
US26	Polished chrome
US26D	Satin chrome
US28	Clear anodized aluminum
US32	Polished stainless steel
US32D	Satin stainless steel
313AN	Dark bronze anodized aluminum
652	Chrome-like coating on steel
SP4	Powder coat brass
SP10	Powder coat bronze
SP28	Powder coat aluminum
SP313/695	Powder coat dark bronze
SPBLK	Powder coat black

PART 1 GENERAL

1.1 Section Includes

.1 This section shall include the supply of all labour, materials, tools and appliances required for the execution and completion of all the work of glass for stainless steel cabinetry.

1.2 Related Sections

.1 Architectural Millwork – 06 40 00 .

.2 Metal Fabrications – 05 50 00.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

.2 Product data sheets: Submit manufacturer's Product data sheets for Products proposed for use in the work of this section, including additional data as may be required to demonstrate compliance with the Contract Documents.

.3 Test Results: Submit certified test results for each required fire resistance rated assembly for work of this section.

1.4 Warranty

.1 All work performed and materials supplied under this Section to be warranted from defects for a period of two (2) years from Substantial Completion.

1.5 Trade Qualifications

.1 Work of this Section shall be executed by a company able to deploy adequate equipment and skilled personnel to complete Work expediently in an efficient and orderly manner.

1.6 Handling And Storage

.1 Handle and store materials in accordance with manufacturer's and supplier's recommendations and so as to prevent damage. Deliver and store packaged materials in original, undamaged containers with manufacturer's labels and seals intact.

PART 2 PRODUCTS

2.1 Tempered Glass

.1 Thickness 6mm, single pane and shall be located in sliding cabinetry doors.

.2 Conform to National Standards of Canada CAN2-12.2-MT6.

2.2 Glazing Tape

.1 Tremco Manufacturing Co. 440 tape.

2.3 Setting Blocks

.1 Neoprene of dimensions to suit the location.

PART 3 EXECUTION

3.1 General

.1 Cut glass to measurements taken at site. Provide for glass expansion. See drawings, door and finish schedule for location and type of glass required

.2 Perform glazing in accordance with material manufacturers' directions to ensure rattle free cushioning. Set glass properly centred with uniform bit and face and edge clearance, free from distortion likely to develop stress.

.3 Clean glazing rabbets, stops and glass edges free of foreign matter that is detrimental to adhesion of glazing materials, with approved cleaner.

.4 Remove stops and replace securely attached and accurately aligned after glazing. Prevent damage to stops and finish.

.5 Set glass with equal bearing full width of pane. Using setting blocks, and spacers of proper size to support and hold glass position independent of the glazing tape.

.6 Apply continuous length of glazing tape to interior leg of glazing recess, making joints only at corners.

3.2 Cleaning of Glass

.1 On completion of the job and before acceptance by the Consultant, remove all paint spots, plaster spots, stickers, etc. from all glass and mirror surfaces throughout the job. All cleaning shall be done with clean water and detergent, and dried with squeegees and chamois.

.2 All protection erected under this Section shall be removed, all damage to this work and joining surfaces made good, all surplus materials and debris and tools, plant and equipment removed from premises.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Suspended metal grid ceiling system.

.2 Hangers and Grids.

.3 Acoustic lay-in tiles.

.4 Acoustic Baffles and Trims.

1.2 Quality Assurance

.1 Comply with applicable requirements of ASTM C636.

.2 Design suspension system to support lighting fixtures according to Ontario Hydro regulation and submit certification in accordance with Rule 30-302(1).

1.3 Submittals

.1 Samples: submit two samples of each type of acoustical panel specified; size: 300mm x 300mm. Upon consultant's request submit samples of suspension system components.

.2 Maintenance materials: provide minimum 50 panels of each type panel used. Obtain receipt and submit copy to Consultant.

1.4 Product Storage

.1 Store material in dry place, keep free of dampness.

1.5 Job Conditions

.1 Install ceiling systems after building has been completely enclosed and not before cementitious building elements are complete and cured and humidity levels are acceptable in the opinion of the Consultant.

.2 Ensure that work to be concealed by ceiling systems has been installed, tested, inspected and approved before starting work.

.3 Co-ordinate with Divisions 20 and 23 for work to be built into work of this Section.

1.6 Warranty

.1 All work performed and materials supplied under this Section to be warranted from defects for a period of two (2) years from Substantial Completion.

.2 30-yr Material Warranty for Ceiling Tiles.

PART 2 PRODUCTS

2.1 Materials

.1 Materials used in the work of this Section shall be manufactured by Armstrong Industries.

.2 Materials shall be delivered to the job in the manufacturer's original packages with seals unbroken and with the manufacturer's original name and contents shown legibly marked there on.

.3 All materials shall be of the latest type made by the manufacturer as specified.

2.2 Suspension

.1 All products to be selected for seismic restraint installation.

.2 Suspended Ceiling System for lay in Acoustic Panels shall be 15/16” Prelude by Armstrong. Components shall be formed from commercial quality cold-rolled steel, electro-galvanized. Exposed finish shall be low sheen satin white (or etched and anodized aluminum). The suspension system shall support the ceiling assembly shown on the drawings, or specified herein, with a maximum deflection of 1/360 of the span. Where noted on the drawings or Schedule of Finishes that the suspended ceiling shall be fire rated, the Suspended Ceiling System shall be 15/16” Prelude XL Fire Guard with the Acoustic Tile restrained with hold down clips.

.3 The ceiling pattern shall be as shown on the drawings using the following components: (1) Main Tee with double web design and with a rectangular bulb; with 24mm (15/16") exposed flange with a rolled cap, with cross tee holes at 150 mm (6") o.c., with hanger wire holes at 50mm (2") o.c.; with integral reversible splice. (2) Cross Tee with double web design and with a rectangular bulb; with web extending to form a positive interlock with main tee; with the lower flange extended and offset. (3) Wall Moulding with a channel or angle shape and with a 25mm (1") exposed face. (4) Hold Down Clips, where required, Suspension shall be with 2.6mm steel wire.

.4 The ceiling grid system shall be hung from structural elements, not the steel decking. Where joists or beams are not in a suitable location for the hangers, supply and install steel angles to safely span between structures and secure.

.5 Where required the support channels between roof joists shall be 38mm (1 1/2”) x 12.7mm (1/2”) and shall be 16 gauge.

.6 The above furring and suspension system shall be manufactured by Donn Canada Ltd., or Bailey Metal Products Ltd., Concord and installation shall comply in all respects with the manufacturer's recommendations.

.7 Accessories: splicers and fasteners, as required to provide complete and finished work; manufacturer’s standard types.

.8 Heavy duty T-section for sufficient edge support for ceiling radiant panels.

2.3 Acoustical Tiles

.1 Lay-in acoustical tiles

.1 Classification: Type XII, Form 2, Pattern E in accordance with ASTM E1264.

.2 Size: 610 mm x 1220 mm x 16 mm (24” x 48” x 5/8”).

.1 Acceptable Products:

.2 Armstrong Dune / Cortega 823A Ceiling Tiles, regular lay-in.

.3 Grid: 15/16” Prelude grid by Armstrong

2.4 Ceiling Accessories

.1 Edge Trim

.1 Acceptable Products:

.1 Armstrong Axiom Classic

2.5 Maintenance Materials:

.1 Deliver to site a minimum of two (2) full boxes of additional spare tiles.

PART 3 EXECUTION

3.1 Ceiling Layouts

.1 Lay out ceilings to in accordance with reflected ceiling plans and symmetrical within each area to obtain uniform borders. Where layout is not shown install ceilings as directed by Consultant.

.2 Finished Work shall be plumb, level and square with adjoining work.

3.2 Suspension System

.1 Suspend ceilings directly from structural members of from carrying channels supported from structural members. Do not fasten hangers to ducts, pipes, conduits.

.2 Erect suspension systems level with a maximum tolerance of 3mm over 3m length.

.3 Install main tees in accord with module size. Suspend at maximum 610mm o.c.

.4 Install cross tees perpendicular to main tees in accord with module size. Interlock with main tees.

.5 Hangers for suspended ceilings shall support grillage independently of walls, columns, pipes and ducts. Space hangers at maximum 1220mm o.c. along supporting grillage and not more than 150mm from ends. Do not place hangers in front of access panels.

.6 Make provisions for carrying fixtures occurring on and in suspended ceilings. Install additional hangers and reinforcing to ensure that loads being carried do not compromise

integrity of system. Frame around fixtures and openings as required.

.7 At light fixtures occurring on and in suspended ceilings, provide suspension hanger at each corner of fixture and at maximum 610mm o.c. around perimeter of fixture.

.8 Where ductwork, piping and other elements within ceiling spaces interfere with direct suspension of ceiling from structure, install additional framing securely fastened to main structure to accommodate proper hanging of ceiling.

.9 Exposed members shall be as long in length as practical to minimize joints. Distribute joints to prevent clustering in one area. Joints shall be made square tight and flush so that exposed faces of intersecting members are on same plane.

.10 Joints in suspension system members shall be reinforced with splines or other suitable methods.

.11 Install perimeter moulding at abutting vertical surfaces.

.12 Where work of other Sections is fastened to acoustical ceilings, reinforce suspension system and/or acoustical panels in manner acceptable to Consultant.

3.3 Installation

.1 This Contractor shall consult and cooperate with other trades whose work precedes and follows this installation, to permit the orderly and expeditious progress of the work of this Division.

.2 Installation shall not start until abutting work to receive the installation has been completed and inspected and the Architect's approval has been obtained to proceed. The contractor shall give the Architect adequate advance notice of such inspection.

.3 Replace any damaged grid or tile immediately before occupation of building by Owner.

3.4 Quality of Work

.1 All surfaces to which the installation is to be attached shall be first cleaned of all matter of substance that interferes with or may impair true alignments of the grid.

.2 Where wall conditions prevent a neat and tight attachment of the wall moulding to the wall, this trade shall advise the General Contractor of same and agree on what and who shall remedy this situation. If apparent gaps cannot be corrected, the void shall be caulked in a matching wall colour.

.3 All ceiling boards shall be set in a level flush plane with snug straight and square joints.

3.5 Cleaning

.1 On completion all work shall be cleaned in a manner with materials as directed by the manufacturer of the product.

.2 Remove all waste materials off the site.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

.1 Section Includes

1. Acoustical metal wall panels
2. Exposed grid suspension system
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
4. Perimeter Trim
5. Furring supports

1.2 REFERENCES

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

.1 ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability

.2 ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

.3 ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

.4 ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

.5 ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Walls

.6 ASTM C 636 Recommended Practice for Installation of Metal Wall Suspension Systems for Acoustical Tile and Lay-in Panels

.7 ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

.8 ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials

.9 ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint

.10 ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Walls Systems

.11 ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Wall Plenum

.12 ASTM E 1264 Classification for Acoustical Wall Products

1.3 SUBMITTALS

.1 Product Data: Submit manufacturer's technical data for each type of acoustical Wall unit and suspension system required.

.2 Samples: Minimum 6-inch x 6-inch samples of specified acoustical panel; 8-inch-long samples of exposed wall molding and suspension system, including main runner and 4-foot cross tees.

.3 Shop Drawings: Layout and details of acoustical Walls show locations of items that are to be coordinated with or supported by the Walls.

.4 Design for Seismic Restraint.

.5 Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

.6 If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of, and replaced with complying product at the expense of the Contractor performing the work.

1.4 QUALITY ASSURANCE

.1 Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

.2 Fire Performance Characteristics: Identify acoustical Wall components with appropriate markings of applicable testing and inspecting organization.

.3 Surface Burning Characteristics: ASTM E 84 and complying with ASTM E 1264 Classification.

.4 Acoustic Panels: As with other architectural features located at the Wall, may obstruct, or skew the planned fire sprinkler water distribution pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.

.5 Coordination of Work: Coordinate acoustical Wall work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver acoustical Wall units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

.2 Before installing acoustical Wall units, permit them to reach room temperature and a stabilized moisture content.

.3 Handle acoustical Wall units carefully to avoid chipping edges or damaged units in any way.

1.6 PROJECT CONDITIONS

.1 Space Enclosure:

.2 Standard Walls: Do not install interior Walls until space is enclosed and weatherproof; wet work in place is completed and nominally dry; work above Walls is complete; and ambient conditions of temperature and humidity are continuously maintained at values near those intended for final occupancy. Building areas to receive Walls shall be free of construction dust and debris.

1.10 WARRANTY

.1 Provide 2 year warranty.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

1. Armstrong World Industries, Inc.

2.2 ACOUSTICAL UNITS

.1 Acoustical Panels

.1 Acoustical Panels Type AMP-1; Surface Texture: Smooth; Electrogalvanized Steel .72mm thick; Color: Gun Metal Grey; Size: 203mmx2438mm; Linear Edge Profile; Perforated; Noise Reduction Coefficient(NRC): 0.70; Flame Spread: ASTM E 1264; Class A (FM) Eg. Armstrong MetalWorks Linear -Classics, as manufactured by Armstrong World Industries

.2 Panel Accessories: Provide Perimeter Moldings to all exterior edges.

.1 Main Beam Carrier Assembly – G90 Mill Finish

.2 Cross Tees; Size to Suit.

.3 Rigid attachment clips

.4 Metal Furring channels, 22mm deep; 13mm wide flange; 0.455mm thick sheet metal; galvanized or galvalumed finish; eg. Baileys Metal Products Ltd.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.2 PREPARATION

.1 Measure each Wall area and establish layout of acoustical units to balance border widths at opposite edges of each Wall. Avoid use of less than half width units at borders and comply with reflected Wall plans. Coordinate panel layout with mechanical and electrical fixtures.

3.3 INSTALLATION

.1 Follow manufacturer installation instructions

.2 Install suspension system and panels in accordance with the manufacturer's instructions BPLA-297437, and in compliance with ASTM C636 and with the authorities having jurisdiction.

.3 Panels with certain product finishes or characteristics, e.g., Sequels™ are part of our MetalWorks™ FASTPeel ™ Panel which come standard with our easier-to-remove protective film

3.4 ADJUSTING AND CLEANING

.1 Replace damaged and broken panels.

.2 Clean exposed surfaces of Walls panels, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

.1 Skim coat over existing concrete slab after grinding off existing sealers, paint or existing resinous flooring.

.2 Resinous flooring system, urethane body:

.1 Application Method: Metal, power or hand troweled.

1.3 SUBMITTALS

.1 Product Data: For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.

.2 Samples for Verification: For each resinous flooring system required, 5 inches (150 mm) square, applied to a rigid backing.

.3 Product Schedule: Use resinous flooring designations indicated in Part 2 and room designations indicated on Drawings in product schedule.

.4 Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

.5 Maintenance Data: For resinous flooring to include in maintenance manuals.

1.4 QUALITY ASSURANCE

.1 No request for substitution shall be considered that would change the generic type of floor system specified (i.e. Urethane mortar based system with decorative quartz topping). Equivalent materials of other manufactures may be substituted only on approval of Architect or Engineer. Request for substitution will only be considered only if submitted 10 days prior to bid date. Request will be subject to specification requirements described in this section.

.2 Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in- service performance, and who is acceptable to resinous flooring manufacturer.

.1 Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.

.2 Contractor shall have completed at least 10 projects of similar size and complexity.

.3 Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, through one source from a single manufacturer, with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

.4 Manufacturer Field Technical Service Representatives: Resinous flooring manufacture

shall retain the services of Field Technical Service Representatives who are trained specifically on installing the system to be used on the project.

.1 Field Technical Services Representatives shall be employed by the system manufacture to assist in the quality assurance and quality control process of the installation and shall be available to perform field problem solving issues with the installer.

.5 Pre-installation Conference:

.1 General contractor shall arrange a meeting not less than thirty days prior to starting work.

.2 Attendance:

.1 General Contractor

.2 Architect/Owner's Representative.

.3 Manufacturer/Installer's Representative.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

.2 Store materials to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects. Store materials per product data sheet.

.3 All materials used shall be factory pre-weighed and pre-packaged in single, easy to manage batches to eliminate on site mixing errors. No on site weighing or volumetric measurements allowed.

1.6 PROJECT CONDITIONS

.1 Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

.1 Maintain material and substrate temperature between 60 and 85 deg F (18 and 30 deg C) during resinous flooring application and for not less than 24 hours after application.

.2 Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

.3 Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

.4 Concrete substrate shall be properly cured for a minimum of 30 days. A vapor barrier must be present for concrete subfloors on or below grade. Otherwise, an osmotic

pressure resistant grout must be installed prior to the resinous flooring

1.7 WARRANTY

.1 Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of (2) full years from date of installation, or provide a joint and several warranty signed on a single document by material manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of (1) full year from date of installation. A sample warranty letter must be included with bid package or bid may be disqualified.

PART 2 - PRODUCTS

2.1 RESINOUS FLOORING

.1 Available Products: Subject to compliance with requirements, product that may be incorporated into the work include,

1. Unsealed or “self-sealing” urethane mortar systems, multiple layers of liquids and broadcasts will not be accepted, and will result in a disqualification from bid.

.2 Acceptable Manufactures,

1. Stonhard
2. Sika
3. Or Equivalent.

.3 Products: Subject to compliance with requirements:

1. Stonhard, Inc.; Stonshield UTS®.

.4 System Characteristics:

1. Color: Grey
2. Wearing Surface: Light or medium texture
3. Integral Cove Base: to match
4. Overall System Thickness: nominal 3/16-1/4”.

.5 System Components: Manufacturer's standard components that are compatible with each other and as follows:

1. Mortar:
   - .1 Material design basis: Stonclad UT
   - .2 Resin: Urethane.
   - .3 Formulation Description: (4) four-component, urethane-urea slurry.
   - .4 Application Method: Screed, Trowel.
     - 1) Thickness of Coats: 3/16”.
     - 2) Number of Coats: One.
   - .5 Aggregates: Pigmented Blended aggregate.

2. Broadcast Media:
   - .1 Material Basis: Stonshield quartz aggregate
   - .2 Type: pigmented.

.3 Finish: standard.
.4 Number of Coats: one.
.5 Pattern: Tweed.

3. Undercoat:
.1 Material Basis: Stonseal CA7.
.2 Resin: Polyaspartic urethane.
.3 Formulation Description: (2) two-component, 100% solids, UV Stable.
.4 Type: Clear.
.5 Number of Coats: one.

4. Broadcast Media:
.1 Material Basis: Stonshield quartz aggregate
.2 Type: pigmented.
.3 Finish: standard.
.4 Number of Coats: one.
.5 Pattern: Tweed.

5. Sealer:
.1 Material Basis: Stonseal CA7.
.2 Resin: Polyaspartic urethane.
.3 Formulation Description: (2) two-component, 100% solids, UV Stable.
.4 Type: Clear.
.5 Finish: Gloss.
.6 Number of Coats: one.
.7 Texture level: Standard or medium.

.6 System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:
1. Compressive Strength: 7,700 psi after 7 days per ASTM C 579.
2. Tensile Strength: 1,000 psi per ASTM C 307.
3. Flexural Strength: 2,400 psi per ASTM C 580.
4. Flexural Modules of Elasticity: 2.6 x 10^6 psi per ASTM C-580
5. Hardness: 80 to 84, Shore D per ASTM D 2240.
6. Impact Resistance: > 160 in. lbs. per ASTM D 2794.
7. Abrasion Resistance: 0.10 gm max. weight loss per ASTM D-4060, CS-17.
8. Thermal Coefficient of Linear Expansion: 1.3 x 10^-5 in./in. .F per ASTM C-531
9. VOC Content per ASTM D-2369
.1 Stonclad UT Mortar – 7 g/l
.2 Stonseal CA7 – 100 g/l
10. Cure Rate: 4 hours for foot traffic, 24 hours for normal operations
11. Flammability: Class 1 per ASEM E-648

2.2 ACCESSORY MATERIALS

.1 Primer: Type recommended by manufacturer for substrate and body coats indicated. Formulation Description: Stonclad UT urethane mortar is self priming.

.2 Pitching and Leveling: Use a four component fast setting Urethane grout. Moisture resistant polyurethane based grout designed for permanent repairs under flooring system. Stonhard, Stonset TG 6. See drawings 1/4” per foot slope to drains. Use standard drain detail, saw cut and chase.

.3 Waterproofing Membrane: Type recommended by manufacturer for substrate and primer and body coats indicated. Formulation Description Only if application above grade Stonproof ME7. Must include texture 3 to ensure intercoat adhesion.

PART 3 - EXECUTION

3.1 PREPARATION

.1 General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.

.2 Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

.1 Mechanically prepare substrates as follows:

.1 Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.

.2 Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.

.3 Verify that concrete substrates are dry.

.1 Perform in situ probe test, ASTM F 2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 85 percent.

.2 Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 6 lb of water/1000 sq. ft. of slab in 24 hours.

.3 Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.

.3 Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

.4 Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations. Allowances should be included for Stonflex MP7 joint fill material, and CT5 concrete crack treatment.

3.2 APPLICATION

.1 General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

.1 Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.

.2 Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.

.3 At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.

.1 Apply joint sealant to comply with manufacturer's written recommendations.

.2 Integral Cove Base: Stonshield cove mortar, apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, of cove base. Round internal and external corners.

.1 Integral Cove Base: 100mm high.

.3 Mortar: Mix mortar material according to manufacturer's recommended procedures. Uniformly spread mortar over substrate at manufacturer's recommended height using specially designed trowel and or Screed box.

.4 Broadcast: Immediately broadcast quartz silica aggregate into the wet mortar using manufacturer's specially designed spray caster. Strict adherence to manufacturer's installation procedures and coverage rates is imperative.

.5 Undercoat: Remove any surface irregularities by lightly abrading and vacuuming the floor surface. Mix and apply undercoat with strict adherence to manufacturer's installation procedures and coverage rates.

.6 Broadcast: Immediately broadcast quartz silica aggregate into the undercoat using manufacturer's specially designed spray caster. Strict adherence to manufacturer's installation procedures and coverage rates is imperative.

.7 Apply topcoat in number of coats indicated for flooring system and at spreading rates recommended in writing by manufacturer.

3.3 TERMINATIONS

.1 Chase edges to "lock" the flooring system into the concrete substrate along lines of termination.

.2 Penetration Treatment: Lap and seal the flooring system onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.

.3 Trenches: Continue flooring system into trenches to maintain monolithic protection. Treat cold joints to assure bridging of potential cracks.

.4 Treat floor drains by chasing the flooring system to lock in place at point of termination.

3.4 JOINTS AND CRACKS

.1 Treat control joints and to maintain monolithic protection.
.2 Treat cold joints and construction joints to bridge potential cracks and to maintain

monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.

.3 Vertical and horizontal contraction and expansion joints are treated by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

3.5 FIELD QUALITY CONTROL

.1 Material Sampling: Owner may at any time and any numbers of times during resinous flooring application require material samples for testing for compliance with requirements.

.1 Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of Contractor.
.2 Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's product data.
.3 If test results show applied materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

3.6 CLEANING, PROTECTING, AND CURING

.1 Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 24 hours.

.2 Protect resinous flooring materials from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application. General Contractor is responsible for protection and cleaning of surfaces after final coats.

.3 Cleaning: Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer. General contractors are responsible for cleaning prior to inspection.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Furnish all labour, materials and tools, ladders, scaffolding and other equipment necessary for completion of this work according to the plans and specifications.

.2 Other than for factory applied finishes and finishing work specifically called for elsewhere in the specifications for other trades, supply all materials and labour necessary for the complete protection and decoration of all of the exterior and interior surfaces throughout the building unless noted on the schedule of finishes to be left unfinished. All other fabricated items elsewhere on site which are supplied and installed as part of this contract shall also be painted.

.3 Anodized aluminium and bright metal surfaces will not be painted.

.4 The architectural millwork shall be finished in the factory and shall arrive on site prefinished ready for installation. This section shall be responsible for finishing all other exterior and interior woodwork exposed to view after installation.

.5 Painting Subcontractor shall allow for a total of four (4) colours on walls.

.6 This section shall be responsible for finishing all wood finishes including doors. Refer to Door Schedule.

.7 Ensure that block filler fully covers the standard architectural block prior to priming and finished painting. Two coats of block filler may be required.

.8 Contractor is responsible for ensuring that the primer being used on existing walls is compatible with existing paint finishes and the new paint finishes.

1.2 Examination

.1 Examine the drawings and specifications for the various trades and become familiar with the provisions regarding their finishing.

.2 The painting contractor shall be responsible for inspection of the work of others prior to the application of any paint or finishing materials. If any surface to be finished cannot be put in proper condition for finish by customary cleaning, sanding and puttying operations, the painting contractor shall immediately notify the General Contractor or Architect in writing or assume the responsibility for and rectify any unsatisfactory finish resulting.

.3 Commencement of work will be interpreted as an acceptance of the surface to be painted as being satisfactory.

1.3 Reference Standards

.1 Ontario Painting Contractors Association (OPCA) Architectural Specification Manual, latest edition.

1.4 Submittals

.1 Submit required submittals in accordance with Section 01 33 00 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

.2 Product data sheets: Submit manufacturer's Product data sheets for Products proposed for use in the work of this section, including additional data as may be required to demonstrate compliance with the Contract Documents.

.3 Test Results: Submit certified test results for each required fire resistance rated assembly for work of this section.

1.5 Quality Assurance

.1 Work of this Section shall be executed by a company able to deploy adequate equipment and skilled personnel to complete Work expediently in an efficient and orderly manner.

.2 A crew of painters shall be maintained throughout the duration of the Work who shall be qualified to fully satisfy the requirements of this specification.

1.6 Delivery, Storage and Handling

.1 Paint materials shall be delivered to the job site in sealed original labelled containers bearing the manufacturer's name, types of paint, brand name, colour designation, and instructions for mixing and reducing.

.2 Store materials where directed by the Contractor. Paint materials shall be stored at a minimum ambient temperature of 7oC, in a well ventilated and heated, single designated area.

.3 Take all necessary precautionary measures to prevent fire hazards and spontaneous combustion.

1.7 Inspection

.1 All work where a coat of material has been applied must be inspected and approved by the Architect before application of succeeding coats.

1.8 Protection

.1 The painter shall protect all adjacent work and materials by suitable covering during progress of the work.

PART 2 PRODUCTS

2.1 Acceptable Manufacturers and Product:

.1 Paints, stains and varnish:

.1 General Paint

.2 Benjamin Moore
.3 Sherwin Williams
.4 Zinsser
.5 Glidden

2. Latex Water Based Epoxy
   - Sherwin Williams B70W00211-Waterbased catalyzed epoxy extra white / Tint base A / B60V00025 – Waterbased Catalyzed epoxy Semi Gloss Hardner Part B
   - Glidden – 4420 –True Glaze Waterborn epoxy / 4426 True Glaze semi gloss converter

3. Latex Super Adherent Primer,
   - General Paint 51-050 Premium Latex Plastic Primer
   - Benjamin Moore # 23-00 Freshstart Acrylic Primer Sealer
   - Zinser 1-2-3 Acrylic Primer Sealer
   - Sherwin-Williams –B51WQ8850-Adhesion Prm White
   - Glidden Latex super undercoat 94280

4. Interior Latex Block Filler, C.G.S.B. Standard #-GP-188M
   - General Paint 70-224 Premium Latex Block Filler
   - Benjamin Moore # 595-01 Latex Block filler
   - Glidden # 36250 Concrete Block Filler
   - Sherwin Williams B42W00046 Heavy Duty Block Filler

5. Stain Suppresent Sealer/Primer Hi-Hide, C.G.S.B. # 1-GP-119M (Prior approval Required)
   - General Paint 60-200 X-Terminator 2 Latex Sealer
   - Zinsser BIN Primer, hi-hide (spot prime only)
   - Zinsser Bullseye Odourless
   - Sherwin-Williams –B49WQ8820 Multipur LTX Pr Wh
   - Glidden / Jammer 200

.6 Exterior Painting and Finishing Schedule – Refer to MPI Architectural Painting specification.

.1 Structural Steel

.1 Corrosion-Resistant Opaque Painted Finish: EXT. 5.1B - W.B. LIGHT INDUSTRIAL COATING (over inorganic zinc), Premium Grade; Semi Gloss.

.2 Metal Fabrications

.1 Opaque Painted Finish: EXT. 5.1D - ALKYD (over alkyd metal primer), Premium Grade; Semi Gloss.

.3 Galvanized and Galvannealed Metal

.1 Opaque Painted Finish: EXT. 5.3B - ALKYD (over cementitious primer), Premium Grade; Gloss Finish.

2.2 Materials:

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

2. All primer and paint must be delivered to the job site in manufacturer's original containers.

3. All materials used in this painting contract are to be applied according to product label directions and in accordance with information stated on the Products Data Specification sheet.

4. Unless otherwise indicated two coats of the specified finish paint are required.

5. Any work not conforming to the specification, or not meeting with the approval of the Architect or Owner's representative, shall be removed or corrected and or/repainted.

6. Manufacturer's sales representatives shall perform inspections on the owner's behalf. In order to ensure compliance with product specifications. Manufacturer's to supply a written letter of compliance.

.7 Three colours will be used for Walls, colours as per finish schedules and consultant selections.

.8 One colour will be used for door frames, frames to match existing, colours as selected by consultant.

.9 One colour for Metal Doors, colour to match existing, colour to be selected by consultant.

.10 Ceilings to be Ceiling White.

.11 Primers shall be as specified by manufacturer and fully compatible with existing wall finishes and new finish coats. Block filler to be used as a primer on all concrete block walls to be painted.

.12 Stains shall be of the rapid dry, alkyd base type or pigment oil type. Manufacturer shall be Cabot.

.13 Varnishes shall be synthetic type.

.14 Shellac shall be pure white gum in pure grain alcohol.

.15 Thinners, cleaners: as recommended by paint manufacturer.

.16 Concrete block/concrete wall sealer (Sld.): water based acrylic matte, tinted grey as directed by Architect: "Glazol" W.B. by Sternson or 'Wallglaze" by Evespec.

.17 The Architect will select and/or approve colours and determine the number of colours to be used on the job. If required, prepare panels for finish and colour in advance, with the materials as specified for the approval of the Architect.

.18 All paints, varnishes, enamels, lacquers, stains, etc. must be delivered in the original containers with the seals unbroken and labels intact. In both paints and varnishes, use only materials which bear identifying labels on the containers.

PART 3 EXECUTION

3.1 Work

.1 Quality of work shall be of the best. Only skilled mechanics shall be employed. All material shall be used as directed by the manufacturer's label on the container. Sand between paint coats as required to assure a smooth finish surface.

3.2 Climatic Conditions

.1 Exterior finish shall not be applied while the surface is damp, or during cold, rainy or frosty winter weather or when the temperature is likely to drop to freezing. Avoid finishing surfaces while they are exposed to hot sun.

3.3 Unpainted Metals

.1 Anodized aluminum, bronze, chromium plate, nickel, stainless steel and monel metal, shall not be painted or finished unless specified. Otherwise all exposed piping, ducts, j-hooks, conduit and lintels shall be painted.

3.4 Preparation

.1 Prepare surfaces to MPI Architectural Painting Specification Manual.

.2 Prepare existing surfaces designated to be re-finished to MPI Maintenance Repainting Manual.

.3 Mask out surrounding surfaces not to receive paint, to protect from overspray or overbrushing.

.4 Remove hardware and accessories, plates, machined surfaces, lighting fixtures and similar items already installed but not intended to be painted.

.5 Remove mildew, efflorescence and foreign materials from surfaces using appropriate methods.

.6 Correct minor defects and deficiencies in surfaces which affect application of paints and coatings.

.7 Clean and prepare surfaces to be painted according to manufacturers' instructions for each particular substrate condition and finish system.

.8 Provide barrier coats over incompatible primers.

.9 Clean ungalvanized ferrous metal surfaces designated to receive site finish. Use solvent or mechanical cleaning methods to SSPC Painting Manual, Volume 2 - Systems and

Specifications.

.10 Clean galvanized surfaces with non-petroleum-based solvents. Surface to be free of oil and surface contaminants. Remove pretreatment from galvanized steel metal fabricated from coil stock by mechanical methods.

3.5 Application

.1 In accordance with manufacturer's printed instructions and manufacturer's Site representative.

.2 With suitable, clean equipment in good condition.

.3 In dust-free suitable conditions on the surfaces free from machine, tool or sandpaper marks, insects, grease, or any other condition liable to impair finished work to prevent production or good results.

.4 Even, uniform in sheen, colour and texture, free from brush or roller marks, well brushed or rolled in and free of crawls, runs, join marks or other defects.

.5 Permit paint to dry between coats. Touch up suction spots after applying first coat. Tint various coats of multiple coat work in light shades of the final colour selected, to distinguish between coats. Give Consultant due notice and sufficient opportunity (minimum 48 hours) to inspect each coat. Do not proceed with subsequent coat until preceding coat approved. Consultant reserves the right to order complete retreatment if this condition is not observed.

.6 Painting coats are intended to cover surfaces perfectly; if in painter's opinion, formula specified is inadequate to provide a first class finished surface, report to the Consultant before commencing work. Surfaces imperfectly covered shall receive additional coats at no additional cost.

.7 Use paint unadulterated. Use same brand of paint for primer, intermediate and finish coats. Factory mix all paints.

.8 Paint finish shall be applied by roller except in the case of wood trim, door frames, base board and similar work of small surface area which shall be painted by brush. Do not use roller for applying finish other than paint.

.9 Spray painting will not be permitted unless specifically approved in writing by the Consultant in each instance. Spray painting will only be permitted for the concrete block prime filler coat to be followed by 2 coats of roller applied paint. Spray painting of H.M. door frames is not permitted.

.10 Spray painting will be allowed in those areas where there is exposed metal deck. Paint must be “Dry Fall” and the work must be complete before the installation of flooring and wall finishes.

.11 Finish all edges of doors with paint or stain treatment as required to match face of door. Seal hidden edges of wood doors with one coat of shellac and one coat varnish

or two coats paint. Repaint tops and edges of wood doors after fitting.

.12 Even up stained woodwork in colour as required by nature of wood and as directed by Consultant. Apply same finish on trim, fitments, cupboards and other protecting ledges as on surrounding work, disregard sight lines.

.13 Carefully hand smooth and sandpaper wood between coats (including priming). Apply one coat sealer before applying first coat paint filler to knots or sap blemishes on wood surfaces to receive paint or stain finish.

.14 Remove rust, oil, grease and loose shop paint from metal work by brushing or with wire brushes and make good shop coat before proceeding with final finish. Feather out edges to make touch up patches inconspicuous.

.15 After first coat, fill nail holes, splits and scratches, using putty coloured to match finish.

.16 Clean castings with wire brush before application of first paint coat.

.17 Do not etch galvanized metal. Use zinc rich primer. This includes metal door frames and the like with wiped zinc coating.

.18 Remove form oil or parting compounds from concrete surfaces. Use Xylol or approved compound.

.19 Paint interior of pipe spaces, ducts, etc. visible through grilles, through linear metal ceilings.

.20 Conform with Consultant's colour schedule and exactly match approved samples.

.21 Mechanical and Electrical Pipes, Ducts and Conduits:

.1 Commence Work when piping installation is complete in the area concerned.

.2 Paint conduit in same colour as background paint.

.3 Apply formulae specified even though surface prime painted at shop prior to delivery. Touch up shop priming where damaged.

.4 Use heat resistant epoxy paint on pipes and surfaces where operating surface temperature exceeds 65 degrees C.

.5 Paint exposed pipes and ducts and their supports and related items in colours to suit colour coding adopted by Owner, to Consultant's later instructions. Refer to Mechanical Division 15 for further instructions.

3.6 Repairs

.1 Cracks occurring in walls or ceilings requiring patching during "Warranty Period" shall be repainted in such a way that the patch is not visible at a distance of 3'0" (1 m).

.2 If patch painting is not acceptable, repaint entire wall, or ceiling.

3.7 Interior Metal Work

.1 All exposed interior metal work, including baseboard cabinets, electrical cabinets and ductwork shall be painted with one coat of BM Interior Trim Primer and 2 coats of BM Dulamel Gloss. Note: Delete first coat on all previously "Primed" Metal. Areas where metal work shall be concealed with wall and ceiling finishes shall not be painted.

3.8 Exposed Block Walls (Interior-Painted)

.1 Shall be painted with 1 coat of BM Primer Filler and 2 coats of Benjamin Moore MooreStyle/K568 Interior Latex Semi-Gloss.

.2 Prior to start of interior painting on block walls, the painting subcontractor shall apply in the presence of the Architect, a sample area (to be agreed upon) consisting of the above specification. Prim-A-Fill shall be applied at the rate of not more than 7m2 (80 sq. ft.) per gallon, by brush or roller application. No further work shall proceed until this sample section has been completed and approved and this shall be standard for the remainder of the contract for finish of block walls.

.3 Where indicated on the finish schedule apply steel floated screed of Durabond 90 to the exposed block wall prior to painting.

3.9 Colour Scheme

.1 Refer to finishes schedule on in architectural drawings for colour scheme. All piping in mechanical room, and boiler room must be painted to colour coding supplied by the Consultant. Accent colour on block walls where indicated on finish plans shall be painted with clean, sharp, edges, properly masking junctions.

3.10 Clean Up and Touch Up

.1 On completion of all of the work, touch up any discrepancies or damage which has occurred subsequent to finishing, then remove all waste and surplus materials from the premises.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Provision of all labour, materials, equipment and incidental services necessary to provide window blinds as follows:

.1 Manual vertical sun screen shades

.2 Manual room darkening shades

1.2 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.

1.3 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.

1.4 SAMPLES

.1 Submit one representative working sample of each type blind in accordance with Section 01 33 00.

.2 Submit duplicate sample sets of manufacturer's standard fabrics for selection by Consultant.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 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.

1.6 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.

1.7 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 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

.1 200vic, Kitchener, ON.
.2 Solarfective Products Ltd.
.3 SunProject Toro Inc.
.4 HunterDouglas (Nysan Solar Control).
.5 Sun Glow Window Coverings of Canada Ltd.
.6 Elite Window Fashions, Concord ON.

2.2 ROLLER SHADES

.1 Manual Sunscreen Roller Shades: chain drive manual sun screen roller shades, soffit-mounted, 65mm tube size, clear anodized aluminum fascias, mounting brackets, bottom bar, and end covers;
  .1 Design: 1 blind/window.
  .2 Sunscreen Fabric: medium weight, flame-retardent sunscreen fabric, colour/pattern as selected by Consultant from manufacturer's standard ranges.
  .3 Shading Fabric: 90% blackout
  .4 Locations: See drawings.
  .5 Acceptable Products
    .1 Moduline 105 Lite-Lift by SunProject.
    .2 Teleshade by Solarfective.
    .3 RB-500 by Hunter Douglas.
    .4 V-Series Manual by Sun Glow.
    .5 Z-300/400 Series by Elite Window Fashions.

2.3 FABRICS

.1 Construction of shadeband includes fabric, external bottom bar, and attachment of the shadeband 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.

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.

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 FASCIAS

.1 One piece 1.7mm thick aluminum front or bottom fascias.

.2 Finish: clear anodized aluminum, or custom painted in colour selected by Consultant.

2.11 GUIDE CHANNELS

.1 One piece 1.7mm thick aluminum jamb guide channels for room darkening shades.

2.12 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 shade 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 re-inserted into the bracket. The roller mechanism must be reversible for future alterations and maintenance on site.

3 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 non corrosive metal fasteners for installation, concealed in final assembly. Install all bottom panels, fascias, and end panels to provide concealed installation.

END OF SECTION

Division 21 Fire Suppression

Common Contract Requirements for Fire Suppression

21 02 51 Fire Protection General Requirements
21 02 61 Fire Protection Occupancy Requirements

Facility Fire Suppression Water Service Piping

21 05 19 Pressure Gauges
21 05 48 Fire Protection Seismic Restraint

Insulation

21 07 19 Fire Protection Piping Insulation

Fire Suppression Sprinkler Systems

21 13 13 Wet Pipe Fire Suppression

Division 22 Plumbing

Contract Requirements for Plumbing

22 02 51 Plumbing General Requirements

Common Work Results for Plumbing

22 05 11 Plumbing Work Requirements
22 05 21 Plumbing Demolition and Renovation
22 05 34 Plumbing Bases, Hangers, and Supports (Indoor)
22 05 48 Plumbing Seismic Restraint
22 05 53 Identification of Plumbing Services

Commissioning for Plumbing

22 05 65 Plumbing Contractor Commissioning Requirements

Plumbing Insulation

22 07 19 Plumbing Piping Insulation

Facility Storm Drainage

22 14 15 Storm Drainage Piping – Cast Iron and Copper
22 14 26 Storm Drains

Division 23 Heating, Ventilating, and Air Conditioning (HVAC)

Common Contract Requirements for HVAC

23 02 51 HVAC General Requirements
23 02 61 HVAC Occupancy Requirements

Common Work for HVAC

23 05 11 General HVAC Work Requirements
23 05 21 HVAC Demolition and Renovation
23 05 35 Bases, Hangers, and Supports (Outdoor)

23 05 48 HVAC Seismic Restraint
23 05 49 HVAC Vibration and Noise Control Measures
23 05 53 Identification of HVAC Services

Testing, Adjusting, and Balancing

23 07 11 Testing, Adjusting, and Balancing (TAB) of HVAC Systems

Commissioning for HVAC

23 08 11 HVAC Contractor Commissioning Requirements

HVAC Insulation

23 10 13 Duct Insulation

Facility Fuel Piping

23 11 13 Site Services – Natural Gas & Propane Piping
23 11 25 Natural Gas Piping Inspection and Testing

HVAC Ducts and Casings

23 31 13 Metal Ducts

Air Duct Accessories

23 33 13 Duct Accessories
23 33 14 Volume-Control Dampers
23 33 16 Fire Dampers
23 33 46 Flexible Ducts

HVAC Fans

23 34 23 Packaged Exhausters

Packaged Outdoor HVAC Equipment

23 74 25 Custom Indirect Fired Outdoor Air Handling Unit

Division 25 Integrated Automation

Other Integrated Automation Components

25 05 21 Gas Detection

Control Systems

25 40 11 Building Control System

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

.1 Conform to Division 1 General Conditions and to all sections of Mechanical Division.

.2 Furnish labour, materials, and equipment necessary for completion of work as described in contract documents.

.3 Unless specifically indicated, all materials and equipment provided under this contract shall be new and shall be manufactured in the project year.

.4 The term “Mechanical Contractor” shall remain active and shall mean a “single contractor” performing plumbing, drainage, heating, cooling, ventilation, and control services.

.5 When quoting as a subcontractor this contractor shall explicitly state the services, they are providing i.e. Mechanical (all services), Plumbing (water and drainage systems) or HVAC (including hydronic and air systems).

.6 Contractors shall be explicit to identify whether Fire Protection is included or omitted from the mechanical scope.

1.2 INTENT

.1 Mention herein or indication on Drawings of articles, materials, operations or methods requires: supply of each item mentioned or indicated, of quality, or subject to qualifications noted; installation according to conditions stated: and, performance of each operation prescribed with furnishing of necessary labour, equipment, and incidentals for fire protection work.

.2 Where used, words “Section” and “Division” shall also include other Subcontractors engaged on site to perform work to make building and site complete in all respects.

.3 Where used, word “supply” shall mean furnishing to site in location required or directed complete with accessory parts.

.4 Where used, word “install” shall mean secured in place and connected up for operation as noted or directed.

.5 Where used, word “provide” shall mean supply and install as each is described above.

1.3 REGULATIONS, PERMITS, AND FEES

.1 All materials and quality of work shall meet all current and latest Provincial, Municipal and Fire Marshall requirements, regulations, codes, and by-laws in force in the area of the project.

.2 Each contractor shall give all necessary notices, obtain all necessary permits, and pay all fees in order that the work shown or specified may be carried out. Each contractor shall furnish any certificates necessary as evidence that the work installed conforms with the laws and regulations of all authorities having jurisdiction.

.3 In the event that changes, or alterations are required on completed work by authorized inspectors, these changes shall be made at the contractor's expense.

.4 Special equipment which does not have a standard CSA label shall be inspected by the local electrical authority having jurisdiction and the Approval Certificate shall be submitted to the Consultant as soon as possible. All costs and fees for inspections shall be borne by this contractor.

1.4 DRAWINGS

.1 The drawings and this specification have been assembled together as a responsibility of the consultant. The same is true for the other consultants, i.e. architect, structural engineer, civil engineer, fire protection engineer, electrical engineer, etc.

.2 The drawings and specifications are not assembled together for responsibility/division between subcontractors. The division of work between subcontractors remains the responsibility of the buildings' contractor (also known as the prime contractor or general contractor).

.3 All subcontractors are encouraged to perform work amicably utilizing all of the drawings and specifications published by all of the consultants.

.4 Fire protection drawings do not show architectural, structural, plumbing, mechanical and related details. Take information involving accurate measurement of building from building drawings, or at building. Make, without additional charge, any necessary changes, or additions to runs of piping, conduits, and ducts to accommodate structural conditions. Location of pipes and other equipment may be altered by Consultant without extra charge provided change is made before installation and does not necessitate major additional material.

.5 As work progresses and before installing piping and any other fittings and equipment which may interfere with interior treatment and use of building, provide detail drawings, or obtain directions for exact location of such equipment and fitment's.

.6 Install piping clear structural members and any fireproofing. Locate work to permit installation of specified insulation. Do not remove or damage structural fireproofing. Leave space to permit fireproofing and insulation to be inspected and repaired.

.7 Before commencing work, check and verify all sizes, locations, grade and invert elevations, levels, and dimensions to ensure proper and correct installation.

.8 Locate all fire protection piping and equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.

.9 In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install piping and other work so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose.

.10 Relocate equipment and/or material installed but not coordinated with work of other Sections and/or installed incorrectly as directed, without extra charge.

.11 Where drawings are done in metric and product not available in metric, the corresponding imperial trade size shall be utilized.

1.5 INTERFERENCE AND COORDINATION DRAWINGS

.1 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the constructed spaces provided.

.2 Prepare drawings to indicate co-ordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are coordinated.

.3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.

.4 Upon consultant's request submit copies of interference drawings to consultant.

.5 Due to the nature of the building and the complexity of the building systems provide the following:

.1 Interference drawings, showing coordination of architectural, structural, plumbing, mechanical, and electrical systems for the consultant's review prior to fabrication.

.2 Detailed layout drawings, clearly showing fasteners and hangers.

.6 Provide CAD drawings (minimum file version AutoCAD 2013) in addition to hard copies.

1.6 QUALITY ASSURANCE

.1 Perform work in accordance with applicable provisions of local Code and NFPA requirements. Ordinances, and adoptions thereof for all fire protection systems. Provide materials and labor necessary to comply with rules, regulations, and ordinances.

.2 In case of differences between building codes, provincial laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Consultant in writing of such differences.

1.7 EXAMINATION

.1 Site Reviews

.1 Examine premises to understand conditions which may affect performance of work of this Division before submitting proposals for this work.

.2 No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

.2 Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

1.8 SEQUENCING, SCHEDULING, AND COORDINATION

.1 It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for installation of systems according to the true intent and meaning of Contract Documents. Anything not clear or in conflict will be explained by making application to Consultant. Should conditions arise where certain changes would be advisable, secure Consultant's approval of these changes before proceeding with work.

.2 Coordinate work of various trades in installing interrelated work. Before installation of fire protection items, make proper provision to avoid interferences in a manner approved by Consultant. Each Contractor shall refer to all sections of the specification for their responsibilities with other trades. Changes required in work specified in Fire Protection Division caused by neglect to do so shall be made at no cost to Owner.

.3 Arrange pipes, ducts, and equipment to permit ready access to valves, unions, traps, starters, motors, control components, and to clear openings of doors and access panels.

.4 Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions of the Work to Sections involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne by Fire Protection Division.

.5 Be responsible for required cutting, and patching incident to work of this Division and make required repairs afterwards to satisfaction of Consultant. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.

.1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

.2 Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

.6 Adjust locations of pipes, equipment, fixtures, etc., to accommodate work from interferences anticipated and encountered. Determine exact route and location of each pipe prior to fabrication.

.1 Make offsets, transitions, and changes in direction of pipes as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.

.7 Slots and openings through floors, walls, and ceilings shall be provided by this contractor but performed by a trade specializing in this type of work. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

1.9 REQUEST FOR INFORMATION (RFI) PROCEDURES

.1 RFIs shall be submitted to the consultant a minimum of two (2) weeks prior to answer being required. Failure to submit an RFI in a timely manner will forfeit delay claims and schedule extension requests by the contractor.

.2 All RFIs will be submitted with the following information:

.1 RFI number
.2 Name of project
.3 Date of initiation
.4 Date response required by (minimum two (2) weeks)
.5 Subject
.6 Submitter's name
.7 Drawing/specification reference
.8 Photograph of the issue (if applicable)
.9 Description of the issue
.10 Contractor's proposed resolution

1.10 SHOP DRAWINGS AND PRODUCT DATA

.1 Furnish complete catalog data for manufactured items of equipment to be used in the Work to Consultant for review within 14 days after award of Contract.

.2 Upon receipt of reviewed shop drawing, product is to be ordered immediately.

.3 Provide a complete list of shop drawings to be submitted prior to first submission.

.4 Before submitting to the Consultant, review all shop drawings to verify that the products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers, and similar data and that it has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The Contractor's review of each shop drawings shall be indicated by stamp, date and signature of a qualified and responsible person possessing by the appropriate authorization.

.5 If material or equipment is not as specified or submittal is not complete, it will be rejected by Consultant.

.6 Additional shop drawings required by the contractor for maintenance manuals, site copies etc., shall be photocopies of the "reviewed" shop drawings. All costs to provide additional copies of shop drawings shall be borne by the contractor.

.7 Submit all shop drawings for the project as a package. Partial submittals will not be accepted.

.8 Catalog data or shop drawings for equipment, which are noted as being reviewed by Consultant or their Engineer shall not supersede Contract Documents.

.9 Review comments of Consultant shall not relieve this Division from responsibility for deviations from Contract Documents unless Consultant's attention has been called to such deviations in writing at time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.

.10 Check work described by catalog data with Contract Documents for deviations and errors.

.11 Shop drawings and product data shall show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances. e.g., access door swing spaces.

.12 Shop drawings and product data shall be accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify as to current model production.

.5 Certification of compliance to applicable codes.

.13 State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information. List on catalog covers page numbers of submitted items. Underline applicable data.

.14 Shop drawings shall be submitted electronically as per the following directions:

.1 Electronic Submissions:

.1 Electronically submitted shop drawings shall be prepared as follows:

.1 Use latest software to generate PDF files of submission sheets.

.2 Scanned legible PDF sheets are acceptable. Image files are not acceptable.

.3 PDF format shall be of sufficient resolution to clearly show the finest detail.

.4 PDF page size shall be standardized for printing to letter size (8.5"x11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11"x17".

.5 Submissions shall contain multiple files according to section names as they appear in Specification.

.6 File names shall include consultant project number and description of shop drawing section submitted.

.7 Each submission shall contain an index sheet listing the products submitted, indexed in the same order as they appear in the Specification. Include associated PDF file name for each section.

.8 On the shop drawing use an “electronic mark” to indicate what is being provided.

.9 **Each file shall bear an electronic representation of the “company stamp” of the contractor. If not stamped the file submission will not be reviewed.**

.2 Email submissions shall include subject line to clearly identify the consultants project number and the description of the shop drawings submitted.

.3 Electronic attachments via email shall not exceed 10MB. For submissions larger than 10MB, multiple email messages shall be used. Denote related email messages by indicating “1 of 2” and “2 of 2” in email subject line for the case of two messages.

.4 Electronic attachments via web links (URL) shall directly reference PDF files. Provide necessary access credentials within link or as username/password clearly identified within body of email message.

.5 On site, provide one (1) copy of the “reviewed” shop drawings in a binder as noted above.

.6 Contractor to print copies of “reviewed” shop drawings and compile into maintenance manuals in accordance with requirements detailed in this section.

1.11 EQUIPMENT NAMEPLATE DATA

.1 Between the manufactures design published literature, the shop drawing submission literature, and the nameplate data on the equipment, they can all read differently.

.2 Most of the confusion and differences are coming out of the electrical power installation.

.3 The contractors installing and connecting the equipment are responsible for the coordination of this data through the construction period.

.4 The contractors shall share and/or request this information through out the project and monitor/make adjustments, provide recommendations accordingly based on any discrepancies.

.5 The contractors are responsible for any cost associated with the changing data.

.6 The final installation must meet the “Nameplate Data” on the equipment on site.

1.12 OPERATION AND MAINTENANCE MANUAL

.1 Provide operation and maintenance data for incorporation into manual as in submittals’ requirements.

.2 Operation and maintenance manual to be approved by, and final copies deposited with, Consultant before final inspection.

.3 Submit one (1) copy of Operation and Maintenance Manual to Consultant for review and approval. Submission of individual data will not be accepted unless directed by Consultant. Submission can be done electronically in PDF format or as a hard copy.

.1 Electronic submission/pdf file is required to be bookmarked. Any submission received without bookmarking will be immediately returned as unacceptable.

.2 Hard copy submission shall be in a three-ring binder (minimum 50 mm (2") ring) and labelled as ‘Operation and Maintenance Manual’ with project name and location. Dividers are to be used for binder organization.

.4 Make changes as required and re-submit as directed by Consultant.

1.13 AS-BUILT DRAWINGS

.1 Site records:

.1 Contractor shall provide two (2) sets of reproducible fire protection drawings. Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include changes to existing fire protection systems, control systems, and low voltage control wiring.

.2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection at all times.

1.14 WARRANTIES

.1 In addition to guarantee specified in General Conditions, guarantee fire protection systems to be free from defects that may develop from failure to construct system in accordance with Contract Documents.

.2 Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record "start-up" date of each piece of equipment on certificate. Include certificates as part of Operation and Maintenance Manual.

.3 Warranty period shall start from date of ready for takeover. Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.

.3 Warranty Duration:

.1 Two year warranty period applies unless otherwise noted.

.4 Warranty Coverage:

.1 Applies to parts and labour.

1.15 READY FOR TAKEOVER

.1 Complete the following to the satisfaction of the consultant prior to request for ready for takeover:

.1 As-built Drawings

.2 Maintenance Manuals

.3 System Start up

.4 Instructions to Owners.

1.16 REVISION TO CONTRACT

.1 Provide the following:

.1 Itemized list of material with associated costs.

.2 Labour rate and itemized list of labour for each item.

.3 Copy of manufacturers/supplier’s invoice if requested.

1.17 DELIVERY, STORAGE, AND HANDLING

.1 Follow Manufacturer's directions in delivery, storage, and protection, of equipment and materials. Contractor to include all costs associated with delivery storage and handling in tender price.

.2 Deliver equipment and material to site and tightly cover and protect against dirt, water, chemical, and other environment damaging conditions but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in dry, heated space.

.3 Remove any damaged materials from site.

1.18 DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS

.1 If designated substances and/or hazardous materials are suspected or identified cease all work in the immediate area in accordance with OHSA and notify Consultant.

.2 Each Contractor and on site employee of the Contractor shall have "asbestos awareness training".

.3 The Contractor shall ensure that employees who may come into contact with designated substances and/or hazardous materials due to the nature of the work that they perform, have received training that enables them to recognize designated substances and/or hazardous materials and that enables them to react in accordance with the Occupational Health and Safety Act and regulations thereto should contact with designated substances and/or hazardous materials occur during the course of their work.

.4 It is the responsibility of the Contractor to review the designated substances and/or hazardous materials book in the building prior to starting any work.

.5 Existing occupied buildings (depending upon their age) may contain designated substances and/or hazardous materials in thermal insulating materials and some manufactured products, such as vinyl asbestos floor tile. Any insulating materials on pipes, fittings, boilers, tanks, ductwork, etc. may contain designated substances and/or hazardous materials and shall not be disturbed.

.6 A survey of each building documenting the location and condition of designated substances and/or hazardous containing materials is available for your mandatory review prior to commencing any work on premises.

1.19 PHASING OF WORK

.1 This work for this project shall be constructed in phases. Refer to the architectural drawings for phasing information and details. Misinterpretation of the drawings with respect to the extent of the phasing of the work shall not relieve the Contractor of the work required to complete the entire contract.

.2 Provide all necessary services or temporary services to suit phasing of construction with respect to all fire protection systems.

.3 Life safety systems in the building are to remain fully operational in occupied areas for building staff and occupants during renovations.

.4 Provide all necessary tests and certificates at completion of each phase to suit requirements of local authorities and Consultants for occupancy of completed areas.

1.20 CONFINED SPACES

.1 Certain areas of the building may be defined as a “Confined Space”. Any personnel working in these areas must have confined space training, appropriate equipment and undertake all work in conformance with appropriate codes and standards.

.2 Refer to building documentation for any spaces deemed “Confined Space”.

1.21 TESTS

.1 Give 48 hours written notice of date for tests.

.2 Insulate or conceal work only after testing and approval by Consultant.

.3 Conduct tests in presence of Consultant.

.4 Bear costs including retesting and making good.

.1 Test fire systems in accordance with authorities having jurisdiction and as specified elsewhere.

.5 Test fire systems in accordance with authorities having jurisdiction (AHJ) NFPA requirements and as specified elsewhere.

.6 Equipment: test as specified in relevant sections.

.7 Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.

1.22 TRIAL USAGE

.1 Consultant or owner may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to all fire protection.

1.23 ELECTRICAL

.1 Electrical work to conform to Electrical Division including the following:

.1 Power wiring and conduit is specified in Electrical Division except for conduit, wiring and connections below 50 V which are related to control systems. Follow Electrical Division for installation methods, quality of materials, and workmanship.

.2 Electrically operated equipment shall be C.S.A. approved label. Special Inspection Label of Provincial Authority having jurisdiction will be accepted in lieu of C.S.A. approval. Each motor shall have an approved starter. Starter will be supplied and installed by Electrical Division unless otherwise indicated.

1.24 PIPING AND EQUIPMENT SUPPORTS

.1 Equipment supports supplied by equipment manufacturer shall follow the manufacturer's recommendation.

.2 Piping and equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel meeting requirements of - Structural Steel Section. Submit structural calculations with shop drawings.

1.25 SLEEVES

.1 Pipe sleeves: at points where pipes pass through masonry, concrete or fire rated assemblies and as indicated. Grout sleeves in place.

.2 Schedule 40 steel pipe.

.3 Sleeves with annular fin continuously welded at midpoint:

.1 Through foundation walls.

.2 Where sleeve extends above finished floor.

.3 Through fire rated walls and floors.

.4 Sizes: minimum 6 mm (1/4") clearance all around, between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm (1") above other floors.

.6 Fill voids around pipes:

.1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.

.2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.

.3 Ensure no contact between copper tube or pipe and ferrous sleeve.

.4 Fill future-use sleeves with lime plaster or other easily removable filler.

.5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+Amdt-Mar-78.

.7 Provide minimum 20 gauge duct sleeves where ducts pass through masonry concrete or fire rated assemblies. Maintain minimum 25 mm clearance all around or to the requirements of the authority having jurisdiction. Seal at wall as indicated.

1.26 FIRE STOPPING

.1 This contractor shall work with all other contractors on the project in providing one common method of fire stopping all penetrations made in fire rated assemblies.

.2 Approved fire stopping and smoke seal material in all fire separations and fire ratings within annular space between pipes, ducts, insulation and adjacent fire separation and/or fire rating.

.3 Do not use cementitious or rigid seals around penetrations for pipe or other fire protection items piercing walls, floors, etc.

.4 Insulated pipes and ducts: ensure integrity of insulation and vapour barrier at fire separation.

.5 Provide materials and systems capable of maintaining effective barrier against flame, smoke and gases. Ensure continuity and integrity of fire separation.

.6 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.

.7 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation. Provide “fire wrap” blanket around services penetrating fire walls. Extent of blanket must correspond to ULC recommendations.

.8 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens and volatile solvents.

.9 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

.10 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes. Exposed surfaces are to be acceptable to consultant prior to application of finish.

.11 Firestopping shall be inspected and approved by local authority prior to concealment or enclosure.

.12 Install material and components in accordance with ULC certification, manufacturers instructions and local authority.

.13 Submit product literature and installation material on fire stopping in shop drawing and product data manual. Maintain copies of these on site for viewing by installers and consultant.

.14 Manufacturer of product shall provide certification of installation. Submit letter to the consultant.

.15 Acceptable alternate manufacturers to approval of local authority:

- .1 Minnesota Mining and Manufacturing
- .2 Fryesleeve Industries Inc.
- .3 General Electric Pensil Firestop Systems
- .4 International Protective Coatings Corp.
- .5 Rectorseal Corporation (Metacaulk)
- .6 Proset Systems
- .7 3M
- .8 AD Systems
- .9 Hilti

.16 Ensure firestop manufacturer representative performs onsite inspections and certifies installation. Submit inspection reports/certification at time of substantial completion.

1.27 ESCUTCHEONS

.1 On pipes and ductwork passing through walls, partitions, floors and ceilings in exposed finished areas and on water and drain pipes inside millwork and cabinets.

.2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.

.3 Outside diameter to cover opening or sleeve.

.4 Inside diameter to fit around finished pipe.

1.28 PAINTING

.1 Refer to Section Interior Painting and specified elsewhere.

.2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

.3 Apply two coats of paint to exposed piping service in mechanical room, electrical, and service rooms. Base colour shall be red.

.4 Prime and touch up marred finished paintwork to match original.

.5 Restore to new condition, or replace equipment at discretion of consultant, finishes which have been damaged too extensively to be merely primed and touched up.

1.29 ACCESS DOORS

.1 Provide access doors to concealed fire protection equipment for operating, inspecting, adjusting and servicing.

.2 Flush mounted 600 x 600 mm (24" x 24") for body entry and 300 x 300 mm (12" x 12") for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.

.3 Material:

.1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Consultant.

.2 Remaining areas: use prime coated steel.

.3 Fire rated areas: provide ULC listed access doors.

.4 Washrooms or high moisture area ceilings: Aluminum with mill finish suitable for painting.

.4 Installation:

.1 Locate so that concealed items are accessible.

.2 Locate so that hand or body entry (as applicable) is achieved.

.5 Acceptable Manufacturers:

.1 Le Hage

.2 Zurn

.3 Acudor

.4 Nailor Industries Inc.

1.30 REPAIRS, CUTTING, AND RESTORATION

.1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

.2 Each Section of this Division shall bear expense of cutting, patching, and repairing to install their work and/or replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

.3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

.4 All patching, painting and making good of the existing walls, floors, ceilings, partitions and roof will be at the expense of this Contractor, but performed by the Contractor specializing in the type of work involved unless otherwise noted.

1.31 EXISTING SYSTEMS

.1 Connections into existing systems to be made at time approved by Consultant. Request written approval of time when connections can be made.

.2 Be responsible for damage to existing plant by this work.

1.32 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units prior to turn over to owner.

.2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition including replacement of all filters in all air and piping systems.

1.33 DISCONNECTION AND REMOVAL

.1 Disconnect and/or remove equipment, piping, etc. as indicated.

.2 Cap and conceal all redundant and obsolete connections.

1.34 EXISTING CONCRETE SLAB X-RAY/SCANNING

.1 This contractor shall retain the services of a qualified company to provide and X-ray and/or scan of the existing buried services in wall and/or floors prior to starting any work in the affected area.

.2 Failure to locate existing piping, conduit rebar etc. shall not relieve this contractor of repair of same prior to installing his service.

.3 This contractor shall be responsible for all repairs and/or replacement of existing services caused by cutting the existing concrete slabs and/or walls.

1.35 INTEGRATED LIFE SAFETY SYSTEMS TESTING

.1 Fire protection systems in this building, including but not limited to flow switches, valves, fire pumps, etc. will be subject to Integrated Life Safety Systems testing.

.2 The Fire Protection Contractor shall co-ordinate with the Integrated Life Safety Systems Testing Agent as follows:

.1 Confirm which fire protection systems are to be included as part of the testing process.

.2 Verify in writing to the Integrated Life Safety Systems Testing Agent that fire protection commissioning of the affected systems/devices is complete prior to the scheduled testing date(s).

.3 Participate in the Integrated Life Safety Systems Testing to confirm proper operation of all associated systems.

.4 This Contractor shall work with the Integrated Life Safety Systems Testing Agent to reset all systems back to normal operating mode after the testing is complete.

.3 Include all costs associated with Integrated Life Safety System Testing in the tender value.

.4 Refer to Division 1/Division 26 Integrated Life Safety Systems Testing specifications for additional information/requirements.

1.36 IDENTIFICATION OF SYSTEMS

.1 Identify contents by background colour marking, pictogram (as necessary), legend, direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

.2 Background colour marking and legends for piping systems:

CONTENTS	BACKGROUND COLOUR MARKING	LEGEND
Fire protection water	Red	FIRE PROT. WTR
Sprinklers	Red	SPRINKLERS

1.37 FUNCTIONAL PERFORMANCE TESTS

.1 This Contractor shall be responsible for the Functional Performance Tests. These tests ensure that all equipment and systems operate in accordance with design intent. Test the systems through all possible modes of operation.

.2 The function performance test shall be:

.1 Test piping systems.

.2 Test all valves and flow switches.

.3 Test flow and record flow from end of inspector’s test port.

.4 Test flow from all standpipe systems at the most remote and highest hose connection.

.5 Test flow thru all backflow preventors.

.6 Test flow thru all fire pumps.

.7 Other test that maybe a requirement of NFPA.

.3 All test shall be recorded and presented to the Consultant and Owner.

.4 Include all test results in the Operation and Maintenance Manuals.

Part 2 Not Used

Part 3 Not Used

END OF SECTION

Part 1 General

1.1 OCCUPANCY REQUIREMENTS

.1 The contractor shall provide the following documentation to the consultant's satisfaction prior to receiving occupancy. Failure to provide the proper documentation will result in the occupancy not being granted. List of required documentation:

.1 Final Certificates (required prior to consultant's release of conformance letter):

.1 NFPA-13 Contractors Material and Test Certificate (sprinkler)

.2 NFPA-13 Fire Protection Bypass Flow Test

.3 Sprinkler/Standpipe Design Engineers' Letter

.4 System has been tested with the Integrated Testing Contractor.

.5 Engineer's seismic restraint letter.

Part 2 Not Used

Part 3 Not Used

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ANSI/ASME B40.100, Pressure Gauges and Gauge Attachments.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements.

.2 Submit manufacturer's product data for following items:

.1 Pressure gauges

.2 Stop cocks

.3 Siphons.

Part 2 Products

2.1 GENERAL

.1 Design point to be at mid point of scale or range.

.2 Ranges: suitable for application.

2.2 PRESSURE GAUGES

.1 115 mm (4 1/2"), dial type: to ANSI/ASME B40.100, Grade 2A, stainless steel phosphor bronze bourdon tube having 0.5% accuracy full scale unless otherwise specified.

.1 Acceptable Manufacturers:

.1 Winters

.2 Trerice

.3 Wiess.

.2 Provide:

.1 Snubber for pulsating operation.

.2 Gasketed pressure relief back with solid front.

.3 Bronze stop cock.

Part 3 Execution

3.1 GENERAL

.1 Install so they can be easily read from floor or platform. If this cannot be accomplished, install remote reading units.

.2 Install between equipment and first fitting or valve.

3.2 PRESSURE GAUGES

.1 Install in following locations:

.1 Suction and discharge of pumps.

.2 Upstream and downstream of PRV's.

.3 Upstream and downstream of backflow preventors.

.4 In other locations as indicated.

.2 Install gauge cocks for balancing purposes, elsewhere as indicated.

3.3 NAMEPLATES

.1 Install engraved lamicoid nameplates as specified elsewhere identifying medium.

END OF SECTION

Part 1 General

1.1 APPLICATION

.1 Seismic restraint is becoming more prominent with improved soil testing equipment. Seismic requirement is not site specific by geographical area but determined by site soil conditions.

.2 Where the structural engineer or architect documents have Ie*Sa(0.2)*Fa<3.5 seismic is not required on the fire protection, mechanical, electrical, or plumbing systems.

.3 Where the structural engineer or architect documents have Ie*Sa(0.2)*Fa≥3.5 seismic is required on the fire protection, mechanical, electrical, or plumbing systems.

.4 Seismic will always be required on fire protection systems when required by NFPA codes.

.5 Seismic will always be required on any “Disaster Relief Building.” For example, hospitals, police stations, ambulance building, etc.

.6 When it is unclear in the tender documents request information from the structural engineer or architect for clarification.

1.2 SECTION INCLUDES

.1 Seismic requirements for single rod hanger support for conduit, pipe and other similar systems.

.2 Seismic requirements for trapeze type supports for cable tray, conduit, pipe and other similar systems.

.3 Seismic requirements for all equipment and piping.

1.3 RELATED WORK SPECIFIED ELSEWHERE

.1 Vibration Isolation Measures.

1.4 REFERENCE STANDARDS

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 National Building Code of Canada (NBC).

.3 Canadian Standards Association.

.1 CSA S832, Seismic Risk Reduction of Operation and Functional Components (OFCs) of Buildings.

.2 CAN/CSA-S16.1 Limit States Design of Steel Structures.

.3 CAN3-S136 Design of Cold Steel Structural Members.

.4 CSA W47.1 Certification of Companies for Fusion Welding of Steel.

.5 CSA W59 Welded Steel Construction.

.4 Canadian Institute of Steel Construction.

.5 Canadian General Standards Board.

.6 Underwriter Laboratories of Canada.

.7 Workers Compensation Board of BC.

.8 American Society of Testing and Materials.

.1 ASTM A653/S653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (galvannealed) by the Hot Dip Process.

.2 ASTM A879M Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface.

.3 ASTM A307 Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.4 ASTM A325M Specification for Structural Bolts, Heat Treated 830MPa Minimum Tensile Strength.

.9 All local codes.

.10 NFPA-13: Installation of Fire Sprinkler Systems.

.11 FEMA: Federal Emergency Management Activity.

.12 FEMA: Seismic Restraint Installation Manuals 412. 413. & 414.

.1 FEMA 412: Installing Seismic Restraints for Mechanical Equipment.

.2 FEMA 413: Installing Seismic Restraints for Electrical Equipment.

.3 FEMA 414: Installing Seismic Restraints for Duct and Pipe.

1.5 DEFINITIONS

.1 A_v: Effective peak velocity related acceleration coefficient BOCA, SBC Code.

.2 S_1: Mapped Long Period Seismic Acceleration Coefficient IBC, TI-809-04, ASCE7.

.3 S_s: Mapped Short Period Seismic Acceleration Coefficient IBC, TI-809-04, ASCE7.

.4 v: Zonal Velocity Coefficient NBC-Canada.

.5 VISCMA: The Vibration Isolation and Seismic Control Manufacturers Association has developed Testing and Rating Standards for Seismic Restraint Components that comply with Code and ASHRAE based requirements.

.6 VISCMA 102-2007: Static Qualification Standards for Obtaining a VISCMA Compliant Seismic Component Rating.

.7 Z: Seismic Zone defines Seismic Coefficient C_a used by UBC Code.

1.6 PERFORMANCE REQUIREMENTS

.1 Design Ground Acceleration Coefficient (A_v, S_s, v, or Z depending on Code = X.XX).

.2 (If IBC or TI-809-04) Design Long Period Ground Acceleration Coefficient (S_1 = X.XX).

.3 Design Soil Type = (S_a, S_b, S_c, S_d) as appropriate. (If NBC Canada, the Foundation Factor).

.4 Importance or Performance Factor appropriate to structure = I_p = X.XX.

.5 If UBC Zone 4, Proximity to Fault and, if less than 10km, Fault Type.

.6 Schedule or drawings indicating critical (Ip = 1.5) Duct/Piping systems, including systems whose importance factor may be increased by proximity to critical components.

1.7 DESCRIPTON OF SYSTEM

.1 It shall be understood that the requirements of this seismic restraint section are in addition to other requirements as specified elsewhere for the support and attachment of equipment and fire protection services, and for the vibration isolation of same equipment. Nothing on the project drawings or specifications shall be interpreted as justification to waive the requirements of this seismic restraint section.

.2 The work under this section shall include furnishing all labour, materials, tools, appliances, and equipment, and performing all operations necessary for the complete execution of the installation of seismic snubber restraint assemblies as shown, detailed, and/or scheduled on the drawing and/or specified in this section of the specifications.

.3 All seismic snubber restraint assemblies shall meet the following minimum requirements:

.1 The snubber/restrained isolator for isolated equipment shall include a resilient element that will ensure that no un-cushioned shock can occur (this does not include cable restraints).

.2 It shall be possible to visually inspect the resilient material for damage and allow for replacement, if necessary.

.3 All snubbers are to include a maximum air gap of 0.25 in (6 mm).

.4 Seismic restraint systems shall be designed to offer seismic restraint in all directions, unless otherwise noted.

.5 Seismic restraint capacities to be verified by an independent test laboratory or certified by a registered Professional Engineer to ensure that the design intent of this specification is realized. Verification shall be by one of the following methods:

.1 An NRTL (National Recognized Testing Laboratory), or laboratory recommended by VISCMA.

.2 Certified by a Professional Engineer with at least 5 years of experience, using industry standard methods of analysis, which employ common engineering practices. Adherence to the ratings standard within ASHRAE SPC171 and VISCMA 102-2007 is required.

.3 By a nationally recognized agency, such as VISCMA, that has reviewed and approved the restraint.

1.8 SYSTEM DESIGN

.1 Seismic restraint manufacturer shall be responsible for the structural design of attachment hardware as required to attach snubbers/restraints to both the equipment and supporting structure on vibration isolated equipment, or to directly attach equipment to the building structure for non-isolated equipment.

.2 The Contractor shall furnish, to the seismic restraint manufacturer, a complete set of approved shop drawings of all equipment that is to be restrained, from which the selection and design of seismic restraint devices and/or attachment hardware will be completed. The shop drawings furnished shall include, at a minimum, basic equipment layout, length, and width dimensions, and installed operating weights of the equipment to be restrained.

.3 All piping, ductwork and equipment is to be restrained to meet code requirements. At a minimum, the seismic restraint manufacturer shall provide documentation on maximum restraint spacing for various restraint sizes and anchors, as well as “worst case” reaction loads for each restraint and/or anchor size.

.4 The Contractor shall ensure that all housekeeping pads used are adequately reinforced and are properly dowelled to the building structure, so as to withstand calculated seismic forces. In addition, the size or the housekeeping pad is to be coordinated with the seismic restraint manufacturer to ensure that adequate edge distances exist in order to obtain the desired equipment anchor capacities.

1.9 SEISMIC BRACING AND SUPPORT DESIGN REQUIREMENTS

.1 Seismic restraint designer shall co-ordinate all attachments with the structural engineer of record.

.2 Design analysis shall include calculated dead loads, static seismic loads, and capacity of materials utilized for the connection of the equipment or system to the structure.

.3 Analysis shall detail anchoring methods, bolt diameter, and embedment depth.

.4 All seismic restraint devices shall be designed to accept without failure the forces calculated per the applicable building code and as summarized in Section 3.01.

.5 Friction from gravity loads shall not be considered resistance to seismic forces.

.6 Fire protection systems shall meet the requirements of NFPA-13 and NFPA-14. Sway bracing used for seismic restraint purposes must be fitted with provisions to resist the vertical force component of the diagonal brace. Single diagonal brace for seismic restraint will not be approved.

1.10 QUALITY ASSURANCE

.1 The Contractor shall provide pre-engineered seismic restraint systems to meet total design lateral force requirements for support and restraint of piping, conduit, cable trays and other similar systems and equipment where required by the applicable building code.

.2 System Supports/Restraints: Firms regularly engaged in the manufacture of products of the types specified in this section, whose products have been in satisfactory use in similar service for not less than 5 years.

.3 Bolted framing channels and fittings shall have the manufacturers name, part number, and material heat code identification number stamped in the part itself for identification. Material certification sheets and test reports must be made available by the manufacturer upon request.

.4 Only companies experienced in performing the work of this section shall do the installation.

.5 All seismic restraint installations shall be independently reviewed by the Owners Representative for compliance with project specifications.

1.11 SUBMITTALS

.1 Product Data: include Seismic Rating Curve for each seismically rated isolator or restraint component.

.2 Samples: the Contractor shall submit samples of specified seismic snubber devices for approval.

.3 Shop Drawings shall include the following:

.1 Design Calculations: Calculate requirements for selecting seismically rated vibration isolators and seismic restraints. Certification documents to be signed and sealed by a qualified Professional Engineer with at least 5 years of experience in the design of seismic restraints. Professional engineer shall have local jurisdiction and provide periodic field review and final certification upon completion of the project. All costs and fees associated with the engineering shall be the responsibility of this contractor.

.2 Vibration Isolation Bases: Dimensional drawings including anchorage and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, base weights, equipment static loads.

.3 Seismic-Restraint Details: Detailed submittal drawings of seismic restraints and snubbers. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors. Include ratings for loads.

.4 Equipment Manufacturer Seismic Qualification Certification: The Equipment Manufacturer must submit certification that each piece of provided equipment will withstand seismic forces identified in “Performance Requirements” Article above. Include the following:

.1 Basis for Certification: Indicate whether the “withstand” certification is based on actual test assembled components or on calculations.

.2 Indicate the equipment is certified to be durable enough to:

.1 structurally resist the design forces and/or

.2 will remain functional after the seismic event.

.5 Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

.6 Detailed description of the assumed equipment anchorage devices on which the certification is based.

1.12 DELIVERY, STORAGE, AND HANDLING

.1 Deliver strut systems, pipe hangers and components carefully to avoid breakage, denting, and scoring finishes. Do not install damaged equipment.

.2 Store strut systems, pipe hangers and components in original cartons and in clean dry space; protect from weather and construction traffic.

1.13 WORK FURNISHED BUT NOT INSTALLED

.1 The materials and systems specified in this section shall be purchased by the fire protection Contractor from a single seismic snubber restraint materials manufacturer to assure sole source responsibility for the performance of the seismic restraints used.

.2 The materials and systems specified in this section can, at the Contractor's option, be installed by the subcontractor who installs the seismic restraint systems.

1.14 COORDINATION

.1 Coordinate size, shape, reinforcement and attachment of all housekeeping pads supporting seismically rated equipment. Concrete shall have a minimum compressive strength of 3,000 psi or as specified by the consultant.

.2 Coordinate with seismic restraint manufacturer to locate and size structural supports underneath seismically restrained equipment (e.g. roof curbs, cooling towers, and other similar equipment).

1.15 INSTALLATION

.1 Installation of all seismic restraint materials specified herein shall be accomplished following the manufacturer's written instructions. Installation instructions shall be submitted to the engineer for approval prior to the beginning of the work.

Part 2 Products

2.1 MATERIALS

.1 To the requirements of NFPA.

Part 3 Execution

3.1 GENERAL INSTALLATION

.1 Installation of all seismic restraint materials specified in this section shall be accomplished as per the manufacturer's written instructions.

.2 Refer to FEMA Manuals 412, 413, and 414 for typical industry standard installation guidelines.

.3 Upon completion of installation of all seismic restraint materials and before start-up of restrained equipment, all debris shall be cleaned from beneath all protected equipment, leaving equipment free to contact snubbers/restraints.

.4 Torque anchor bolts according to anchor manufacturer's written instructions to resist seismic forces.

.5 All seismic restraint systems shall be installed in strict accordance with the manufacturer's seismic restraint guidelines manual and all certified submittal data.

.6 Prior to installation, bring to the architect's/engineer's attention any discrepancies between the specifications and the field conditions, or changes required due to specific equipment selection.

.7 Brace support rods when necessary to accept compressive loads. Welding of compressive braces to the vertical support rods is not acceptable.

.8 Seismic restraints shall be mechanically attached to the structural system. Looping restraints around the system is not acceptable.

.9 Do not brace a system to two independent structures such as ceiling and wall.

.10 Provide appropriately sized openings in walls, floors, and ceilings for anticipated seismic movement. Provide fire seal systems in fire-rated walls.

.11 Seismic restraint cables shall be adjusted such that they are not visibly slack, or the flexibility is approximately 25 mm under thumb pressure for a 1500 mm cable length (equivalent ratio for other cable lengths).

.12 All seismic restraint cables shall be at least 25 mm clear of all other equipment and services.

3.2 FIRE PROTECTION PIPING

.1 Fire protection, sprinkler piping, and related equipment is considered as "Life Safety Equipment" and is to be seismically restrained per guidelines as published by NFPA (National Fire Protection Association).

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian General Standards Board (CGSB)

.1 ASTM C553, Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.2 CGSB 51-GP-52Ma, Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.3 CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketing Sheet, for Insulating Pipes, Vessels and Round Ducts.

.3 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.4 American Society for Testing and Materials (ASTM)

.1 ASTM C547, Type I and IV, Standard Specifications for Mineral Fibre Pipe Insulation.

.2 ASTM C 335, Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.3 ASTM C177, Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Proprieties by Means of the Guarded Hot-Plate Apparatus.

.4 ASTM C518, Standard Test Method for Steady-State Thermal Transmission Proprieties by Means of the Heat Flow Meter Apparatus.

.5 ASTM C 921, Practice for Determining the Properties Jacketing Materials for Thermal Insulation.

.6 ASTM C1695, Standard Specification for Fabrication of Flexible, Removable, and Reusable Blanket Insulation for Hot Service.

.7 ASTM C1729 Standard Specification for Aluminium Jacketing for Insulation.

.5 Manufacturer's Trade Associations

.1 Thermal Insulation Association of Canada (TIAC), North American Commercial and Industrial Insulation Standards.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for pipe, fittings, valves, and jointing recommendations.

.3 Submit properly completed detail plates from the North American Commercial and Industrial Insulation Standards manual, applicable to installation types required by this specific section.

1.3 INSTALLATION INSTRUCTIONS

.1 Submit manufacturer's installation instructions in accordance with general requirements.

.2 Installation instructions to include procedures to be used, installation standards to be achieved.

1.4 QUALIFICATIONS

.1 Installer to have successfully completed apprenticeship program.

.2 Installer to be specialist in performing work of this section and have at least three (3) years successful experience in this size and type of project, qualified to standards of TIAC.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Protect from weather, construction traffic.

.3 Protect against damage from any source.

.4 Store at temperatures and conditions required by manufacturer.

1.6 DEFINITIONS

.1 For purposes of this section:

.1 "ASJ+" – All Service Jacket – vapor retarder laminate of aluminium foil inner layer, reinforced with fiberglass scrim, bonded to a bleached kraft paper, with outer poly film leaving no paper exposed.

.2 "ASJ" – All Service Jacket (no outer film) – vapor retarder laminate of aluminium foil inner layer, reinforced with fiberglass scrim, bonded to a bleached kraft paper outer layer.

Part 2 Products

2.1 MATERIAL LIMITATIONS

.1 Products shall not contain formaldehyde, asbestos, lead, mercury or mercury compounds or PBDE fire retardants.

2.2 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC-S102:

.1 Maximum flame spread rating: 25

.2 Maximum smoke developed rating: 50.

2.3 INSULATION

.1 Mineral fibre as specified herein includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C (75°F) mean temperature when tested in accordance with ASTM C335, ASTM C177 or ASTM C518.

.2 Type A-1: Rigid moulded or wound mineral fibre with factory applied vapour retarder jacket.

.1 Mineral fibre: to ASTM C547 Type I and IV

.2 Jacket: to ASTM C1136, Type I, II, III, IV, X

.3 Maximum "k" factor: to ASTM C547.

.3 Materials:

.1 All materials must be supplied by the same manufacturer.

.2 Acceptable Manufacturers:

.1 Johns Manville

.2 Knauf

.3 Manson

.4 Owens Corning.

2.4 INSULATION SECUREMENT

.1 Tape: Self-adhesive, aluminum, reinforced, 50 mm (2") wide minimum

.2 Contact adhesive: Quick setting

.3 Canvas adhesive: Washable.

2.5 JACKETS

.1 Polyvinyl Chloride (PVC):

.1 Minimum thickness: 20 mm (0.020").

.2 One-piece moulded type [and sheet] to CAN/CGSB-51.53 with pre-formed shapes as required.

.3 Colours: white.

.4 Minimum service temperatures: -29°C (-20°F).

.5 Maximum service temperature: 65°C (150°F).

.6 Moisture vapour transmission: 0.05 perm.

.7 Fastenings:

.8 Use solvent weld adhesive compatible with insulation to seal laps and joints.

.9 Tacks are not to be used below ambient temperature (cold) operating systems.

.10 Pressure sensitive vinyl tape of matching colour.

Part 3 Execution

3.1 PRE-INSTALLATION REQUIREMENT

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed, and certified.

.2 Surfaces to be clean, dry, free from foreign material.

3.2 INSTALLATION

.1 Install in accordance with TIAC, North American Commercial and Industrial Insulation Standards.

.2 Apply materials in accordance with manufacturers' instructions and this specification.

.3 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.4 Hangers, supports to be outside vapour retarder jacket.

3.3 PIPING INSULATION SCHEDULES

.1 Install insulator and jackets to applicable TIAC codes.

.2 Insulate ends of capped piping with type and thickness indicated for capped service.

.3 Thickness of insulation to be as listed in following table:

Application	Type	Pipe sizes through (NPS) and insulation thickness mm (")				
		to 25 (1")	32 (1¼") 40 (1½")	50 (2") 80 (3")	105 (4") 150 (6")	200 (8") & over
Fire Protection Piping	A-1	40 (1½")	40 (1½")	50 (2")	50 (2")	50 (2")

.2 Finishes: Conform to the following table:

Application	Piping
All indoors	PVC
Outdoors	Aluminum

.1 Connection: to appropriate TIAC code.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 NFPA 13 latest edition, Installation of Sprinkler Systems.

.3 Ontario Fire Code.

.4 Ontario Building Code.

.5 Factory Mutual guidelines.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements in accordance with NFPA 13, working plans and design requirements.

.2 Shop drawings shall be approved by authority having jurisdiction prior to submission.

.3 Submit to Consultant for general review and information only.

.4 Submitted drawings shall be reproducible. Do not submit marked up prints.

.5 Drawings shall be in AutoCad format.

1.3 SAMPLES

.1 Submit samples in accordance with general requirements.

.2 Submit samples of following:

.1 Each type of sprinkler head.

.2 Signs.

1.4 ENGINEERING DESIGN CRITERIA

.1 Design system in accordance with Ontario Fire Marshall, local authority having jurisdiction, Owner's underwriters as required, and NFPA 13, NFPA 20, and NFPA 45 using following parameters:

.1 To suit occupancy as indicated.

.2 Pipe size and layout: Hydraulic design.

.3 Conduct flow and pressure test of water supply in vicinity of project to obtain criteria for bases of design in accordance with NFPA 13. Indicate location and flow on shop drawings.

.4 System zoning as indicated in accordance with NFPA 13.

.5 Provide complete drawings and calculations stamped by a qualified professional engineer registered in the Province of Ontario.

.6 Professional Engineer shall provide on site review and certification for local building code review.

.2 System shall be approved by Ontario Fire Marshall, local authority, and Owner's underwriter prior to shop drawing submission.

1.5 COMMISSIONING & INTEGRATED TESTING OF FIRE PROTECTION & LIFE SAFETY SYSTEMS

.1 Sprinkler Contractor to perform services with the Fire Commissioning Agent (FCA) to meet their requirements for administration, verification, and final sign-off.

.2 The Fire Commissioning Agent (FCA) is being retained by the Electrical Contractor, however; this Contractor's work to satisfy the FCA requirements shall be included in the tender price.

.3 The Sprinkler Contractor at a minimum must include for:

.1 Providing FCA with all documentation of design and shop drawings.

.2 Provide documents for sequence of operation and maintenance of system.

.3 Movement of all valves and accessories to confirm Alarm/Supervisory/Trouble at the fire panel.

.4 Create flow at all initiating devices to verify detection at the fire panel.

.5 Testing and operation of any fire pumps.

.6 Other items that may be requested by the FCA.

.7 Re-commissioning of any items that may have failed.

.8 Putting the system back into proper operation after tests are completed.

.4 All work is to be performed in accordance with NFPA 3 2010 Edition. Special consideration to be given to Figure A3.3.16 (b) for Sequence of Operation Form required to be completed in conjunction with the FCA and submitted to the Consultant's prior to occupancy.

.5 The work to be performed by this Contractor is also described in NFPA 3 table A.5.1.1 as labelled "Construction Stage" and "Occupancy Stage".

1.6 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

1.7 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with general requirements.

.2 Provide spare sprinklers and tools as required by NFPA 13.

1.8 QUALIFICATIONS

.1 Contractor to be specialist in performing work of this section and have **at least 3 years'** successful experience in this size and type of project.

1.9 PERMITS AND FEES

.1 Obtain and pay for all permits, fees, and inspections as required by authority having jurisdiction.

1.10 EQUIPMENT

.1 ULC listed and labeled.

1.11 STORAGE

.1 Store in original packaging with manufacturers' labels and seals intact.

.2 Store in dry secure location.

.3 Damaged material and/or equipment shall be replaced.

1.12 INSURANCE

.1 Confirm with owner prior to submitting quote.

.2 Owner's insurance underwriters:

.1 **Factory Mutual Insurance Company**
165 Commerce Valley Drive West, Suite 500
Thornhill, ON L3T 7V8
Ph: (905) 763-5555, Fax: (905) 763-5622

1.13 UNDERWRITERS REQUIREMENTS

.1 Confirm with owner insurance underwriters prior to submitting quote.

.2 Ordinary hazard group II

Part 2 Products

2.1 PIPE, FITTINGS, AND VALVES

.1 Pipe and Fittings:

.1 25 mm (1"): Schedule 40 steel pipe with screwed fittings.

.2 32 mm (1¼") to 50 mm (2"):

.1 Schedule 40 steel pipe with screwed fittings or,

.2 Schedule 10 steel pipe with roll grooved fittings.

.3 65 mm (2½") and larger: Schedule 10 steel pipe with roll grooved fittings.

.2 Valves:

.1 ULC listed for fire protection service.

.2 Up to NPS 2: bronze, screwed ends, OS&Y gate.

.3 NPS 2 1/2 and over: cast iron, flanged or roll grooved ends, indicating butterfly valve.

.4 Swing check valves.

.5 Ball drip.

.3 Pipe hangers:

.1 ULC listed for fire protection services.

.4 End switches:

.1 Provide on all isolating valves.

.2 Coordinate voltage and location with Fire Alarm Contractor.

.5 Flow switches:

.1 Provide where indicated and required.

.2 Coordinate voltage and location with Fire Alarm Contractor.

2.2 SPRINKLER HEADS

.1 General: to NFPA 13 and ULC listed for fire services.

.2 Indicate type and location of sprinkler heads on drawings. Co-ordinate sprinkler heads location with other trades.

.3 Locate sprinkler heads in acoustic tile ceiling in centre of tile.

.4 Provide sprinkler heads as follows:

.1 Upright bronze: Exposed with no ceilings.

.2 Concealed fusible link type brass pendent with ring and cup in ceiling and brass coverplate. Coverplate finish selected by Consultant. Concealed heads installed in unsupervised areas (corridors, washrooms).

.3 White semi-recessed fusible link type brass pendent with adjustable, recessed escutcheon ring and cup. Sprinkler and escutcheon cup. Finish selected by Consultant. Semi-recessed heads installed in supervised areas (classrooms, offices, seminar rooms, etc.).

.4 Sprinkler heads with O-ring design shall not be used.

.5 Provide guards on upright sprinkler heads in all storage rooms, in the gymnasium and on heads below 1800 mm AFF.

.5 Provide sprinkler heads under all equipment/ductwork over 1200 mm wide.

2.3 WATERFLOW DETECTORS (WFD)

.1 Provide, where shown, waterflow detectors, complete with vane type sensor to actuate two single pole, double throw snap action switches when waterflow exceeds a sustained 0.63 L/s (10 gpm) flow.

.2 Provide a built-in pneumatic retard device, with automatic reset to reduce false alarms. The time delay shall be field adjustable from 0 to 70 seconds.

.3 Provide local wiring at WFD. Refer to Electrical Division for alarm wiring to fire alarm system.

.4 WFD shall be suitable for 1750 kPa (250 psig) service pressure.

2.4 SUPERVISORY SWITCHES

.1 General: to NFPA 13 and ULC listed for fire service.

.2 Valves:

.1 Mechanically attached to valve body, with normally open and normally closed contacts and supervisory capability.

.3 Flow switch type:

.1 With normally open and normally closed contacts and supervisory capability.

.4 Pressure alarm switch:

.1 With normally open and normally closed contacts and supervisory capability.

2.5 PRESSURE GAUGES

.1 ULC listed.

.2 Shall have maximum limit of not less than twice normal working pressure at point where installed.

2.6 SIGNS

.1 Signs for control drain and test valves: to NFPA 13.

2.7 SPARE PARTS CABINET

.1 For storage of maintenance materials, spare sprinkler heads and special tools.

.2 Include all types and temperature ratings of sprinkler heads installed.

.3 Construct to sprinkler head manufacturers standard.

.4 Install where directed on site or next to alarm valve.

2.8 DOCUMENTATION

.1 Prepare documentation as indicated.

.2 Provide documentation based on tender documents. Coordinate sprinkler drawings with all trades.

.3 Provide one hard copy and one electronic copy of As Built drawings acceptable to Consultant prior to final payment.

2.9 UNIT PRICES

.1 Provide unit prices as follows.

.1 Additional sprinkler head including hangers, 3.6 m piping and two elbows.

.2 Delete sprinkler head including hangers, 3.6 m piping and two elbows.

2.10 UNDERWRITERS APPROVED GATE VALVE

.1 NPS 65 – 350 mm (2 1/2" - 14"), OS&Y:

.1 Approvals: UL and FM approved for fire service.

.2 UL and FM Label: on valve yoke.

.3 Body, Bonnet: cast iron to ASTM A 126 Class B. Wall thicknesses to ANSI B 16.1 and ULC 262(B).

.4 Bonnet bushing, yoke sleeve: bronze, to FM requirements.

.5 Packing gland: bronze.

.6 Stem: manganese bronze. Diameter to ULC C-262(B).

.7 Stuffing box dimensions, gland bolt diameter: to ULC C 262(B).

.8 Bosses for bypass valve, drain: on NPS 100 mm (4") and over.

.9 Disc: solid taper wedge. Up to NPS 80 mm (3"): bronze. NPS 100 mm (4") and over: cast iron with bronze disc rings.

.10 Disc seat ring: self-aligning, Milwood undercut on NPS 80 mm (3").

.11 Complete with lock and chain where indicated.

.12 Complete with supervisory valves where indicated.

.13 Pressure rating:

.1 NPS 65 – 300 mm (2-1/2" - 12"): 1.7 MPa (250 psi) CWP

.2 NPS 350 mm (14"): 1.2 MPa (175 psi) CWP

.14 Operator: Handwheel.

Part 3 Execution

3.1 INSTALLATION

.1 Install, inspect and test to acceptance in accordance with NFPA 13 and FC 403.

.2 Testing to be witnessed by authority having jurisdiction.

.3 Space hangers and support of sprinkler piping in accordance with N.F.P.A. regulations.

.4 Hydrostatically test systems at 350kPa in excess of normal working pressure, but not less than 1.4 MPA for two hours without loss under supervision of authority having jurisdiction and NFPA requirements.

.5 Provide hydraulic pump, temporary connections and labour required for tests.

.6 Protect exposed work, in accordance with 'Painting' section.

.7 Do not cover or conceal piping accessories or work prior to inspection and approval by authorities having jurisdiction.

.8 Adjust equipment to satisfaction of authority having jurisdiction and Consultant.

.9 Protect equipment during painting. Replace damaged and painted components.

.10 Co-ordinate the sprinkler piping and equipment with that of other trades on the job. Mains and branches shall be run so as not to interfere with building's structure, mechanical, or electrical installations. Branch piping above ceilings is to run in joist space or minimum 300 mm above ceiling. Provide drops at head locations only. All exposed piping to run in joist space.

.11 Guarantee that the systems and equipment be installed in accordance with all Local and Provincial by-laws and the rules and regulations of the Insurance Underwriters and the Building Code of Ontario.

.12 Provide a flow test for each system on the remote inspectors test connection using methods approved by the local fire department and local water commission. Report the test results in writing to the Consultant.

3.2 WATER FLOW TEST

.1 Provide a flow test to approval of local fire department and local water commission at nearest fire hydrant adjacent to building to determine water flow rate and pressure. Provide written test results with shop drawing submission.

.2 Provide a forward flow test through the bypass to prove system demand can be provided through the backflow preventer.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

.1 This section covers items common to all sections of Plumbing Division.

.2 Conform to Division 1 General Conditions.

.3 Furnish labour, materials, and equipment necessary for completion of work as described in contract documents.

.4 Unless specifically indicated, all materials and equipment provided under this contract shall be new and shall be manufactured in the project year.

.5 The term “Mechanical Contractor” shall remain active and shall mean a “single contractor” performing plumbing, drainage, heating, cooling, ventilation, and control services.

.6 When quoting as a subcontractor this contractor shall explicitly state the services they are providing i.e. Mechanical (all services), Plumbing (water and drainage systems) or HVAC (including hydronic and air systems).

.7 Contractors shall be explicit to identify whether Fire Protection is included or omitted from the mechanical scope.

1.2 INTENT

.1 Mention herein or indication on Drawings of articles, materials, operations or methods requires: supply of each item mentioned or indicated, of quality, or subject to qualifications noted; installation according to conditions stated: and, performance of each operation prescribed with furnishing of necessary labour, equipment, and incidentals for plumbing work.

.2 Where used, words “Section” and “Division” shall also include other Subcontractors engaged on site to perform work to make building and site complete in all respects.

.3 Where used, word “supply” shall mean furnishing to site in location required or directed complete with accessory parts.

.4 Where used, word “install” shall mean secured in place and connected up for operation as noted or directed.

.5 Where used, word “provide” shall mean supply and install as each is described above.

1.3 REGULATIONS, PERMITS, AND FEES

.1 All materials and quality of work shall meet all current and latest Provincial, Municipal and Fire Marshall requirements, regulations, codes, and by-laws in force in the area of the project.

.2 Each contractor shall give all necessary notices, obtain all necessary permits, and pay all fees in order that the work shown or specified may be carried out. Each contractor shall furnish any certificates necessary as evidence that the work installed conforms with the laws and regulations of all authorities having jurisdiction.

.3 In the event that changes, or alterations are required on completed work by authorized inspectors, these changes shall be made at the contractor's expense.

.4 Special equipment which does not have a standard CSA label shall be inspected by the local electrical authority having jurisdiction and the Approval Certificate shall be submitted to the Consultant as soon as possible. All costs and fees for inspections shall be borne by this contractor.

1.4 DRAWINGS

.1 The drawings and this specification have been assembled together as a responsibility of the consultant. The same is true for the other consultants, i.e. architect, structural engineer, civil engineer, fire protection engineer, electrical engineer, etc.

.2 The drawings and specifications are not assembled together for responsibility/division between subcontractors. The division of work between subcontractors remains the responsibility of the buildings' contractor (also known as the prime contractor or general contractor).

.3 All subcontractors are encouraged to perform work amicably utilizing all of the drawings and specifications published by all of the consultants.

.4 Plumbing and Mechanical Drawings do not show structural and related details. Take information involving accurate measurement of building from building drawings, or at building. Make, without additional charge, any necessary changes, or additions to runs of piping, conduits, and ducts to accommodate structural conditions. Location of pipes, ducts, conduits and other equipment may be altered by Consultant without extra charge provided change is made before installation and does not necessitate major additional material.

.5 As work progresses and before installing piping, ductwork, heating units, registers, diffusers, fixtures and any other fittings and equipment which may interfere with interior treatment and use of building, provide detail drawings, or obtain directions for exact location of such equipment and fittments.

.6 Plumbing and Mechanical Drawings indicate general location and route of pipes, ducts and conduits which are to be installed. Where required work is not shown or only shown diagrammatically, install same at maximum height in space to conserve head room (minimum 2200 mm (88") clear) and interfere as little as possible with free use of space through which they can pass. Follow building lines, conceal piping, conduits and ducts in furred spaces, ceilings and walls unless specifically shown otherwise. Install work close to structure so furring will be small as practical.

.7 Install piping and ductwork to clear structural members and any fireproofing. Locate plumbing work to permit installation of specified insulation. Do not remove or damage structural fireproofing. Leave space to permit fireproofing and insulation to be inspected and repaired.

.8 Before commencing work, check and verify all sizes, locations, grade and invert elevations, levels, and dimensions to ensure proper and correct installation. Verify existing/municipal services.

.9 Locate all plumbing, mechanical, and electrical equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.

.10 In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install piping and other work so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose.

.11 Relocate equipment and/or material installed but not coordinated with work of other Sections and/or installed incorrectly as directed, without extra charge.

.12 Where drawings are done in metric and product not available in metric, the corresponding imperial trade size shall be utilized.

1.5 INTERFERENCE AND COORDINATION DRAWINGS

.1 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the constructed spaces provided.

.2 Prepare drawings to indicate co-ordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are coordinated.

.3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.

.4 Upon consultant's request submit copies of interference drawings to consultant.

.5 Due to the nature of the building and the complexity of the building systems provide the following:

.1 Interference drawings, showing coordination of architectural, structural, plumbing, mechanical, and electrical systems for the consultant's review prior to fabrication.

.2 Detailed layout drawings, clearly showing fasteners and hangers.

.6 Provide CAD drawings (minimum file version AutoCAD 2013) in addition to hard copies.

1.6 QUALITY ASSURANCE

.1 Perform work in accordance with applicable provisions of local Plumbing Code, Gas Ordinances, and adoptions thereof for all plumbing systems. Provide materials and labor necessary to comply with rules, regulations, and ordinances.

.2 In case of differences between building codes, provincial laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Consultant in writing of such differences.

1.7 ALTERNATES AND SUBSTITUTIONS

.1 Throughout Plumbing and Mechanical Division are lists of "Alternate Equipment" manufacturers acceptable to Consultant if their product meets characteristics of specified described equipment. Submitted Bids shall be based on the supply of named articles and or products as specified in the Bid Documents.

.2 Each bidder may elect to use "Alternate Equipment" from lists of Alternates where listed. Include for any additional costs including all costs for revisions to electrical contract to suit Alternate used. Prices are not required in Tender for Alternates listed except where specifically noted as "Separate Price". Complete the Supplementary Tender Form.

.3 When two or more suppliers/manufacturers are named in the Bid Documents, only one supplier/manufacturer of the products named will be acceptable; however, it is the responsibility of this Division to ensure "Alternate Equipment" fits space allocated and gives performance specified. If an "Alternate Equipment" nor "equal" specified product unit is proposed and does not fit space allotted in Consultant's opinion, supply of specified described equipment will be required without change in Contract amount. Should electrical characteristics for "alternate" or "equal" equipment differ from equipment specified it shall be the responsibility of the equipment manufacturer to pay all costs associated with the revisions to the electrical contract. Only manufacturers listed will be accepted for their product listing. All other manufacturers shall be quoted as substitution stating conditions and credit amount.

.4 If item of material specified is unobtainable, state in Tender proposed substitute and amount added or deducted for its use. Extra monies will not be paid for substitutions after Contract has been awarded.

.5 If pipe or item, of size or weight indicated, is unobtainable, supply next larger size or heavier weight without additional charge.

1.8 EXAMINATION

.1 Site Reviews

.1 Examine premises to understand conditions which may affect performance of work of this Division before submitting proposals for this work.

.2 No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

.2 Drawings:

.1 Plumbing and Mechanical Drawings show general arrangement of piping, ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.

.2 Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing, Mechanical, and Fire Protection Drawings.

.3 Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories, which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

.3 Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

1.9 SEQUENCING SCHEDULING AND COORDINATION

.1 It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for installation of systems according to the true intent and meaning of Contract Documents. Anything not clear or in conflict will be explained by making application to Consultant. Should conditions arise where certain changes would be advisable, secure Consultant's approval of these changes before proceeding with work.

.2 Coordinate work of various trades in installing interrelated work. Before installation of plumbing items, make proper provision to avoid interferences in a manner approved by Consultant. Each Contractor shall refer to all sections of the specification for their responsibilities with other trades. Changes required in work specified in Plumbing Division caused by neglect to do so shall be made at no cost to Owner.

.3 Arrange pipes, ducts, and equipment to permit ready access to valves, unions, traps, starters, motors, control components, and to clear openings of doors and access panels.

.4 Furnish and install inserts and supports required by Plumbing Division unless otherwise noted. Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions of the Work to Sections involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne by Plumbing Division.

.5 Be responsible for required excavation, backfilling, cutting, and patching incident to work of this Division and make required repairs afterwards to satisfaction of Consultant. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.

.1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

.2 Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

.3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

.6 Adjust locations of pipes, ducts, equipment, fixtures, etc., to accommodate work from interferences anticipated and encountered. Determine exact route and location of each pipe and duct prior to fabrication.

.1 Make offsets, transitions, and changes in direction of pipes, ducts, and electrical raceways as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.

.2 Furnish and install traps, air vents, sanitary vents, pull boxes, etc., as required to affect these offsets, transitions, and changes in direction.

.7 Slots and openings through floors, walls, ceilings, and roofs shall be provided by this contractor but performed by a trade specializing in this type of work. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

1.10 REQUEST FOR INFORMATION (RFI) PROCEDURES

.1 RFIs shall be submitted to the consultant minimum two (2) weeks prior to answer being required. Failure to submit an RFI in a timely manner will forfeit delay claims and schedule extension requests by the contractor.

.2 All RFIs will be submitted with the following information:

.1 RFI number
.2 Name of project
.3 Date of initiation
.4 Date response required by (minimum two (2) weeks)
.5 Subject
.6 Submitter's name
.7 Drawing/specification reference
.8 Photograph of the issue (if applicable)
.9 Description of the issue
.10 Contractor's proposed resolution

1.11 CONTRACT BREAKDOWN

.1 Provide breakdown of contract exclusive of HST to acceptance of consultants prior to first draw submission.

.2 Provide labour and material cost for each item.

.3 Breakdown shall indicate total contract amount.

.4 Contract breakdown shall be as follows as a minimum.

.1 Mobilization and shop drawings (max. $2,000.00)

.2 Demolition

.3 Above grade rough-in plumbing and drainage

.4 Roof drainage system

.5 Plumbing fixtures

.6 Plumbing equipment

.7 Piping insulation

.8 Firestopping

.9 Plumbing contractor closeout requirements (min. of 3% for the first $500,000.00, 1% from $500,000.00 to $5,000.000.00, and 0.5% beyond. Shall not be less than $5,000.00).

.5 Progress claims, when submitted are to be itemized against each item of the contract breakdown, this shall be done in table form showing contract amount, work complete to date, previous draw, amount this draw and balance.

.6 Mobilization amount may only be drawn when all required shop drawings have been reviewed by the consultant.

1.12 SHOP DRAWINGS AND PRODUCT DATA

.1 Furnish complete catalog data for manufactured items of equipment to be used in the Work to Consultant for review within 14 days after award of Contract.

.2 Upon receipt of reviewed shop drawing, product is to be ordered immediately.

.3 Provide a complete list of shop drawings to be submitted prior to first submission.

.4 Before submitting to the Consultant, review all shop drawings to verify that the products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers, and similar data and that it has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The Contractor's review of each shop drawings shall be indicated by stamp, date and signature of a qualified and responsible person possessing by the appropriate authorization.

.5 If material or equipment is not as specified or submittal is not complete, it will be rejected by Consultant.

.6 Additional shop drawings required by the contractor for maintenance manuals, site copies etc., shall be photocopies of the "reviewed" shop drawings. All costs to provide additional copies of shop drawings shall be borne by the contractor.

.7 Submit all shop drawings for the project as a package. Partial submittals will not be accepted.

.8 Catalog data or shop drawings for equipment, which are noted as being reviewed by Consultant or their Engineer shall not supersede Contract Documents.

.9 Review comments of Consultant shall not relieve this Division from responsibility for deviations from Contract Documents unless Consultant's attention has been called to such deviations in writing at time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.

.10 Check work described by catalog data with Contract Documents for deviations and errors.

.11 Shop drawings and product data shall show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances. e.g., access door swing spaces.

.12 Shop drawings and product data shall be accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify as to current model production.

.5 Certification of compliance to applicable codes.

.13 State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information. List on catalog covers page numbers of submitted items. Underline applicable data.

.14 Shop drawings shall be submitted electronically as per the following directions:

.1 Electronic Submissions:

.1 Electronically submitted shop drawings shall be prepared as follows:

.1 Use latest software to generate PDF files of submission sheets.

.2 Scanned legible PDF sheets are acceptable. Image files are not acceptable.

.3 PDF format shall be of sufficient resolution to clearly show the finest detail.

.4 PDF page size shall be standardized for printing to letter size (8.5"x11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11"x17".

.5 Submissions shall contain multiple files according to section names as they appear in Specification.

.6 File names shall include consultant project number and description of shop drawing section submitted.

.7 Each submission shall contain an index sheet listing the products submitted, indexed in the same order as they appear in the Specification. Include associated PDF file name for each section.

.8 On the shop drawing use an “electronic mark” to indicate what is being provided.

.9 **Each file shall bear an electronic representation of the "company stamp" of the contractor. If not stamped the file submission will not be reviewed.**

.2 Email submissions shall include subject line to clearly identify the consultants project number and the description of the shop drawings submitted.

.3 Electronic attachments via email shall not exceed 10MB. For submissions larger than 10MB, multiple email messages shall be used. Denote related email messages by indicating "1 of 2" and "2 of 2" in email subject line for the case of two messages.

.4 Electronic attachments via web links (URL) shall directly reference PDF files. Provide necessary access credentials within link or as username/password clearly identified within body of email message.

.5 On site, provide one (1) copy of the "reviewed" shop drawings in a binder as noted above.

.6 Contractor to print copies of "reviewed" shop drawings and compile into maintenance manuals in accordance with requirements detailed in this section.

1.13 EQUIPMENT NAMEPLATE DATA

.1 Between the manufactures design published literature, the shop drawing submission literature, and the nameplate data on the equipment, they can all read differently.

.2 Most of the confusion and differences are coming out of the electrical power installation.

.3 The contractors installing and connecting the equipment are responsible for the coordination of this data through the construction period.

.4 The contractors shall share and/or request this information through out the project and monitor/make adjustments, provide recommendations accordingly based on any discrepancies.

.5 The contractors are responsible for any cost associated with the changing data.

.6 The final installation must meet the "Nameplate Data" on the equipment on site.

1.14 OPERATION AND MAINTENANCE MANUAL

.1 Provide operation and maintenance data for incorporation into manual as in submittals' requirements.

.2 Operation and maintenance manual to be approved by, and final copies deposited with, Consultant before final inspection.

.3 Submit one (1) copy of Operation and Maintenance Manual to Consultant for approval. Submission of individual data will not be accepted unless directed by Consultant. Submission can be done electronically in PDF format or as a hard copy.

.1 Electronic submission/PDF file is required to be bookmarked. Any submission received without bookmarking will be immediately returned as unacceptable.

.2 Hard copy submission shall be in a three-ring binder (minimum 50 mm (2") ring) and labelled as 'Operation and Maintenance Manual' with project name and location. Dividers are to be used for binder organization.

.4 Make changes as required and re-submit as directed by Consultant.

.5 Operation data to include:

.1 Control schematics for each system including environmental controls.

.2 Description of each system and its controls.

.3 Operation instruction for each system and each component.

.4 Description of actions to be taken in event of equipment failure.

.5 Valves schedule and flow diagram.

.6 Colour coding chart.

.7 Spare parts equipment list.

.8 Manufacturers standard or extended warranty information.

.6 Maintenance data shall include:

.1 Servicing, maintenance, operation, and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.7 Performance data to include:

.1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified elsewhere.

.4 Testing, adjusting and balancing reports as specified in Testing, Adjusting and Balancing Section.

.5 Copy of all substantial performance final certificates.

.8 Miscellaneous data to include:

.1 Letter of contractor's warranty and guarantee.

.2 Index sheet.

.3 Tabbed format for each section.

.4 Manufacturers approved shop drawings.

.5 Spare parts list and source.

.6 List of Manufacturers and suppliers address for each piece of equipment.

.9 Final Submittals:

.1 Upon acceptance of Operation and Maintenance Manual by the Consultant, provide the following:

.1 Provide two (2) copies of final Operation and Maintenance Manuals, as well as a PDF file of the entire approved manual on a USB stick. Only one (1) USB stick is to be provided containing both the approved manual and as-built drawings.

1.15 AS-BUILT DRAWINGS

.1 Site records:

.1 Contractor shall provide two (2) sets of reproducible plumbing drawings. Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include changes to existing plumbing systems, control systems, and low voltage control wiring.

.2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection at all times.

.2 As-built drawings submittal for TAB and review:

.1 Prior to start of Testing, Adjusting, and Balancing (TAB), finalize production of as-built drawings.

.2 Identify **each drawing** in lower right-hand corner in letters at least 3 mm (1/8") high as follows: - "AS-BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW PLUMBING SYSTEMS AS INSTALLED" (Company Name) (Signature of Contractor) (date).

.3 TAB to be performed using as-built drawings.

.4 Submit copy to Consultant for review and approval. When returned, make corrections as directed.

.3 As-built drawings final submittal:

.1 Once approved, submit completed, reproducible paper as-built drawings as well as a scanned PDF file copy on USB stick with Operation and Maintenance Manuals.

1.16 WARRANTIES

.1 In addition to guarantee specified in General Conditions, guarantee plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.

.2 Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record "start-up" date of each piece of equipment on certificate. Include certificates as part of Operation & Maintenance Manual.

.3 If plumbing sub-contractor with offices located more than 80 km (50 miles) from Project site is used, provide service/warranty work agreement for warranty period with local plumbing sub-contractor approved by Consultant. Include copy of service/warranty agreement in warranty section of Operation & Maintenance Manual.

Warranty period shall start from date of ready for takeover. Warranty start date based on shipment date, start up date, substantial completion date, etc. are not applicable.

.4 Warranty Duration:

.1 Two year warranty period applies unless otherwise noted.

.5 Warranty Coverage:

.1 Applies to parts and labour.

1.17 READY FOR TAKEOVER

.1 Complete the following to the satisfaction of the consultant prior to request for ready for takeover.

.1 As-built Drawings
.2 Maintenance Manuals
.3 System Start up
.4 TAB Reports
.5 Plumbing Systems Commissioning
.6 Instructions to Owners

1.18 REVISION TO CONTRACT

.1 Provide the following:

.1 Itemized list of material with associated costs.
.2 Labour rate and itemized list of labour for each item.
.3 Copy of manufacturers/supplier's invoice if requested.

1.19 DELIVERY, STORAGE, AND HANDLING

.1 Follow Manufacturer's directions in delivery, storage, and protection, of equipment and materials. Contractor to include all costs associated with delivery storage and handling in tender price.

.2 Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or environmental damages but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in dry, heated space.

.3 Remove all damaged materials from site.

1.20 DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS

.1 If designated substances and/or hazardous materials are suspected or identified cease all work in the immediate area in accordance with OHSA and notify consultant.

.2 **Each contractor and on site employee of the contractor shall have "asbestos awareness training".**

.3 The Contractor shall ensure that employees who may come into contact with designated substances and/or hazardous materials due to the nature of the work that they perform, have received training that enables them to recognize designated substances and/or hazardous materials and that enables them to react in accordance with the Occupational Health and Safety Act and regulations thereto should contact with designated substances and/or hazardous materials occur during the course of their work.

.4 **It is the responsibility of the contractor to review the designated substances and/or hazardous materials book in the building prior to starting any work.**

.5 **Existing occupied buildings (depending upon their age) may contain designated substances and/or hazardous materials in thermal insulating materials and some manufactured products, such as vinyl asbestos floor tile. Any insulating materials, on pipes, fittings, boilers, tanks, ductwork, etc. may contain designated substances and/or hazardous materials and shall not be disturbed.**

.6 **A survey of each building documenting the location and condition of designated substances and/or hazardous materials -containing materials is available for your mandatory review prior to commencing any work on premises.**

1.21 PHASING OF WORK

.1 This work for this project shall be constructed in phases. Refer to the architectural drawings for phasing information and details. Misinterpretation of the drawings with respect to the extent of the phasing of the work shall not relieve the contractor of the work required to complete the entire contract.

.2 Provide all necessary services or temporary services to suit phasing of construction with respect to all plumbing services and fire protection.

.3 Life safety systems in the building are to remain fully operational in occupied areas for building staff and occupants during renovations.

.4 Provide all necessary tests and certificates at completion of each phase to suit requirements of local authorities and consultants for occupancy of completed areas.

1.22 CONFINED SPACES

.1 Certain areas of the building may be defined as a "Confined Space". Any personnel working in these areas must have confined space training, appropriate equipment and undertake all work in conformance with appropriate codes and standards.

.2 Refer to building documentation for any spaces deemed "Confined Space".

1.23 ENERGY EFFICIENCY

.1 The systems of this building must achieve the energy efficiency levels by conforming to ANSI/ASHRAE/IESNA 90.1 “Energy Standard for Buildings Except Low-Rise Residential Buildings” and Chapter 2 of Division 3 of SB-10 prescriptive method from the Ontario Building Code.

.2 All equipment, products, and installations must conform to the Codes and Standards.

END OF SECTION

Part 1 General

1.1 TESTS

.1 Give 48 hours written notice of date for tests.

.2 Insulate or conceal work only after testing and approval by Consultant.

.3 Conduct tests in presence of Consultant.

.4 Bear costs including retesting and making good.

.5 Piping:

.1 General: maintain test pressure without loss for 4 h unless otherwise specified.

.2 Test drainage, waste and vent piping to Ontario Building Code and authorities having jurisdiction.

.6 Equipment: test as specified in relevant sections.

1.2 SYSTEM START UP

.1 Provide adjusting testing and start up of all equipment prior to testing and balancing (TAB) specified elsewhere.

.2 Provide consultant with written notice verifying all equipment operation and installation is complete.

.3 Start up shall be in presence of the following: owner or representative, contractor, building automation systems (BAS) contractor, and manufacturer's representative. Each person shall witness and sign off each piece of equipment. Consultant's attendance will be determined by consultant.

.4 Simulate system start up and shut down and verify operation of each piece of equipment.

.5 Arrange with all parties and provide 72 hours notice for start up procedure.

.6 Arrange with building automation systems contractor to sequence all components and ensure system operation.

1.3 COMMISSIONING

.1 Co-ordinate and direct each step of the commissioning process and recommend acceptance or non-acceptance to the Owner/Owner's Representative.

.2 Prepare, in writing, documentation of any deficiencies discovered during the commissioning process. Submit to consultant and Owner/Owner's Representative.

.3 The Commissioning Process is detailed in *ASHRAE Guideline 1-1996 HVAC Commissioning Process.* The commissioning plan may be modified to reflect the actual construction schedule and design.

.4 Provide a pre-functional test of all plumbing system and sub-system elements, including control devices, shall be checked for the following:

.1 Verify that each element has been properly installed, properly identified, and that all connections (including electrical) have been made correctly.

.2 Verify that each element has been checked for proper lubrication, drive rotation, belt tension, control sequence, flow direction, or other conditions which may cause damage or reduce system performance.

.3 Verify that tests, meter readings, and specific plumbing/mechanical/electrical performance characteristics agree with those required by equipment or system manufacturer.

.4 Controls calibration to be completed in accordance with the specification.

.5 The TAB shall be done in accordance with the specifications.

.5 Reports:

.1 The contractor shall be responsible for recording, documenting, and maintaining detailed inspection and testing data on the test documentation reports. The data record shall be comprehensive and concise.

.2 All data must be recorded as soon as possible during the course of the inspection and testing.

.3 All documentation shall have the date, time, and names of persons participating in the inspection and testing.

.6 The verification testing procedures shall address all operating characteristics of all plumbing equipment and systems.

1.4 TRIAL USAGE

.1 Consultant or owner may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:

.1 Plumbing and drainage.

1.5 DEFICIENCIES

.1 During the course of construction, the consultants will monitor construction and provide written reports of work progress, discussions, and instruction to correct work.

.2 Instruction to correct work shall be done within the work period before the next review.

.3 The contractor shall not conceal any work until inspected.

.4 The contractor shall expedite 100% complete rough-in work and have inspected prior to concealing services and equipment especially above ceiling.

.5 Upon completion of the project the consultant will do a final review. Upon receiving the final inspection report, the contractor must correct and sign back the inspection report indicating the deficiencies are completed. A re-inspection will only be done once consultant receives this in writing.

1.6 EQUIPMENT INSTALLATIONS

.1 Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines.

1.7 PROTECTION OF OPENINGS

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.8 SLEEVES

.1 Pipe sleeves: at points where pipes pass through masonry, concrete or fire rated assemblies and as indicated. Grout sleeves in place.

.2 Schedule 40 steel pipe.

.3 Sleeves with annular fin continuously welded at midpoint:

.1 Through foundation walls.

.2 Where sleeve extends above finished floor.

.3 Through fire rated walls and floors.

.4 Sizes: minimum 6 mm (1/4") clearance all around, between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm (1") above other floors.

.6 Fill voids around pipes:

.1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.

.2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.

.3 Ensure no contact between copper tube or pipe and ferrous sleeve.

.4 Fill future-use sleeves with lime plaster or other easily removable filler.

.5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+Amdt-Mar-78.

.7 Provide minimum 20 gauge duct sleeves where ducts pass through masonry concrete or fire rated assemblies. Maintain minimum 25 mm clearance all around or to the requirements of the authority having jurisdiction. Seal at wall as indicated.

1.9 FIRE STOPPING

.1 This contractor shall work with all other contractors on the project in providing one common method of fire stopping all penetrations made in fire rated assemblies.

.2 Approved fire stopping and smoke seal material in all fire separations and fire ratings within annular space between pipes, ducts, insulation and adjacent fire separation and/or fire rating.

.3 Do not use cementitious or rigid seals around penetrations for pipe(s) or other equipment at all wall, floor, or ceiling penetrations.

.4 Insulated pipes and ducts: ensure integrity of insulation and vapour barrier at fire separation.

.5 Provide materials and systems capable of maintaining effective barrier against flame, smoke and gases. Ensure continuity and integrity of fire separation.

.6 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.

.7 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation. Provide “fire wrap” blanket around services penetrating fire walls. Extent of blanket must correspond to ULC recommendations.

.8 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens and volatile solvents.

.9 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

.10 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes. Exposed surfaces are to be acceptable to consultant prior to application of finish.

.11 Firestopping shall be inspected and approved by local authority prior to concealment or enclosure.

.12 Install material and components in accordance with ULC certification, manufacturers instructions and local authority.

.13 Submit product literature and installation material on fire stopping in shop drawing and product data manual. Maintain copies of these on site for viewing by installers and consultant.

.14 Manufacturer of product shall provide certification of installation. Submit letter to the consultant.

.15 Acceptable Alternate Manufacturers to approval of local authority:

- .1 Minnesota Mining and Manufacturing
- .2 Fryesleeve Industries Inc.
- .3 General Electric Pensil Firestop Systems
- .4 International Protective Coatings Corp.
- .5 Rectorseal Corporation (Metacaulk)
- .6 Proset Systems
- .7 3M
- .8 AD Systems
- .9 Hilti

.16 Ensure firestop manufacturer representative performs onsite inspections and certifies installation. Submit inspection reports/certification at time of substantial completion.

1.10 ESCUTCHEONS

.1 On pipes and ductwork passing through walls, partitions, floors and ceilings in exposed finished areas and on water and drain pipes inside millwork and cabinets.

.2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.

.3 Outside diameter to cover opening or sleeve.

.4 Inside diameter to fit around finished pipe.

1.11 PAINTING

.1 Refer to Section Interior Painting and specified elsewhere.

.2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

.3 Apply two coats of paint to exposed piping service in service room(s). Base colour as specified in Pipe Identification Section.

.4 Prime and touch up marred finished paintwork to match original.

.5 Restore to new condition, or replace equipment at discretion of consultant, finishes which have been damaged too extensively to be merely primed and touched up.

1.12 ACCESS DOORS

.1 Provide access doors to concealed plumbing equipment for operating, inspecting, adjusting and servicing.

.2 Flush mounted 600 x 600 mm (24" x 24") for body entry and 300 x 300 mm (12" x 12") for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.

.3 Material:

.1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Consultant.

.2 Remaining areas: use prime coated steel.

.3 Fire rated areas: provide ULC listed access doors.

.4 Washrooms or high moisture area ceilings: Aluminum with mill finish suitable for painting.

.4 Installation:

.1 Locate so that concealed items are accessible.

.2 Locate so that hand or body entry (as applicable) is achieved.

.5 Acceptable Manufacturers:

.1 Le Hage

.2 Zurn

.3 Acudor

.4 Nailor Industries Inc.

1.13 DRAIN VALVES

.1 Locate at low points and at section isolating valves unless otherwise specified.

.2 Minimum NPS 20 mm (3/4") unless otherwise specified: bronze, with hose end male thread and complete with vacuum air breaker and chain with cap.

.3 Drain valves on potable water systems shall be complete with vacuum breaker.

1.14 REPAIRS, CUTTING, AND RESTORATION

.1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

.2 Each Section of this Division shall bear expense of cutting, patching, and repairing to install their work and/or replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

.3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

.4 All patching, painting and making good of the existing walls, floors, ceilings, partitions and roof will be at the expense of this Contractor, but performed by the Contractor specializing in the type of work involved unless otherwise noted.

1.15 EXISTING SYSTEMS

.1 Connections into existing systems to be made at time approved by Consultant. Request written approval of time when connections can be made.

.2 Be responsible for damage to existing plant by this work.

1.16 CLEANING

.1 Clean interior and exterior of all systems including strainers.

.2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition.

1.17 DISCONNECTION AND REMOVAL

.1 Disconnect and/or remove equipment, piping, etc. as indicated.

.2 Cap and conceal all redundant and obsolete connections.

.3 Provide a list of equipment to be removed to the owner, for his acceptance of same. Remove all equipment from site, which the owner does not retain.

.4 Store equipment to be retained by owner on site where directed by consultant.

1.18 OWNER SUPPLIED EQUIPMENT

.1 Connect to equipment supplied by the owner and make operable.

1.19 VIDEO RECORDING OF NEW & EXISTING UNDERGROUND SERVICES

.1 Prior to final acceptance of the new underground plumbing system and prior to pouring the floor this contractor shall retain a qualified contractor to video tape the new, existing and revised sanitary and storm drainage piping and branch piping. Transfer all videotape information to USB.

.2 This contractor shall flush the new and existing storm and sanitary system to remove all debris prior to final video taping of systems.

.3 Provide 1 copy of USB.

.4 Identify video routing on As-built drawings.

1.20 CONFINED SPACES

.1 Certain areas of the building may be defined as a “Confined Space”. Any personnel working in these areas must have confined space training, appropriate equipment and undertake all work in conformance with appropriate codes and standards.

.2 Refer to building documentation for any spaces deemed “Confined Space”.

1.21 EXISTING SYSTEM DRAINAGE

.1 Drain all existing piping and drainage systems including all related equipment as required to facilitate system renovations.

.2 Disposal of existing system shall be to the requirements of the local and/or provincial regulations.

1.22 COOPERATION WITH OTHER TRADES

.1 Give full cooperation to other trades and furnish in writing to other trades, with copies to the engineer, any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

.2 Where plumbing work will be installed in close proximity to, or will interfere with work of other trades, assist in working out space conditions to make a satisfactory adjustment. Prepare composite working drawings and sections at a suitable scale, not less than ¼ inches = 1-foot – 0-inches, clearly showing how the plumbing work is to be installed in relation to the work of other trades. If work is installed before coordinating with other trades, or if it causes any interference with work of other trades, make the necessary changes in the work to correct the conditions and bear all costs.

.3 Furnish to other trades necessary templates, patterns, setting drawings, and shop details for the proper installation of work and for coordinating adjacent work.

1.23 WATERPROOFING SEAL MATERIALS

.1 Modular, expanding mechanical seal assemblies consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and pipe sleeve or wall opening, assembled with stainless steel bolts and pressure plates and designed so when bolts are tightened the links expand to seal the opening watertight. Select seal assemblies to suit pipe size and sleeve size or wall opening size.

.2 Standard of quality assurance manufacturers are:

.1 Thunderline Corp. (Power Plant Supply Co.) “Link Seal” Model S-316

.2 The Metraflex Co. “MetraSeal” type ES

.3 Or approved equivalent.

1.24 SLEEVE, CUT, AND FORMED OPENING LOCATION DRAWINGS

.1 Prepare and submit for review, drawings indicating size and location of required sleeves, recesses, and formed openings in poured or precast concrete work.

.2 Such drawings are to be completely and accurately dimensioned and relate sleeve, recesses, and formed openings to suitable grid lines and elevation datum, and are to take into account structural items such as grade beams, column caps, and column drop slabs.

.3 Begin to prepare such drawings immediately upon notification of acceptance of bid and award of Contract.

1.25 SUSTAINABLE CONSTRUCTION

.1 Construction Waste Management:

.1 Recycle all waste materials to avoid land fill sites where possible.

.2 All metal contents shall be recycled.

.3 All cardboard and paper shall be recycled.

.4 All plastic packaging shall be recycled.

.5 All wood shall be directed to the appropriate recycled wood section at the landfill site.

.2 This contractor is responsible for their own waste management system and cost associated with the disposal. This can be their own on site system, daily removal, back to shop, or a communal system shared with other contractors on site.

.3 In all cases the cost to remove materials on site are the cost of this contractor.

1.26 FREEZE PROTECTION

.1 Do not run lines in outside walls, or locations where freezing may occur. Piping next to outside walls shall be in furred spaces with insulation between the piping and the outside wall. Insulation of piping shall not be considered freeze protection.

1.27 SCAFFOLDING, RIGGING, AND HOISTING

.1 Provide all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished; remove same from premises when no longer required. Conform to OSHA requirements and standards.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

.1 Conform to the General Provisions of General Requirements Section.

.2 This project is one of a retrofit nature in part, and which will require some demolition.

.3 Allow for all remedial work in areas indicated on the drawings and as generally defined in the relevant sections of the specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1 Electrical Division.

1.3 SCOPE OF WORK

.1 The scope of work is essentially the selected disconnection and/or removal of services and/or equipment, piping, ductwork, etc. as indicated or required to complete the work.

Part 2 Products

2.1 GENERAL

.1 This Division is to liaise with the Owners or Consultant for equipment being removed that may be suitable for reuse to that specified or handed over to the Owner.

.2 This Division is to take full responsibility for any special tools or equipment required to disassemble or remove material from building.

Part 3 Execution

3.1 GENERAL

.1 The general requirements are indicated on the drawings and on the outline specification in Division 1.

.2 The general execution of the demolition is to be carried out in a clean and efficient manner.

.3 Demolition of existing ceilings, walls, etc., to facilitate removal of existing services or equipment or installation of new to be kept to a minimum and then restored to match existing.

.4 All openings or holes created by removal of existing plumbing systems which are not being reused are to be patched with the same material surrounding surfaces.

.5 All new holes and openings to facilitate plumbing systems are to be patched to match surrounding surfaces.

.6 Protect all existing furnishings, materials, and equipment. Any damage occurring as a result of the work of this Division shall be repaired or replaced at the expense of this Division.

.7 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Owners in an expedient manner with minimum disruption to the facility and systems downtime.

.8 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

.9 Where the location of any services has been shown on the plans, such information is not guaranteed. It is this Division's responsibility to verify locations, invert elevations, etc., immediately after moving on site. Should for any reason the information obtained necessitate changes in procedure or design, advise the Consultant at once. If verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Division's.

.10 Disconnect and/or remove equipment, piping, ductwork, etc. as indicated.

.11 Cap and conceal all redundant and obsolete connections.

.12 Provide a list of equipment to be removed to the Owner, for their acceptance of same. Remove all equipment from site which the Owner does not retain.

.13 Maintain equipment to be retained by Owner on site where directed by Consultant.

.14 Demolition of all parts of the work must be completed within the confines of the work area and in such a way as the dust produced and risk to injury of will not adversely affect the building users.

.15 Demolished areas of the existing building will remain in their current use in some cases. Demolition in these areas must be kept to the minimum required to complete the work.

.16 Demolition shall take place within areas isolated from all other areas with appropriate hoarding, scaffolding, netting, fencing or other means of security between building users and the work.

.17 Co-ordinate making safe electrical devices, capping plumbing and removal of fixtures prior to commencement of demolition.

.18 All piping and equipment to be removed and/or abandoned shall be drained prior to capping and/or abandoning. Disposal of all liquids shall be to the approval of authority of having jurisdiction and/or provincial regulations.

3.2 EXISTING SYSTEM DRAINAGE

.1 Drain all existing piping systems including all related equipment as required to facilitate system renovations.

.2 Disposal of existing system shall be to the requirements of the local and/or provincial regulations.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME)

.1 ANSI/ASME B31.1, Power Piping, (SI Edition).

.3 American Society for Testing and Materials (ASTM)

.1 ASTM A 125, Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A 563, Specification for Carbon and Alloy Steel Nuts.

.4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)

.1 MSS SP-58, Pipe Hangers and Supports - Materials, Design, Manufacture Selection, Application, and Installation.

1.2 DESIGN REQUIREMENTS

.1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.

.2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP-58.

.3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.

.4 Design hangers and supports to support systems under all conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.

.5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment to be in accordance with MSS SP-58.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements.

.2 Submit shop drawings and product data for following items:

.1 All bases, hangers and supports.

.2 Connections to equipment and structure.

.3 Structural assemblies.

1.4 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 GENERAL

.1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS-SP-58.

.2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.2 PIPE HANGERS

.1 Finishes:

.1 Pipe hangers and supports: to ANSI & ULC requirements

.2 Ensure steel hangers in contact with copper piping are copper plated.

.2 Upper attachment structural: Suspension from upper flange of I-Beam or joist.

.1 Cold piping NPS 65 mm (2 1/2") or greater, all hot piping: Malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed & FM approved.

.3 Upper attachment structural: Suspension from upper flange of I-Beam.

.1 Cold piping NPS 65 mm (2 1/2") or greater, all hot piping: Malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nuts.

.4 Upper attachment to concrete.

.1 Ceiling: Carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm (1/4") minimum greater than rod diameter.

.2 Concrete inserts: wedge shaped body with knockout protector plate ULC listed. Note: Rapidex and Siporex are not considered concrete. Should one of these systems be encountered, piping/ductwork and/or equipment shall be supported from adjacent walls or from supplemental steel provided by this contractor attached to the adjacent walls/structure.

.5 Shop and field-fabricated assemblies.

.1 Trapeze hanger assemblies: ASME B31.1.

.2 Steel brackets: ASME B31.1.

.6 Hanger rods: threaded rod material to MSS SP-58.

.1 Ensure that hanger rods are subject to tensile loading only.

.2 Provide linkages where lateral or axial movement of pipework is anticipated.

.7 Pipe attachments: material to MSS SP-58.

.1 Attachments for steel piping: carbon steel.

.2 Attachments for copper piping: copper plated black steel.

.3 Use insulation shields for all piping.

.4 Oversize pipe hangers and supports to accommodate thermal insulation. Provide 1.5 mm (16 gauge) saddles.

.8 Adjustable clevis: material to MSS SP-58 UL listed, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.

.1 Ensure "U" has hole in bottom for rivetting to insulation shields.

2.3 MANUFACTURER

.1 Acceptable Manufacturers:

.1 Grinnell

.2 Anvil

.3 Myatt

.4 Taylor

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with:

.1 Manufacturer's instructions and recommendations.

.2 Clevis plates:

.1 Attach to concrete with 4 minimum concrete inserts at each corner.

.3 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

3.2 HANGER SPACING

.1 Plumbing piping: most stringent requirements of Canadian Plumbing Code, Provincial Code, or authority having jurisdiction.

.2 Copper piping: up to NPS 15 mm (1/2"): every 1.5 m (5').

.3 Within 300 mm (12") of each elbow and:

Maximum Pipe Size: NPS	Spacing Steel	Maximum Spacing Copper
100 mm (4")	4.2 m (14')	3.6 m (12')
125 mm (5")	4.8 m (16')	
150 mm (6")	5.1 m (17')	

3.3 HANGER INSTALLATION

.1 Install hanger so that rod is vertical under operating conditions.

.2 Adjust hangers to equalize load.

.3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

.4 Do “NOT” support piping, ductwork and equipment from roof deck, on bottom chord of floor and/or roof joist and/or from OWSJ bridging. Provide structural member between joist.

3.4 HORIZONTAL MOVEMENT

.1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4mm (5/32") from vertical.

.2 Where horizontal pipe movement is less than 15 mm (1/2"), offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.5 FINAL ADJUSTMENT

.1 Adjust hangers and supports:

.1 Ensure that rod is vertical under operating conditions.

.2 Equalize loads.

.2 Adjustable clevis:

.1 Tighten hanger load nut securely to ensure proper hanger performance.

.2 Tighten upper nut after adjustment.

.3 C-clamps:

.1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.

.4 Beam clamps:

.1 Hammer jaw firmly against underside of beam.

END OF SECTION

Part 1 General

1.1 APPLICATION

.1 Seismic restraint is becoming more prominent with improved soil testing equipment. Seismic requirement is not site specific by geographical area but determined by site soil conditions.

.2 Where the structural engineer or architect documents have Ie*Sa(0.2)*Fa<3.5 seismic is not required on the plumbing, mechanical, electrical, or fire protection systems.

.3 Where the structural engineer or architect documents have Ie*Sa(0.2)*Fa≥3.5 seismic is required on the plumbing, mechanical, electrical, or fire protection systems.

.4 Seismic will always be required on fire protection systems when required by NFPA codes.

.5 Seismic will always be required on any “Disaster Relief Building.” For example, hospitals, police stations, ambulance building, etc.

.6 When it is unclear in the tender documents request information from the structural engineer or architect for clarification.

1.2 SECTION INCLUDES

.1 Seismic Requirements for single rod hanger support for conduit, pipe and other similar systems.

.2 Seismic Requirements for trapeze type supports for cable tray, conduit, pipe and other similar systems.

.3 Seismic requirements for all plumbing equipment and piping.

1.3 RELATED WORK SPECIFIED ELSEWHERE

.1 Vibration Isolation Measures.

1.4 REFERENCE STANDARDS

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 National Building Code of Canada (NBC).

.3 Canadian Standards Association

.1 CSA S832, Seismic Risk Reduction of Operation and Functional Components (OFCs) of Buildings.

.2 CAN/CSA-S16.1 Limit States Design of Steel Structures

.3 CAN3-S136 Design of Cold Steel Structural Members

.4 CSA W47.1 Certification of Companies for Fusion Welding of Steel

.5 CSA W59 Welded Steel Construction

.4 American Society of Testing and Materials

.1 ASTM A653/S653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (galvannealed) by the Hot Dip Process.

.2 ASTM A879M Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface.

.3 ASTM A307 Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.4 ASTM A325M Specification for Structural Bolts, Heat Treated 830MPa Minimum Tensile Strength.

.5 All local codes.

.6 FEMA: Seismic Restraint Installation Manuals 412. 413. & 414

.1 FEMA 412: Installing Seismic Restraints for Plumbing/Mechanical Equipment

.2 FEMA 413: Installing Seismic Restraints for Electrical Equipment

.3 FEMA 414: Installing Seismic Restraints for Duct and Pipe

.7 ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.).

.8 ASHRAE Applications Handbook; Seismic and Wind Restraint Design Chapter.

1.5 DEFINITIONS

.1 A_v: Effective peak velocity related acceleration coefficient BOCA, SBC Code.

.2 S_1: Mapped Long Period Seismic Acceleration Coefficient IBC, TI-809-04, ASCE7.

.3 S_s: Mapped Short Period Seismic Acceleration Coefficient IBC, TI-809-04, ASCE7.

.4 v: Zonal Velocity Coefficient NBC-Canada.

.5 VISCMA: The Vibration Isolation and Seismic Control Manufacturers Association has developed Testing and Rating Standards for Seismic Restraint Components that comply with Code and ASHRAE based requirements.

.6 VISCMA 102-2007: Static Qualification Standards for Obtaining a VISCMA Compliant Seismic Component Rating.

.7 Z: Seismic Zone defines Seismic Coefficient C_a used by UBC Code.

1.6 PERFORMANCE REQUIREMENTS

.1 Design Ground Acceleration Coefficient (A_v, S_s, v, or Z depending on Code = X.XX).

.2 (If IBC or TI-809-04) Design Long Period Ground Acceleration Coefficient (S_1 = X.XX).

.3 Design Soil Type = (S_a, S_b, S_c, S_d) as appropriate. (If NBC Canada, the Foundation Factor).

.4 Importance or Performance Factor appropriate to structure = I_p = X.XX.

.5 If UBC Zone 4, Proximity to Fault and, if less than 10km, Fault Type.

.6 Schedule or drawings indicating critical (Ip = 1.5) Duct/Piping systems, including systems whose importance factor may be increased by proximity to critical components.

1.7 DESCRIPTON OF SYSTEM

.1 It shall be understood that the requirements of this seismic restraint section are in addition to other requirements as specified elsewhere for the support and attachment of equipment and plumbing services, and for the vibration isolation of same equipment. Nothing on the project drawings or specifications shall be interpreted as justification to waive the requirements of this seismic restraint section.

.2 The work under this section shall include furnishing all labour, materials, tools, appliances, and equipment, and performing all operations necessary for the complete execution of the installation of seismic snubber restraint assemblies as shown, detailed, and/or scheduled on the drawing and/or specified in this section of the specifications.

.3 All seismic snubber restraint assemblies shall meet the following minimum requirements:

.1 The snubber/restrained isolator for isolated equipment shall include a resilient element that will ensure that no un-cushioned shock can occur (this does not include cable restraints).

.2 It shall be possible to visually inspect the resilient material for damage and allow for replacement, if necessary.

.3 All snubbers are to include a maximum air gap of 0.25 in (6 mm).

.4 Seismic restraint systems shall be designed to offer seismic restraint in all directions, unless otherwise noted.

.5 Seismic restraint capacities to be verified by an independent test laboratory or certified by a registered Professional Engineer to ensure that the design intent of this specification is realized. Verification shall be by one of the following methods:

.1 An NRTL (National Recognized Testing Laboratory), or laboratory recommended by VISCMA.

.2 Certified by a Professional Engineer with at least 5 years of experience, using industry standard methods of analysis, which employ common engineering practices. Adherence to the ratings standard within ASHRAE SPC171 and VISCMA 102-2007 is required.

.3 By a nationally recognized agency, such as VISCMA, that has reviewed and approved the restraint.

1.8 SYSTEM DESIGN

.1 Seismic restraint manufacturer shall be responsible for the structural design of attachment hardware as required to attach snubbers/restraints to both the equipment and supporting structure on vibration isolated equipment, or to directly attach equipment to the building structure for non-isolated equipment.

.2 The contractor shall furnish, to the seismic restraint manufacturer, a complete set of approved shop drawings of all equipment that is to be restrained, from which the selection and design of seismic restraint devices and/or attachment hardware will be completed. The shop drawings furnished shall include, at a minimum, basic equipment layout, length, and width dimensions, and installed operating weights of the equipment to be restrained.

.3 All piping, ductwork and equipment is to be restrained to meet code requirements. At a minimum, the seismic restraint manufacturer shall provide documentation on maximum restraint spacing for various restraint sizes and anchors, as well as “worst case” reaction loads for each restraint and/or anchor size.

.4 The contractor shall ensure that all housekeeping pads used are adequately reinforced and are properly dowelled to the building structure, so as to withstand calculated seismic forces. In addition, the size or the housekeeping pad is to be coordinated with the seismic restraint manufacturer to ensure that adequate edge distances exist in order to obtain the desired equipment anchor capacities.

1.9 SEISMIC BRACING AND SUPPORT DESIGN REQUIREMENTS

.1 Seismic restraint designer shall co-ordinate all attachments with the structural engineer of record.

.2 Design analysis shall include calculated dead loads, static seismic loads, and capacity of materials utilized for the connection of the equipment or system to the structure.

.3 Analysis shall detail anchoring methods, bolt diameter, and embedment depth.

.4 All seismic restraint devices shall be designed to accept without failure the forces calculated per the applicable building code and as summarized in Section 3.01.

.5 Friction from gravity loads shall not be considered resistance to seismic forces.

.6 Fire protection systems shall meet the requirements of NFPA-13 and NFPA-14. Sway bracing used for seismic restraint purposes must be fitted with provisions to resist the vertical force component of the diagonal brace. Single diagonal brace for seismic restraint will not be approved.

1.10 QUALITY ASSURANCE

.1 The contractor shall provide pre-engineered seismic restraint systems to meet total design lateral force requirements for support and restraint of piping, conduit, cable trays and other similar systems and equipment where required by the applicable building code.

.2 System Supports/Restraints: Firms regularly engaged in the manufacture of products of the types specified in this section, whose products have been in satisfactory use in similar service for not less than 5 years.

.3 Bolted framing channels and fittings shall have the manufacturers name, part number, and material heat code identification number stamped in the part itself for identification. Material certification sheets and test reports must be made available by the manufacturer upon request.

.4 Only companies experienced in performing the work of this section shall do the installation.

.5 All seismic restraint installations shall be independently reviewed by the Owners Representative for compliance with project specifications.

1.11 SUBMITTALS

.1 Product Data: Include Seismic Rating Curve for each seismically rated isolator or restraint component.

.2 Samples: The contractor shall submit samples of specified seismic snubber devices for approval.

.3 Shop Drawings shall include the following:

.1 Design Calculations: Calculate requirements for selecting seismically rated vibration isolators and seismic restraints. Certification documents to be signed and sealed by a qualified Professional Engineer with at least 5 years of experience in the design of seismic restraints. Professional engineer shall have local jurisdiction and provide periodic field review and final certification upon completion of the project. All costs and fees associated with the engineering shall be the responsibility of this contractor.

.2 Vibration Isolation Bases: Dimensional drawings including anchorage and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, base weights, equipment static loads.

.3 Seismic-Restraint Details: Detailed submittal drawings of seismic restraints and snubbers. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors. Include ratings for loads.

.4 Equipment Manufacturer Seismic Qualification Certification: The Equipment Manufacturer must submit certification that each piece of provided equipment will withstand seismic forces identified in “Performance Requirements” Article above. Include the following:

.1 Basis for Certification: Indicate whether the “withstand” certification is based on actual test assembled components or on calculations.

.2 Indicate the equipment is certified to be durable enough to:

.1 structurally resist the design forces and/or

.2 will remain functional after the seismic event.

.5 Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

.6 Detailed description of the assumed equipment anchorage devices on which the certification is based.

1.12 DELIVERY, STORAGE, AND HANDLING

.1 Deliver strut systems, pipe hangers and components carefully to avoid breakage, denting, and scoring finishes. Do not install damaged equipment.

.2 Store strut systems, pipe hangers and components in original cartons and in clean dry space; protect from weather and construction traffic.

1.13 WORK FURNISHED BUT NOT INSTALLED

.1 The materials and systems specified in this section shall be purchased by the plumbing contractor from a single seismic snubber restraint materials manufacturer to assure sole source responsibility for the performance of the seismic restraints used.

.2 The materials and systems specified in this section can, at the contractor's option, be installed by the subcontractor who installs the seismic restraint systems.

1.14 COORDINATION

.1 Coordinate size, shape, reinforcement and attachment of all housekeeping pads supporting seismically rated equipment. Concrete shall have a minimum compressive strength of 3,000 psi or as specified by the consultant.

.2 Coordinate with seismic restraint manufacturer to locate and size structural supports underneath seismically restrained equipment (e.g. roof curbs, cooling towers, and other similar equipment).

1.15 INSTALLATION

.1 Installation of all seismic restraint materials specified herein shall be accomplished following the manufacturer's written instructions. Installation instructions shall be submitted to the engineer for approval prior to the beginning of the work.

Part 2 Products

2.1 MATERIALS

.1 Unless otherwise specified materials used in the Work shall conform to the following:

.1 All steel rolled sections and steel plates shall conform to CAN/CSA G40.21M-300W

.2 All steel hollow structural steel sections shall conform to CAN/CSA G40.21-350W Class C

.3 Structural steel bolts, nuts and washers shall conform to ASTM A325M

.4 Weld electrodes shall be SMAW-E-E480XX and SAW-F480-EXXX.

2.2 ACCEPTABLE MANUFACTURERS

.1 All seismic snubbers and combination restraint/vibration isolation materials specified herein shall be provided by a single manufacturer to assure sole source responsibility for the proper performance of the materials used. Manufacturer is to be a member of VISCMA.

.2 Anchor types and sizes are to be per the design data as provided by the seismic restraint manufacturer.

.3 Materials and systems specified herein and detailed or scheduled on the drawings are based upon materials manufactured by Kinetics Noise Control Inc. Materials and systems provided by other manufacturers are acceptable, provided that they meet all requirements as listed in this specification.

.4 Kinetics Noise Control Inc.

.5 Cooper 'B' Line.

.6 Unistrut Building Systems.

.7 Mason Industries.

2.3 SEISMIC SNUBBER TYPES

GENERAL
(Isolator/Snubber Types contained herein are per ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.) Handbook, HVAC Applications, Seismic and Wind Restraint Design)

.1 Type A, Coil Spring Isolator Incorporated Within a Ductile Iron or Cast Aluminum Housing.

.1 Cast iron or aluminum housings are brittle when subjected to shock loading and are therefore not approved for seismic restraint applications.

.2 Type B, Coil Spring Isolator Incorporated Within A Steel Housing

.1 Spring isolators shall be seismic control restrained spring isolators, incorporating a single or multiple coil spring element, having all of the characteristics of free standing coil spring isolators as specified in the vibration isolation portion of this specification. Springs shall be restrained using a housing engineered to limit both lateral and vertical movement of the supported equipment during an earthquake without degrading the vibration isolation capabilities of the spring during normal equipment operating conditions.

.2 Vibration isolators shall incorporate a steel housing and neoprene snubbing grommet system designed to limit motion to no more than ¼" (6 mm) in any direction and to prevent any direct metal-to-metal contact between the supported member and the fixed restraint housing. The restraining system shall be designed to withstand the seismic design forces in any lateral or vertical direction without yield or failure. Where the capacity of the anchorage hardware in concrete is inadequate for the required seismic loadings, a steel adapter base plate to allow the addition of more or larger anchors will be fitted to fulfill these requirements. In addition to the primary isolation coil spring, the load path will include a minimum ¼" (6 mm) thick neoprene pad.

.3 Spring elements shall be colour coded or otherwise easily identified. Springs shall have a lateral stiffness greater than 1.2 times the rated vertical stiffness and shall be designed to provide a minimum of 50% overload capacity. Non-welded spring elements shall be epoxy powder coated and shall have a minimum of a 1000-hour rating when tested in accordance with ASTM B-117.

.4 . To facilitate servicing, the isolator will be designed in such a way that the coil spring element can be removed without the requirements to lift or otherwise disturb the supported equipment.

.5 Spring isolators shall be Model FHS as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (2).

.3 Type C, Coil Spring Isolator Incorporated Within a Steel Housing

.1 Spring isolators shall be seismic control restrained spring isolators, incorporating one or more coil spring elements, having all the characteristics of free standing coil spring isolators per the vibration isolation section of this specification, for equipment which is subject to load variations and/or large external forces. Isolators shall consist of one or more laterally stable steel coil springs assembled into fabricated welded steel housings designed to limit movement of the supported equipment in all directions.

.2 Housing assembly shall be made of fabricated steel members and shall consist of a top load plate complete with adjusting and leveling bolts, adjustable vertical restraints, isolation washers, and a bottom load plate with internal non-skid isolation pads and holes for anchoring the housing to the supporting structure. Housing shall be hot dipped galvanized for outdoor corrosion resistance. Housing shall be designed to provide a constant free and operating height within ⅛" (3 mm).

.3 The isolator housing shall be designed to withstand the project design seismic forces in all directions.

.4 Coil spring elements shall be selected to provide static deflections as shown on the vibration isolation schedule or as indicated or required in the project documents. Spring elements shall be colour coded or otherwise easily identified. Springs shall have a lateral stiffness greater than 1.2 times the rated vertical stiffness and shall be designed to provide a minimum of 50% overload capacity. Non-welded spring elements shall be epoxy powder coated and shall have a minimum of a 1000-hour rating when tested in accordance with ASTM B-117.

.5 Spring isolators shall be Model FLS and FLSS as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (3).

.4 Type D, Coil Spring Isolator Incorporated with Integral Seismic Restraint

.1 Spring isolators shall be single or multiple coil spring elements which have all of the characteristics of freestanding coil spring isolators as specified in the vibration isolation portion of this specification, incorporating lateral and vertically restrained seismic housing assemblies. Spring elements shall be readily replaceable without the need to list or remove the supported equipment.

.2 Restraint housing shall be sized to meet or exceed the force requirements of the application and shall have the capability of accepting coil springs of various sizes, capabilities, and deflections as required to meet the required isolation criteria. All spring forces shall be contained within the coil/housing assembly, and the restraint anchoring hardware shall not be exposed to spring generated forces under conditions of no seismic force. Spring element leveling adjustment shall be accessible from above and suitable for use with a conventional pneumatic or electric impact wrench.

.3 Restraint element shall incorporate a steel housing with elastomeric elements at all dynamic contact points. Elastomeric elements shall be replaceable. Restraint shall allow ¼" (6 mm) free motion in any direction from the neutral position. Restraint shall have an overturning factor (ratio of effective lateral snubber height to short axis anchor spacing) of 0.33 or less to ensure optimum anchorage capacity.

.4 Spring isolators shall be Model FMS as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (4).

.5 Type E, All Direction Neoprene Isolator

.1 Vibration Isolators shall be neoprene, molded from oil resistant compounds, designed to operate within the strain limits of the isolator so to provide the maximum isolation and longest life expectancy possible using neoprene compounds. Isolators shall include encapsulated cast-in-place top steel load transfer plate for bolting to equipment and a steel base plate with anchor holes for bolting to the supporting structure. Ductile iron or cast aluminum components are not acceptable alternatives and shall not be used due to brittleness when subjected to shock loading.

.2 Isolator shall be capable of withstanding the design seismic loads in all directions with no metal-to-metal contact.

.3 Isolator shall have minimum operating static deflections as shown on the project Vibration Isolation Schedule or as otherwise indicated in the project documents and shall not exceed published load capacities.

.4 Neoprene isolators shall be Model RQ as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections .2.01, 2.02 and 2.03 (5).

.6 Type F, Light Capacity All Direction 3-Axis External Seismic Snubber Assembly

.1 Equipment shall be restrained against excessive movement during a seismic event by the use of 3-axis resilient snubbers, designed to withstand the project required seismic forces. A minimum of two (2) snubbers are to be used at each equipment installation, oriented to effectively restrain the isolated equipment in all three directions, and additional snubbers shall be used as required by seismic design conditions.

.2 Snubbers shall be of interlocking steel construction and shall be attached to the equipment structure and equipment in a manner consistent with anticipated design loads. Snubbers shall limit lateral and vertical equipment movement at each snubber location to a maximum of ¼" (6 mm) in any direction.

.3 Snubbers shall include a minimum ¼" (6 mm) thick resilient neoprene pads to cushion any impact and to avoid any potential for metal-to-metal contact. Maximum neoprene bearing pressure shall not exceed 1500 pounds / sq. inch (10.4 N / sq. mm). Snubber shall be capable of withstanding an externally applied seismic force of up to 3,000 pounds (1360 kg) in any direction. Snubber shall be installed only after the isolated equipment is mounted, piped, and operating so as to ensure that no contact occurs during normal equipment operation.

.4 Three-axis seismic snubbers shall be Model HS-5 as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and 2.01, 2.02, and 2.03 (6).

.7 Type G, Lateral 2-Axis External Seismic Snubber Assembly

.1 Equipment shall be restrained against excessive lateral movement during a seismic event by the use of 2-axis horizontal resilient snubbers, designed to withstand the project required seismic forces. A minimum of two (2) snubbers are to be used at each equipment installation, oriented to effectively restrain the isolated equipment in all horizontal directions, and additional snubbers shall be used as required by seismic design conditions.

.2 Snubbers shall be interlocking steel construction and shall be attached to the equipment structure and equipment in a manner consistent with anticipated design loads. Snubbers shall limit lateral equipment movement at each snubber location to a maximum of ¼" (6 mm).

.3 Snubbers shall include a minimum of ¼" (6 mm) thick resilient neoprene pads to cushion any impact and to avoid any potential for metal-to-metal contact. Snubber shall be installed only after the isolated equipment is mounted, piped, and operating so as to ensure that no contact occurs during normal equipment operation.

.4 Two-axis lateral seismic snubbers shall be Model HS-2 as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (7).

.8 Type H, Heavy Capacity All Direction 3-Axis External Seismic Snubber Assembly

.1 Equipment shall be restrained against excessive vertical and horizontal movement during a seismic event by the use of 3-axis resilient snubbers, designed to withstand the project required seismic forces. A minimum of two (2) snubbers are to be used at each equipment installation, oriented to effectively restrain the isolated equipment in all three directions, and additional snubbers shall be used as required by seismic design conditions.

.2 Snubbers shall be of welded interlocking steel construction and shall be attached to the equipment structure and equipment in a manner consistent with anticipated design loads. Snubbers shall limit lateral and vertical equipment movement at each snubber location to a maximum of ¼" (6 mm) in any direction.

.3 Snubbers shall include resilient neoprene pads with a minimum thickness of ¼" (6 mm) to cushion any impact and to avoid any potential for metal-to-metal contact. Snubber shall be capable of withstanding an externally applied seismic force up to 10,000 pounds (4,540 kg) in any direction. Snubber shall be installed only after the isolated equipment is mounted, piped, and operating so as to ensure that no contact occurs during normal equipment operation.

.4 Three-axis seismic snubbers shall be Model HS-7 as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (8).

.9 Type I, Horizontal 1-Axis External Seismic Snubber Assembly

.1 Equipment shall be restrained against excessive horizontal one-axis movement during a seismic event by the use of single-axis resilient snubbers, designed to withstand the project required seismic forces. A minimum of four (4) snubbers are to be used at each equipment installation, oriented to effectively restrain the isolated equipment in all lateral directions.

.2 Snubbers shall be of steel construction and shall be attached to the equipment structure and equipment in a manner consistent with anticipated design loads. Snubbers shall limit lateral equipment movement at each snubber location in the direction of impact to a maximum of ¼" (6 mm).

.3 Snubbers shall include resilient neoprene pads with a minimum thickness of ¼" (6 mm) to cushion any impact and to avoid any potential for metal-to-metal contact. Snubber shall be installed only after the isolated equipment is mounted, piped, and operating so as to eliminate any contact during normal equipment operation.

.4 Single-axis seismic snubbers shall be Model HS-1 as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (9).

.10 Type J, Cable Restraints for Suspended Piping and Ductwork

.1 Seismic wire rope cable restraints shall consist of steel wire strand cables, sized to resist project seismic loads, arranged to offer seismic restraint capabilities for piping, ductwork, and suspended equipment in all lateral directions.

.2 Building and equipment attachment brackets at each end of the cable shall be designed to permit free cable movement in all directions up to a 45-degree misalignment. Protective thimbles shall be used at sharp connection points as required to eliminate potential for dynamic cable wear and strand breakage.

.3 Restraints shall be sized to the capacity of the cable or to the capacity of the anchorage, whichever is lesser.

.4 Seismic wire rope connections shall be made using overlap wire rope “U” clips or seismically rated tool-less wedge insert lock connectors.

.5 Vertical suspension rods shall be braced as required to avoid potential for buckling due to vertical “up” forces. Braces shall be structural steel angle uniquely selected to be of sufficient strength to prevent support rod bending. Brace shall be attached to the vertical suspension rod by a series of adjustable straps. Clips shall be capable of securely locking brace to suspension rod without the need for hand tools.

.6 Where clevis hanger brackets are used for seismic restraint attachment, they will be fitted with clevis internal braces to prevent buckling of the hanger brackets.

.7 Seismic cable shall be as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.03 through 1.07 inclusive, and sections 2.01, 2.02, and 2.03 (10).

.8 Seismic cable building and equipment attachment brackets shall be Model KSCA, KSCU, or KSCC as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (10).

.9 Seismic cable concrete anchor bolts shall be Model KCAB Wedge, Model KCCAB Cracked Concrete, or Model KUAB Undercut, as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (10).

.10 Seismic wire rope connectors shall be (Model KWRC - 'U’ clamp) / (Model KWGC - Tool-less wedge lock) as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (10).

.11 Seismic vertical suspension stiffener rod clips shall be Model KHRC as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (10).

.12 Clevis Internal Braces shall be Model KCHB as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (10).

2.4 SEISMIC BRACING COMPONENTS

.1 Steel strut shall be 1-5/8 wide in varying heights and mig-welded combinations as required to meet load capacities and designs. A material heat code, part number, and manufacturer’s name shall be stamped on all strut and fittings to maintain traceability to material test reports.

.2 Material for epoxy painted strut: ASTM A1011, SS, Grade 33.

.3 Material for pre-galvanized strut: ASTM A653, SS, Grade 33.

.4 Material for hot-dip galvanized strut: ASTM A1011, SS, Grade 33 and hot-dip galvanized after fabrication in accordance with ASTM A123.

.5 Material for fittings and accessories: ASTM A907, Grade 33, Structural Quality or ASTM A1011, SS, Grade 33.

.6 Fittings and accessories: Products shall be of the same manufacturer as strut and designed for use with that product.

2.5 UNIFORM BUILDING CODE REQUIREMENTS

.1 Seismic Zone Factor to Table 16-I for area of jurisdiction.

.2 Soil Profile Type to Table 16-J for area of jurisdiction.

.3 Seismic Importance Factor to Table 16-K for area of jurisdiction.

.4 Component Amplification Factor to Table 16-O for area of jurisdiction.

.5 Component Response Mod. Factor to Table 16-O for area of jurisdiction.

.6 Seismic Coefficient to Table 16-Q for area of jurisdiction.

.7 The total height of the structure (h_r) and the height of the system to be restrained within the structure (h_x) shall be determined in co-ordination with architectural plans and the General Contractor.

.8 Forces shall be calculated for individual supports using the above information. Exceptions to Table 16-O may be utilized. However, all use of exceptions shall be noted on submitted seismic bracing plan documents.

Part 3 Execution

3.1 GENERAL INSTALLATION

.1 Installation of all seismic restraint materials specified in this section shall be accomplished as per the manufacturer's written instructions.

.2 Refer to FEMA Manuals 412, 413, and 414 for typical industry standard installation guidelines.

.3 Upon completion of installation of all seismic restraint materials and before start-up of restrained equipment, all debris shall be cleaned from beneath all protected equipment, leaving equipment free to contact snubbers/restraints.

.4 Torque anchor bolts according to anchor manufacturer's written instructions to resist seismic forces.

.5 All seismic restraint systems shall be installed in strict accordance with the manufacturer's seismic restraint guidelines manual and all certified submittal data.

.6 Prior to installation, bring to the architect's/engineer's attention any discrepancies between the specifications and the field conditions, or changes required due to specific equipment selection.

.7 Brace support rods when necessary to accept compressive loads. Welding of compressive braces to the vertical support rods is not acceptable.

.8 Seismic restraints shall be attached to the structural system. Looping restraints around the system is not acceptable.

.9 Do not brace a system to two independent structures such as ceiling and wall.

.10 Provide appropriately sized openings in walls, floors, and ceilings for anticipated seismic movement. Provide fire seal systems in fire-rated walls.

.11 Seismic restraint cables shall be adjusted such that they are not visibly slack, or the flexibility is approximately 25mm under thumb pressure for a 1500mm cable length (equivalent ratio for other cable lengths).

.12 All seismic restraint cables shall be at least 25mm clear of all other equipment and services.

3.2 EQUIPMENT INSTALLATION

.1 All external utility connections to restrained equipment shall be designed to allow differential seismic motion without damage to the equipment or utility connections.

.2 Adjust isolators and restraints after piping systems have been filled and equipment is at its operating weight, following the manufacturer's written instructions.

.3 After equipment installation is completed, adjust limit stops following manufacturer's written instructions so that they are out of contact during normal operation.

.4 Adjust snubbers according to manufacturer's written instructions.

.5 Installation of seismic restraints shall not cause any change in position of equipment, resulting in stresses or misalignment.

.6 No rigid connections between equipment and the building structure shall be made that degrade the noise and vibration isolation system specified.

.7 Do not install any seismic restraint for equipment, cable trays or conduit that compromises isolation specified.

3.3 PIPING INSTALLATION

.1 Hold down clamps must be used to attach pipe to all trapeze members before applying restraints.

.2 Branch lines may not be used to restrain main lines.

.3 Piping crossing building seismic or expansion joints, passing from building to building, or supported from different portions of the building shall be installed to allow differential support displacements without damaging the pipe, equipment connections, or support connections. Pipe offsets, loops, anchors, and guides shall be installed as required to provide specified motion capability and limit motion of adjacent piping.

.4 Attach piping to the trapeze per seismic restraint manufacturer's design. Install cables so they do not bend across sharp edges of adjacent equipment or building structures.

3.4 FASTENING TO STRUCTURE

.1 Bracing may occur from flanges of structural beams, upper truss cords of bar joists, cast in place inserts, or wedge-type concrete anchors. Consult structural engineer of record.

.2 Overstressing of the building structure shall not occur from overhead support of equipment. Bracing attached to structural members may present additional stresses. The contractor shall submit loads to the structural engineer of record for approval in this event.

.3 Coring is not permitted for the installation of concrete anchors. Use ground penetrating radar or equivalent method of embedment item detection to locate all embed items including reinforcing steel and electrical conduits. Concrete reinforcing steel and electrical conduits shall not be cut or damaged under any circumstances.

.4 Install vertical braces to stiffen hanger rods and prevent buckling per seismic restraint manufacturer's design. Clamp vertical brace to hanger rods. Requirements apply equally to hanging equipment. Do not weld vertical braces to hanger rods.

.5 If mounting hole diameter exceeds bolt diameter by more than 0.125" (3 mm), reduce clearance in hole with epoxy grout, flanged elastomeric bushings or welded washer.

.6 Housekeeping Pads must be adequately reinforced and adequately sized for proper installation of equipment anchors. Refer to seismic restraint manufacturer's written instructions.

3.5 INSPECTION

.1 The contractor shall notify the local representative of the seismic restraint materials manufacturer prior to installing any seismic restraint devices. The contractor shall seek the representative's guidance in any installation procedures with which he/she is unfamiliar.

.2 Upon completion of the installation of all seismic restraint devices herein specified, the local representative of the seismic restraint manufacturer shall, at the contractor's request, inspect the completed system and report in writing any installation errors, improperly selected snubber devices, or other fault in the system which could affect the performance of the system.

.3 The installing contractor shall submit a report upon request to the building architect and/or engineer, including the manufacturer's representative's final report, indicating that all seismic restraint material has been properly installed, or steps that are to be taken by the contractor to properly complete the seismic restraint work as per the specifications.

.1 Guidelines for Mechanical Systems", Second Edition (Remaining Codes).

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.

.2 CAN/CGSB-24.3, Identification of Piping Systems.

.3 Canadian Standards Association (CSA).

.1 Natural Gas and Propane Installation Code CSA B149.1.

.4 National Fire Protection Association

.1 NFPA 13, Installation of Sprinkler Systems.

.2 NFPA 14, Standpipe and Systems.

1.2 PRODUCT DATA

.1 Submit product data in accordance with General Requirements.

.2 Product data to include paint colour chips, all other products specified in this section.

1.3 PRODUCT LITERATURE

.1 Submit product literature in accordance with General Requirements.

.2 Product literature to include nameplates, labels, tags, lists of proposed legends.

Part 2 Products

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

.1 Metal or plastic lamicoid nameplate mechanically fastened to each piece of equipment by manufacturer.

.2 Lettering and numbers to be raised or recessed.

.3 Information to include, as appropriate:

.1 Equipment: Manufacturer's name, model, size, serial number, capacity.

.2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

.1 Colours:

.1 Black letters, white background (except where required otherwise by applicable codes).

.2 Construction:

.1 3 mm (1/8") thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.

.3 Sizes:

.1 Conform to following table:

Size	No. of Sizes mm (")	Height of Line mm (")	Letters mm (")
1	10 x 50 (3/8" x 2")	1 (3/64")	3 (1/8")
2	15 x 75 (1/2" x 3")	1 (3/64")	6 (1/4")
3	15 x 75 (1/2" x 3")	2 (5/64")	3 (1/8")
4	20 x 100 (3/4" x 4")	1 (3/64")	10 (3/8")
5	20 x 100 (3/4" x 4")	2 (6/64")	6 (1/4")
6	20 x 200 (3/4" x 8")	1 (3/64")	10 (3/8")
7	25 x 125 (1" x 5")	1 (3/64")	15 (1/2")
8	25 x 125 (1" x 5")	2 (5/64")	10 (3/8")
9	32 x 200 (1¼" x 8")	1 (3/64")	20 (3/4")

.2 Use maximum of 25 letters/numbers per line.

.4 Locations:

.1 Equipment in Mechanical Rooms: Use size #9.

.2 Equipment above ceiling: use size #1 riveted to ceiling suspension system.

2.3 EXISTING IDENTIFICATION SYSTEMS

.1 Apply existing identification system to new work.

.2 Where existing identification system does not cover for new work, use identification system specified this section.

2.4 IDENTIFICATION OF PIPING SYSTEMS

.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

.2 Legend:

.1 Block capitals to sizes and colours listed in CAN/CGSB-24.3.

.3 Arrows showing direction of flow:

.1 Outside diameter of pipe or insulation less than 75 mm (3"): 100 mm (4") long x 50 mm (2") high.

.2 Outside diameter of pipe or insulation 75 mm (3") and greater: 150 mm (6") long x 50 mm (2") high.

.3 Use double-headed arrows where flow is reversible.

.4 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

.2 Length to accommodate pictogram, full length of legend and arrows.

.5 Materials for background colour marking, legend, arrows:

.1 Pipes and tubing 20 mm (3/4") and smaller: Waterproof and heat-resistant pressure sensitive plastic marker tags.

.2 All other pipes: Pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150°C (300°F) and intermittent temperature of 200°C (395°F).

.6 Colours and Legends:

.1 Where not listed, obtain direction from Consultant.

.2 Colours for legends, arrows: To following table:

Background colour:	Legend:	Arrows:
Yellow	White	Black
Green	White	Black
Red	White	Black

.7 Background colour marking and legends for piping systems:

CONTENTS	BACKGROUND COLOUR MARKING	LEGEND
Storm water	Green	STORM
Plumbing vent	Green	SAN. VENT

2.5 VALVES, CONTROLLERS

.1 Brass tags with 15 mm (1/2") stamped identification data filled with black paint.

.2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

.3 Provide adhesive coloured tab (max. size 15 mm) indication on ceiling to locate valves/equipment above. Same applies to grid. Colour to be approved by consultant.

2.6 LANGUAGE

.1 Identification to be in English.

Part 3 Execution

3.1 TIMING

.1 Provide identification only after all painting specified has been completed.

3.2 INSTALLATION

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

.2 Provide ULC and/or CSA registration plates as required by respective agency.

3.3 NAMEPLATES

.1 Locations:

.1 In conspicuous location to facilitate easy reading and identification from operating floor.

.2 Standoffs:

.1 Provide for nameplates on hot and/or insulated surfaces.

.3 Protection

.1 Do not paint, insulate or cover in any way.

3.4 LOCATION OF IDENTIFICATION ON PIPING SYSTEMS

.1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels not more than 1.7 m (5'-8") intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.

.2 Adjacent to each change in direction.

.3 At least once in each small room through which piping or ductwork passes.

.4 On both sides of visual obstruction or where run is difficult to follow.

.5 On both sides of separations such as walls, floors, partitions.

.6 Where system is installed in pipe chases, ceiling spaces, galleries, other confined spaces, at entry and exit points, and at each access opening.

.7 At beginning and end points of each run and at each piece of equipment in run.

.8 Identification to be easily and accurately readable from usual operating areas and from access points.

.1 Position of identification to be approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 VALVES, CONTROLLERS

.1 Valves and operating controllers, except at plumbing fixtures, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.

.2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Consultant. Provide one copy (reduced in size if required) in each operating and maintenance manual.

.3 Number valves in each system consecutively. Where existing numbering system is installed start new numbering system at 100.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND AS-BUILT DRAWINGS

.1 Conform to General Requirements Section for shop drawings and as-built drawings requirements.

1.2 PLUMBING AND DRAINAGE SYSTEM TESTING

.1 The plumbing and drainage system shall be tested in accordance with the Plumbing Code under the Ontario Water Resources Act and the specification.

.2 The Mechanical Contractor shall notify the Building Inspector when systems are available for testing. The Mechanical Contractor shall document all tests performed and shall arrange for the Building Inspector to sign for tests completed. The forms shall be forwarded to the Consultant.

1.3 OPERATION AND MAINTENANCE MANUAL

.1 Conform to General Requirements section for the Operating and Maintenance Manual requirements.

1.4 WARRANTIES

.1 Equipment and system warranties shall not begin until the system demonstration and turnover has been conducted successfully and accepted by The Owner.

.2 The Mechanical Contractor shall fill out the warranty form listing the equipment and systems and the start and finishing dates for warranty.

.3 Refer to the general conditions specification section for the requirements during the warranty period.

1.5 CLOSEOUT PROCESS ALLOCATION

.1 The mechanical contractor closeout process shall be as follows:

.1 3% for the first $500,000 of contract value.

.2 1% of the contract value for value between $500,000 to $5,000,000.

.3 0.5% of contract value for the value in excess of $5,000,000.

.4 Minimum Allocation for Close Out Documents is $5,000.

.2 The Mechanical Contractor shall submit all test and verification forms. The Consultant will use these forms to calculate percentage complete.

.3 The monies shall not be paid out until the performance testing, O & M manuals, systems demonstration, and training including all required paperwork have been completed to the satisfaction of the consultant. Refer to General Requirements section for contract breakdown.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian General Standards Board (CGSB)

.1 ASTM C553, Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.2 CGSB 51-GP-52Ma, Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.3 CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketing Sheet, for Insulating Pipes, Vessels and Round Ducts.

.3 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.4 American Society for Testing and Materials (ASTM)

.1 ASTM C547, Type I and IV, Standard Specifications for Mineral Fibre Pipe Insulation.

.2 ASTM C 335, Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.3 ASTM C177, Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Proprieties by Means of the Guarded Hot-Plate Apparatus.

.4 ASTM C518, Standard Test Method for Steady-State Thermal Transmission Proprieties by Means of the Heat Flow Meter Apparatus.

.5 ASTM C 921, Practice for Determining the Properties Jacketing Materials for Thermal Insulation.

.6 ASTM C1695, Standard Specification for Fabrication of Flexible, Removable, and Reusable Blanket Insulation for Hot Service.

.7 ASTM C1729 Standard Specification for Aluminium Jacketing for Insulation.

.5 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

.1 ASHRAE Standard 90.1.

.6 Manufacturer's Trade Associations

.1 Thermal Insulation Association of Canada (TIAC), North American Commercial and Industrial Insulation Standards.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for pipe, fittings, valves, and jointing recommendations.

.3 Submit properly completed detail plates from the North American Commercial and Industrial Insulation Standards manual, applicable to installation types required by this specific section.

1.3 INSTALLATION INSTRUCTIONS

.1 Submit manufacturer's installation instructions in accordance with general requirements.

.2 Installation instructions to include procedures to be used, installation standards to be achieved.

1.4 QUALIFICATIONS

.1 Installer to have successfully completed apprenticeship program.

.2 Installer to be specialist in performing work of this section and have at least three (3) years successful experience in this size and type of project, qualified to standards of TIAC.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Protect from weather, construction traffic.

.3 Protect against damage from any source.

.4 Store at temperatures and conditions required by manufacturer.

1.6 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - will mean "not concealed" as defined herein.

.3 "ASJ+" – All Service Jacket – vapor retarder laminate of aluminium foil inner layer, reinforced with fiberglass scrim, bonded to a bleached kraft paper, with outer poly film leaving no paper exposed.

.4 "ASJ" – All Service Jacket (no outer film) – vapor retarder laminate of aluminium foil inner layer, reinforced with fiberglass scrim, bonded to a bleached kraft paper outer layer.

Part 2 Products

2.1 MATERIAL LIMITATIONS

.1 Products shall not contain formaldehyde, asbestos, lead, mercury or mercury compounds or PBDE fire retardants.

2.2 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.3 INSULATION

.1 Mineral fibre as specified herein includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C (75°F) mean temperature when tested in accordance with ASTM C335, ASTM C177 or ASTM C518.

.3 Type A-1: Rigid moulded or wound mineral fibre with factory applied vapour retarder jacket.

.1 Mineral fibre: to ASTM C547 Type I and IV.

.2 Jacket: to ASTM C1136, Type I, II, III, IV, X.

.3 Maximum "k" factor: to ASTM C547.

.4 Type A-5: Fiberglass pipe and tank insulation:

.1 Segmented, flexible fiberglass board bonded to laminated vapor retarder, ASJ or FSK.

.2 Complying with ASTM C1393, Type II or Type III Category 2.

.3 Maximum "k" value: 0.037W/M (or less) x C°@100°F (38°C) is 0.26BTU x IN/H FT^2 x °F

.4 Jacket: specified in 'Factory-Applied Jackets' Article

.5 Materials:

.1 All materials must be supplied by the same manufacturer.

.2 Acceptable Manufacturers:

.1 Johns Manville

.2 Knauf

.3 Manson

.4 Owens Corning

2.4 INSULATION SECUREMENT

.1 Tape: Self-adhesive, aluminum, reinforced, 50 mm (2") wide minimum.

.2 Contact adhesive: Quick setting.

.3 Canvas adhesive: Washable.

2.5 CEMENT

.1 Thermal insulating and finishing cement:

.1 Hydraulic setting or Air drying on mineral wool, to ASTM C 449M.

2.6 VAPOUR RETARDER LAP ADHESIVE

.1 Water based, fire retardant type, compatible with insulation.

2.7 INDOOR VAPOUR RETARDER FINISH

.1 Compatible with insulation.

2.8 JACKETS

.1 Polyvinyl Chloride (PVC):

.1 Minimum thickness: 20 mm (0.020")

.2 One-piece moulded type [and sheet] to CAN/CGSB-51.53 with pre-formed shapes as required.

.3 Colours: white.

.4 Minimum service temperatures: -29°C (-20°F).

.5 Maximum service temperature: 65°C (150°F).

.6 Moisture vapour transmission: 0.05 perm.

.7 Fastenings:

.1 Use solvent weld adhesive compatible with insulation to seal laps and joints.

.2 Tacks are not to be used below ambient temperature (cold) operating systems.

.3 Pressure sensitive vinyl tape of matching colour.

2.9 CAULKING FOR JACKETS

.1 Caulking: Silicone clear caulking.

Part 3 Execution

3.1 PRE-INSTALLATION REQUIREMENT

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed, and certified.

.2 Surfaces to be clean, dry, free from foreign material.

3.2 INSTALLATION

.1 Install in accordance with TIAC, North American Commercial and Industrial Insulation Standards.

.2 Apply materials in accordance with manufacturers' instructions and this specification.

.3 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Hangers, supports to be outside vapour retarder jacket.

.4 Supports, Hangers:

.1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.3 PIPING INSULATION SCHEDULES

.1 Thickness of insulation to be as listed in following table:

.1 All storm piping including all vertical and horizontal piping shall be insulated.

Application	Type	Pipe sizes through (NPS) and insulation thickness mm (")				
		to 25 (1")	32 (1¼") 40 (1½")	50 (2") 80 (3")	105 (4") 150 (6")	200 (8") & over
Storm Piping	A-1/A-5	25 (1")	25 (1")	25 (1")	25 (1")	25 (1")

.2 Finishes: Conform to the following table:

Application	Piping	Valves & Fittings
Exposed indoors	PVC	PVC
Exposed in mech. rooms	PVC	PVC
Concealed indoors	N/A	PVC

.3 Connection: To appropriate TIAC code.

.4 Finish attachments: SS bands, @ 150 mm (6") oc. seals: closed.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ASTM B32, Specification for Solder Metal.

.3 ASTM B306, Specification for Copper Drainage Tube (DWV).

.4 ASTM C564, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.5 CAN/CSA-B70, Cast Iron Soil Pipe, Fittings and Means of Joining.

.6 CAN/CSA-B125.3, Plumbing Fittings.

Part 2 Products

2.1 COPPER TUBE AND FITTINGS

.1 Above ground storm maximum 65 mm (2½") Type DWV copper to: ASTM B306.

.1 Fittings.

.1 Cast brass: to CAN/CSA B125.3.

.2 Wrought copper: to CAN/CSA B125.3.

.2 Solder: tin-lead, 50:50, to ASTM B32, type 50A.

2.2 CAST IRON PIPING AND FITTINGS

.1 Above ground storm minimum NPS 80 mm (3"), cast iron to: CAN/CSA-B70.

.1 Mechanical joints (storm)

.1 Heavy duty neoprene or butyl rubber compression gaskets to: ASTM C1540.

.2 Stainless steel clamps (4 band min).

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with Provincial Plumbing Code and local authority having jurisdiction.

.2 Install above ground piping parallel and close to walls and ceilings to conserve headroom and space, and to grade as indicated.

.3 Place Cleanouts

.1 Where shown on Drawings and near bottom of each stack and riser.

.2 At every 90 degree change of direction for horizontal lines.

.3 Every 15 m (50') of horizontal run.

.4 Extend clean out to accessible surface. Do not place cleanouts in carpeted floors. In such locations, use wall type cleanouts.

.4 Use torque wrench to obtain proper tension in cinch bands when using hubless cast iron pipe. Butt ends of pipe against centering flange of coupling.

.5 Before piping is covered, conduct tests in presence of Consultant and correct leaks or defective work. Conduct test prior to placing floor slab but after backfill is placed.

.1 Do not caulk threaded work.

.2 Fill waste and vent system to roof level [a minimum of 3,100 mm (10')] with water and show no leaks for 2 hours.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ASTM A126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

.3 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

.4 CAN/CSA-B79, Commercial and Residential Drains and Cleanouts.

1.2 SUBMITTALS

.1 Submit shop drawings and product data in accordance with general requirements.

.2 For shop drawings, indicate dimensions, construction details and materials.

.3 For product data, indicate dimensions, construction details and materials for all items specified herein.

1.3 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

.2 Data to include:

.1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

Part 2 Products

2.1 ROOF DRAINS

.1 As indicated on schedules.

2.2 CLEANOUTS

.1 Cleanout plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.

.2 Wall access: face or wall type, stainless steel round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.

.1 Acceptable Manufacturers:

.1 Zurn ZSS-1469

.2 Mifab C1400-RD

.3 WATTS CO-480-RD-3

.4 Jay R. Smith SQ-A-1753-XNBCO-SP-U

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with provincial codes, and local authority having jurisdiction.

.2 Install in accordance with manufacturer's instructions and as specified.

.3 Install roof drains in lowest point of roof. Co-ordinate location with architectural, structural, and mechanical drawings.

3.2 CLEANOUTS

.1 In addition to those required by code, and as indicated, install at base of all soil and waste stacks, and rainwater leaders.

.2 Bring cleanouts to wall or finished floor unless serviceable from below floor.

.3 Building drain cleanout and stack base cleanouts: line size to maximum NPS 100 mm (4").

3.3 COMMISSIONING

.1 In context of this paragraph, "verify" to include "demonstrate" to Consultant.

.2 Timing: commission only after start-up deficiencies rectified.

.3 Access doors: verify size and location relative to items to be services.

.4 Adjust to suit site conditions, including, but not necessarily limited to, following:

.1 Roof drains:

.1 Verify installation at low points in roof.

.2 Verify security and removability of dome.

.3 Adjust weirs to suit actual roof slope and meet requirements of design.

.4 Verify provision for movement of roof and integrity of roof drain piping system.

.2 Cleanouts:

.1 Verify covers are gastight, secure and easily removable.

.2 Verify that cleanout rods can probe as far as next cleanout.

.5 Commissioning reports:

.1 Record all results on approved report forms.

.2 Include signature of tester and supervisor.

.3 To be countersigned by Consultant.

.6 Verification:

.1 Notify Consultant 48 h before commencing tests.

.2 All tests and procedures to be witnessed by Consultant.

.3 All reported results subject to verification by consultant.

.7 Training:

.1 Train O&M personnel in start-up, operation, monitoring, servicing, maintenance and shut-down procedures.

.8 Demonstrations:

.1 Demonstrate full compliance with Design Criteria.

.2 Demonstrations also to show completeness of O&M personnel training.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

.1 This section covers items common to all sections of Heating, Ventilation, and Air Conditioning (HVAC) Division.

.2 Conform to Division 1 General Conditions.

.3 Furnish labour, materials, and equipment necessary for completion of work as described in contract documents.

.4 Unless specifically indicated, all materials and equipment provided under this contract shall be new and shall be manufactured in the project year.

.5 The term “Mechanical Contractor” shall remain active and shall mean a “single contractor” performing plumbing, drainage, heating, cooling, ventilation, and control services.

.6 When quoting as a subcontractor this building contractor shall explicitly state the services they are providing i.e. Mechanical (all services), Plumbing (water and drainage systems) or HVAC (including hydronic and air systems).

.7 Contractors shall be explicit to identify whether Fire Protection is included or omitted from the mechanical scope.

1.2 INTENT

.1 Mention herein or indication on Drawings of articles, materials, operations or methods requires: supply of each item mentioned or indicated, of quality, or subject to qualifications noted; installation according to conditions stated: and performance of each operation prescribed with furnishing of necessary labour, equipment, and incidentals for HVAC work.

.2 Where used, words “Section” and “Division” shall also include other Subcontractors engaged on site to perform work to make building and site complete in all respects.

.3 Where used, word “supply” shall mean furnishing to site in location required or directed complete with accessory parts.

.4 Where used, word “install” shall mean secured in place and connected up for operation as noted or directed.

.5 Where used, word “provide” shall mean supply and install as each is described above.

1.3 REGULATIONS, PERMITS, AND FEES

.1 All materials and quality of work shall meet all current and latest Provincial, Municipal and Fire Marshall requirements, regulations, codes, and by-laws in force in the area of the project.

.2 Each contractor shall give all necessary notices, obtain all necessary permits, and pay all fees in order that the work shown or specified may be carried out. Each contractor shall furnish any certificates necessary as evidence that the work installed conforms with the laws and regulations of all authorities having jurisdiction.

.3 In the event that changes, or alterations are required on completed work by authorized inspectors, these changes shall be made at the contractor's expense.

.4 Special equipment which does not have a standard CSA label shall be inspected by the local electrical authority having jurisdiction and the Approval Certificate shall be submitted to the Consultant as soon as possible. All costs and fees for inspections shall be borne by this contractor.

1.4 DRAWINGS

.1 The drawings and this specification have been assembled together as a responsibility of the consultant. The same is true for the other consultants, i.e. architect, structural engineer, civil engineer, fire protection engineer, electrical engineer, etc.

.2 The drawings and specifications are not assembled together for responsibility/division between subcontractors. The division of work between subcontractors remains the responsibility of the buildings' contractor (also known as the prime contractor or general contractor).

.3 All subcontractors are encouraged to perform work amicably utilizing all of the drawings and specifications published by all of the consultants.

.4 Plumbing and HVAC Drawings do not show structural and related details. Take information involving accurate measurements of building from building drawings, or at building. Make, without additional charge, any necessary changes, or additions to runs of piping, conduits, and ducts to accommodate structural conditions. Location of pipes, ducts, conduits and other equipment may be altered by Consultant without extra charge provided change is made before installation and does not necessitate major additional material.

.5 As work progresses and before installing piping, ductwork, heating units, registers, diffusers, fixtures and any other fittings and equipment which may interfere with interior treatment and use of building, provide detail drawings, or obtain directions for exact location of such equipment and fitments.

.6 Plumbing and HVAC drawings indicate general location and route of pipes, ducts and conduits which are to be installed. Where required work is not shown or only shown diagrammatically, install same at maximum height in space to conserve head room (minimum 2200 mm (88") clear) and interfere as little as possible with free use of space through which they can pass. Follow building lines, conceal piping, conduits and ducts in furred spaces, ceilings and walls unless specifically shown otherwise. Install work close to structure so furring will be small as practical.

.7 Install piping and ductwork to clear structural members and any fireproofing. Locate HVAC work to permit installation of specified insulation. Do not remove or damage structural fireproofing. Leave space to permit fireproofing and insulation to be inspected and repaired.

.8 Before commencing work, check and verify all sizes, locations, grade and invert elevations, levels, and dimensions to ensure proper and correct installation. Verify existing/municipal services.

.9 Locate all HVAC and electrical equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.

.10 In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install piping and other work so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose.

.11 Relocate equipment and/or material installed but not coordinated with work of other Sections and/or installed incorrectly as directed, without extra charge.

.12 Where drawings are done in metric and product not available in metric, the corresponding imperial trade size shall be utilized.

1.5 INTERFERENCE AND COORDINATION DRAWINGS

.1 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the constructed spaces provided.

.2 Prepare drawings to indicate co-ordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are coordinated.

.3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.

.4 Upon consultant's request submit copies of interference drawings to consultant.

.5 Due to the nature of the building and the complexity of the building systems provide the following:

.1 Interference drawings, showing coordination of architectural, structural, plumbing, HVAC, and electrical systems for the consultant's review prior to fabrication.

.2 Detailed layout drawings, clearly showing fasteners and hangers.

.6 Provide CAD drawings (minimum file version AutoCAD 2013) in addition to hard copies.

1.6 QUALITY ASSURANCE

.1 Perform work in accordance with applicable provisions of local plumbing code, gas ordinances, and adoptions thereof for all HVAC systems. Provide materials and labor necessary to comply with rules, regulations, and ordinances.

.2 In case of differences between building codes, provincial laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Consultant in writing of such differences.

1.7 ALTERNATES AND SUBSTITUTIONS

.1 Throughout HVAC Division are lists of "Alternate Equipment" manufacturers acceptable to Consultant if their product meets characteristics of specified described equipment. Submitted Bids shall be based on the supply of named articles and or products as specified in the Bid Documents.

.2 Each bidder may elect to use "Alternate Equipment" from lists of Alternates where listed. Include for any additional costs including all costs for revisions to electrical contract to suit Alternate used. Prices are not required in Tender for Alternates listed except where specifically noted as "Separate Price". Complete the Supplementary Tender Form.

.3 When two or more suppliers/manufacturers are named in the Bid Documents, only one supplier/manufacturer of the products named will be acceptable; however, it is the responsibility of this Division to ensure "Alternate Equipment" fits space allocated and gives performance specified. If an "Alternate Equipment" nor "equal" specified product unit is proposed and does not fit space alloted in Consultant's opinion, supply of specified described equipment will be required without change in Contract amount. Should electrical characteristics for "alternate" or "equal" equipment differ from equipment specified it shall be the responsibility of the equipment manufacturer to pay all costs associated with the revisions to the electrical contract. Only manufacturers listed will be accepted for their product listing. All other manufacturers shall be quoted as substitution stating conditions and credit amount.

.4 If item of material specified is unobtainable, state in Tender proposed substitute and amount added or deducted for its use. Extra monies will not be paid for substitutions after Contract has been awarded.

.5 If pipe or item, of size or weight indicated, is unobtainable, supply next larger size or heavier weight without additional charge.

1.8 EXAMINATION

.1 Site Reviews

.1 Examine premises to understand conditions which may affect performance of work of this Division before submitting proposals for this work.

.2 No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

.2 Drawings

.1 Plumbing and HVAC Drawings show general arrangement of piping, ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.

.2 Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing, HVAC, and Fire Protection Drawings.

.3 Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories, which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

.3 Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

1.9 SEQUENCING SCHEDULING AND COORDINATION

.1 It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for installation of systems according to the true intent and meaning of Contract Documents. Anything not clear or in conflict will be explained by making application to Consultant. Should conditions arise where certain changes would be advisable, secure Consultant's approval of these changes before proceeding with work.

.2 Coordinate work of various trades in installing interrelated work. Before installation of HVAC items, make proper provision to avoid interferences in a manner approved by Consultant. Each Contractor shall refer to all sections of the specification for their responsibilities with other trades. Changes required in work specified in HVAC Division caused by neglect to do so shall be made at no cost to Owner.

.3 Arrange pipes, ducts, and equipment to permit ready access to valves, unions, traps, starters, motors, control components, and to clear openings of doors and access panels.

.4 Furnish and install inserts and supports required by HVAC Division unless otherwise noted. Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions of the Work to Sections involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne by HVAC Division.

.5 Be responsible for required excavation, backfilling, cutting, and patching incident to work of this Division and make required repairs afterwards to satisfaction of Consultant. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.

.1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

.2 Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

.3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

.6 Adjust locations of pipes, ducts, equipment, fixtures, etc., to accommodate work from interferences anticipated and encountered. Determine exact route and location of each pipe and duct prior to fabrication.

.1 Make offsets, transitions, and changes in direction of pipes, ducts, and electrical raceways as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.

.2 Furnish and install traps, air vents, sanitary vents, pull boxes, etc., as required to effect these offsets, transitions, and changes in direction.

.7 Slots and openings through floors, walls, ceilings, and roofs shall be provided by this contractor but performed by a trade specializing in this type of work. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

1.10 REQUEST FOR INFORMATION (RFI) PROCEDURES

.1 RFIs shall be submitted to the consultant minimum two (2) weeks prior to answer being required. Failure to submit an RFI in a timely manner will forfeit delay claims and schedule extension requests by the contractor.

.2 All RFIs will be submitted with the following information:

.1 RFI number
.2 Name of project
.3 Date of initiation
.4 Date response required by (minimum two (2) weeks)
.5 Subject
.6 Submitter’s name
.7 Drawing/specification reference
.8 Photograph of the issue (if applicable)
.9 Description of the issue
.10 Contractor’s proposed resolution

1.11 CONTRACT BREAKDOWN

.1 Provide breakdown of Contract exclusive of HST to acceptance of consultants prior to first draw submission.

.2 Provide labour and material cost for each item.

.3 Breakdown shall indicate total contract amount.

.4 Contract breakdown shall be as follows as a minimum.

.1 Mobilization and shop drawings (max. $2,000.00)

.2 Demolition
.3 Natural gas piping
.4 Piping insulation
.5 Ductwork
.6 Duct insulation
.7 Grilles and diffusers
.8 Fire stopping
.9 Fans and equipment
.10 HVAC system commissioning
.11 Building automation systems
.12 Testing, adjusting, and balancing
.13 HVAC contractor closeout requirements (min. of 3% for the first $500,000.00, 1% from $500,000.00 to $5,000.000.00, and 0.5% beyond. Shall not be less than $5,000.00.)

.5 Progress claims, when submitted are to be itemized against each item of the contract breakdown, this shall be done in table form showing contract amount, work complete to date, previous draw, amount this draw and balance.

.6 Mobilization amount may only be drawn when all required shop drawings have been reviewed by the consultant.

1.12 SHOP DRAWINGS AND PRODUCT DATA

.1 Furnish complete catalog data for manufactured items of equipment to be used in the Work to Consultant for review within 14 days after award of Contract.

.2 Upon receipt of reviewed shop drawing, product is to be ordered immediately.

.3 Provide a complete list of shop drawings to be submitted prior to first submission.

.4 Before submitting to the Consultant, review all shop drawings to verify that the products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers, and similar data and that it has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The Contractor's review of each shop drawings shall be indicated by stamp, date and signature of a qualified and responsible person possessing by the appropriate authorization.

.5 If material or equipment is not as specified or submittal is not complete, it will be rejected by Consultant.

.6 Additional shop drawings required by the contractor for maintenance manuals, site copies etc., shall be photocopies of the "reviewed" shop drawings. All costs to provide additional copies of shop drawings shall be borne by the contractor.

.7 Submit all shop drawings for the project as a package. Partial submittals will not be accepted.

.8 Catalog data or shop drawings for equipment, which are noted as being reviewed by Consultant or their Engineer shall not supersede Contract Documents.

.9 Review comments of Consultant shall not relieve this Division from responsibility for deviations from Contract Documents unless Consultant's attention has been called to such deviations in writing at time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.

.10 Check work described by catalog data with Contract Documents for deviations and errors.

.11 Shop drawings and product data shall show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances. e.g., access door swing spaces.

.12 Shop drawings and product data shall be accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify as to current model production.

.5 Certification of compliance to applicable codes.

.13 State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information. List on catalog covers page numbers of submitted items. Underline applicable data.

.14 Shop drawings shall be submitted electronically as per the following directions:

.1 Electronic Submissions:

.1 Electronically submitted shop drawings shall be prepared as follows:

.1 Use latest software to generate PDF files of submission sheets.

.2 Scanned legible PDF sheets are acceptable. Image files are not acceptable.

.3 PDF format shall be of sufficient resolution to clearly show the finest detail.

.4 PDF page size shall be standardized for printing to letter size (8.5"x11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11"x17".

.5 Submissions shall contain multiple files according to section names as they appear in Specification.

.6 File names shall include consultant project number and description of shop drawing section submitted.

.7 Each submission shall contain an index sheet listing the products submitted, indexed in the same order as they appear in the Specification. Include associated PDF file name for each section.

.8 On the shop drawing use an “electronic mark” to indicate what is being provided.

.9 **Each file shall bear an electronic representation of the “company stamp” of the contractor. If not stamped the file submission will not be reviewed.**

.2 Email submissions shall include subject line to clearly identify the consultant’s project number and the description of the shop drawings submitted.

.3 Electronic attachments via email shall not exceed 10MB. For submissions larger than 10MB, multiple email messages shall be used. Denote related email messages by indicating “1 of 2” and “2 of 2” in email subject line for the case of two messages.

.4 Electronic attachments via web links (URL) shall directly reference PDF files. Provide necessary access credentials within link or as username/password clearly identified within body of email message.

.5 On site, provide one (1) copy of the “reviewed” shop drawings in a binder as noted above.

.6 Contractor to print copies of “reviewed” shop drawings and compile into maintenance manuals in accordance with requirements detailed in this section.

1.13 EQUIPMENT NAMEPLATE DATA

.1 Between the manufactures design published literature, the shop drawing submission literature, and the nameplate data on the equipment, they can all read differently.

.2 Most of the confusion and differences are coming out of the electrical power installation.

.3 The contractors installing and connecting the equipment are responsible for the coordination of this data through the construction period.

.4 The contractors shall share and/or request this information through out the project and monitor/make adjustments, provide recommendations accordingly based on any discrepancies.

.5 The contractors are responsible for any cost associated with the changing data.

.6 The final installation must meet the “Nameplate Data” on the equipment on site.

1.14 OPERATION AND MAINTENANCE MANUAL

.1 Provide operation and maintenance data for incorporation into manual as in submittals’ requirements.

.2 Operation and maintenance manual to be approved by, and final copies deposited with, Consultant before final inspection.

.3 Submit one (1) copy of Operation and Maintenance Manual to Consultant for review and approval. Submission of individual data will not be accepted unless directed by Consultant. Submission can be done electronically in PDF format or as a hard copy.

.1 Electronic submission/PDF file is required to be bookmarked. Any submission received without bookmarking will be immediately returned as unacceptable.

.2 Hard copy submission shall be in a three-ring binder (minimum 50 mm (2") ring) and labelled as 'Operation and Maintenance Manual' with project name and location. Dividers are to be used for binder organization.

.4 Make changes as required and re-submit as directed by Consultant.

.5 Operation data to include:

.1 Control schematics for each system including environmental controls.

.2 Description of each system and its controls.

.3 Description of operation of each system at various loads together with reset schedules and seasonal variances.

.4 Operation instruction for each system and each component.

.5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.7 Colour coding chart.

.8 Spare parts equipment list.

.9 Manufacturers standard or extended warranty information.

.6 Maintenance data shall include:

.1 Servicing, maintenance, operation, and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.7 Performance data to include:

.1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified elsewhere.

.4 Testing, adjusting, and balancing reports as specified in Testing, Adjusting, and Balancing Section.

.5 Copy of all substantial performance final certificates.

.8 Miscellaneous data to include:

.1 Letter of contractor's warranty and guarantee.

.2 Index sheet.

.3 Tabbed format for each section.

.4 Manufacturers approved shop drawings.

.5 Spare parts list and source.

.6 List of Manufacturers and suppliers address for each piece of equipment.

.9 Final Submittals:

.1 Upon acceptance of Operation and Maintenance Manual by the Consultant, provide the following:

.1 Provide two (2) copies of final Operation and Maintenance Manuals, as well as a PDF file of the entire approved manual on a USB stick. Only one (1) USB stick is to be provided containing both the approved manual and as-built drawings.

1.15 AS-BUILT DRAWINGS

.1 Site records:

.1 Contractor shall provide two (2) sets of reproducible HVAC drawings. Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include changes to existing HVAC systems, control systems, and low voltage control wiring.

.2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection at all times.

.2 As-built drawings submittal for TAB and review:

.1 Prior to start of Testing, Adjusting, and Balancing (TAB), finalize production of as-built drawings.

.2 Identify **each drawing** in lower right-hand corner in letters at least 3 mm (1/8") high as follows: - "AS-BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW HVAC SYSTEMS AS INSTALLED" (Company Name) (Signature of Contractor) (date).

.3 TAB to be performed using as-built drawings.

.4 Submit copy to Consultant for review and approval. When returned, make corrections as directed.

.3 As-built drawings final submittal:

.1 Once approved, submit completed, reproducible paper as-built drawings as well as a scanned PDF file copy on USB stick with Operation and Maintenance Manuals.

1.16 WARRANTIES

.1 In addition to guarantee specified in General Conditions, guarantee heating, cooling, and plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.

.2 Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record "start-up" date of each piece of equipment on certificate. Include certificates as part of Operation and Maintenance Manual.

.3 If HVAC sub-contractor with offices located more than 80 km (50 miles) from Project site is used, provide service/warranty work agreement for warranty period with local HVAC sub-contractor approved by Consultant. Include copy of service/warranty agreement in warranty section of Operation and Maintenance Manual.

.4 Contractor shall rectify any installation deficiencies in the boiler or pressurized other systems identified by a TSSA Inspector for a period of three (3) years from ready for takeover.

.5 Warranty period shall start from date of ready for takeover. Warranty period shall start from date of ready for takeover. Warranty start date based on shipment date, start up date, substantial completion date, etc. are not applicable.

.5 Warranty Duration:

.1 Two year warranty period applies unless otherwise noted.

.6 Warranty Coverage:

.1 Applies to parts and labour.

1.17 READY FOR TAKEOVER

.1 Complete the following to the satisfaction of the consultant prior to request for ready for takeover.

.1 As-built Drawings
.2 Maintenance Manuals
.3 System Start up
.4 TAB Reports
.5 HVAC System Commissioning
.6 Instructions to Owners

1.18 REVISION TO CONTRACT

.1 Provide the following:

.1 Itemized list of material with associated costs.
.2 Labour rate and itemized list of labour for each item.
.3 Copy of manufacturers/supplier’s invoice if requested.

1.19 DELIVERY, STORAGE, AND HANDLING

.1 Follow Manufacturer's directions in delivery, storage, and protection of equipment and materials. Contractor to include all costs associated with delivery storage and handling in tender price.

.2 Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or environmental damaging conditions but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in dry, heated space.

.3 Remove any damaged materials from the site.

1.20 DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS

.1 If designated substances and/or hazardous materials are suspected or identified cease all work in the immediate area in accordance with OHSA and notify consultant.

.2 Each contractor and on site employee of the contractor shall have "asbestos awareness training".

.3 The Contractor shall ensure that employees who may come into contact with designated substances and/or hazardous materials due to the nature of the work that they perform, have received training that enables them to recognize designated substances and/or hazardous materials and that enables them to react in accordance with the Occupational Health and Safety Act and regulations thereto should contact with designated substances and/or hazardous materials occur during the course of their work.

.4 It is the responsibility of the contractor to review the designated substances and/or hazardous materials book in the building prior to starting any work.

.5 Existing occupied buildings (depending upon their age) may contain designated substances and/or hazardous materials in thermal insulating materials and some manufactured products, such as vinyl asbestos floor tile. Any insulating materials, on pipes, fittings, boilers, tanks, ductwork, etc. may contain designated substances and/or hazardous materials and shall not be disturbed.

.6 A survey of each building documenting the location and condition of designated substances and/or hazardous materials -containing materials is available for your mandatory review prior to commencing any work on premises.

1.21 PHASING OF WORK

.1 This work for this project shall be constructed in phases. Refer to the architectural drawings for phasing information and details. Misinterpretation of the drawings with respect to the extent of the phasing of the work shall not relieve the contractor of the work required to complete the entire contract.

.2 Provide all necessary services or temporary services to suit phasing of construction with respect to all HVAC services and fire protection.

.3 Life safety systems in the building are to remain fully operational in occupied areas for building staff and occupants during renovations.

.4 Provide all necessary tests and certificates at completion of each phase to suit requirements of local authorities and consultants for occupancy of completed areas.

1.22 TSSA INSPECTION

.1 Prior to final completion of the project, this contractor shall make application, arrange, and pay for a TSSA inspection of all piping systems and equipment installations, including, but not limited to medical gasses, refrigeration, fuel piping, compressed air, heating plant, cooling plant, and associated equipment installed under the contract.

.2 Provide a copy of the TSSA report in the maintenance manuals for each system.

1.23 CONFINED SPACES

.1 Certain areas of the building may be defined as a “Confined Space”. Any personnel working in these areas must have confined space training, appropriate equipment and undertake all work in conformance with appropriate codes and standards.

.2 Refer to building documentation for any spaces deemed “Confined Space”.

1.24 ENERGY EFFICIENCY

.1 The HVAC systems of this building must achieve the energy efficiency levels by conforming to ANSI/ASHRAE/IESNA 90.1 “Energy Standard for Buildings Except Low-Rise Residential Buildings” and Chapter 2 of Division 3 of SB-10 prescriptive method from the Ontario Building Code.

.2 All equipment, products, and installations must conform to the Codes and Standards.

END OF SECTION

Part 1 General

1.1 OCCUPANCY REQUIREMENTS

.1 The contractor shall provide the following documentation to the consultant's satisfaction prior to receiving occupancy. Failure to provide the proper documentation will result in the occupancy not being granted. List of required documentation:

.1 Final Certificates (required prior to consultant's release of conformance letter).

.1 Mandatory TSSA Gas Pressure Test (CSA B149.1)

.2 Gas detection system commissioning (Refer to spec section 25 05 21 Part 3)

.3 Seismic Restraint Engineer's Letter.

.4 Balancing report for auto mechanics/truck coach (124) ventilation systems.

.5 Contractor letter verifying all refrigeration leak detection systems and their interlocks to downstream devices have been installed and tested.

Part 2 Not Used

Part 3 Not Used

END OF SECTION

Part 1 General

1.1 TESTS

.1 Give 48 hours' written notice of date for tests.

.2 Insulate or conceal work only after testing and approval by Consultant.

.3 Conduct tests in presence of Consultant.

.4 Bear costs including retesting and making good.

.5 Piping:

.1 General: Maintain test pressure without loss for 4 h unless otherwise specified.

.2 Hydraulically test steam and hydronic piping systems at 1-1/2 times system operating pressure or minimum 860 kPa, whichever is greater.

.3 Test natural gas systems to CSA-B149.1-00, TSSA requirements and requirements of authorities having jurisdiction.

.4 Test fuel oil systems to CSA B139 1976, CSA B139S1-1982 and authorities having jurisdiction.

.6 Equipment: Test as specified in relevant sections.

.7 Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.

1.2 SYSTEM START UP

.1 Provide adjusting testing and start up of all equipment prior to testing and balancing (TAB) specified elsewhere.

.2 Provide Consultant with written notice verifying all equipment operation and installation is complete.

.3 Start up shall be in presence of the following: Owner or Representative, Contractor, Building Automation Systems (BAS) Contractor, and Manufacturer's Representative. Each person shall witness and sign off each piece of equipment. Consultant's attendance will be determined by Consultant.

.4 Simulate system start up and shut down and verify operation of each piece of equipment.

.5 Arrange with all parties and provide 72 hours' notice for start up procedure.

.6 Arrange with building automation systems contractor to sequence all components and ensure system operation.

1.3 COMMISSIONING

.1 Co-ordinate and direct each step of the commissioning process and recommend acceptance or non-acceptance to the Owner/Owner's Representative.

.2 Prepare, in writing, documentation of any deficiencies discovered during the commissioning process. Submit to Consultant and Owner/Owner's Representative.

.3 The Commissioning Process is detailed in *ASHRAE Guideline 1-1996 HVAC Commissioning Process.* The commissioning plan may be modified to reflect the actual construction schedule and design.

.4 Provide a pre-functional test of all HVAC system and sub-system elements, including control devices, shall be checked for the following:

- **.1 Verify that each element has been properly installed, properly identified, and that all connections (including electrical) have been made correctly.**
- **.2 Verify that each element has been checked for proper lubrication, drive rotation, belt tension, control sequence, flow direction, or other conditions which may cause damage or reduce system performance.**
- **.3 Verify that tests, meter readings, and specific HVAC/electrical performance characteristics agree with those required by equipment or system manufacturer.**
- **.4 Controls calibration to be completed in accordance with the specification.**
- **.5 The TAB shall be done in accordance with the specifications.**

.5 A functional performance testing shall be done during two separate periods – one during the cooling season and one during the heating season. The first (cooling) testing period shall occur as soon after completion of installation as practical. The heating testing period shall occur as soon as weather conditions make it practical to test warm-up, zone heating and economizer functions. These tests ensure that all equipment and systems operate in accordance with design intent. The tests are dynamic tests and test the systems through all possible modes of operation.

.6 Reports:

- **.1 The Contractor shall be responsible for recording, documenting, and maintaining detailed inspection and testing data on the test documentation reports. The data record shall be comprehensive and concise.**
- **.2 All data must be recorded as soon as possible during the course of the inspection and testing.**
- **.3 All documentation shall have the date, time, and names of persons participating in the inspection and testing.**
- **.4 All test instruments shall be documented for valid calibration.**
- **.5 The recording work sheets, inspection check lists, and Performance Testing plans must all be approved by the Engineer and the Owner's Representative prior to the start of the testing.**
- **.6 Include all commissioning documentation in the maintenance manuals.**

.7 HVAC System Execution:

.1 Operate equipment and systems shall be tested in the presence of the Owner's Representative and the Consultant to demonstrate compliance with specified requirements. To minimize the time of Commissioning Team members, testing shall be done in four seasonal single blocks of time insofar as possible.

.2 Notify the consultant, in writing, fourteen (14) days prior to tests scheduled under requirements of this Section.

.3 Testing shall be conducted under specified design operating conditions as recommended or approved by the Consultant.

.4 All elements of systems shall be tested to demonstrate that total systems satisfy all requirements of these Specifications. Testing shall be accomplished on hierarchical basis. Test each piece of equipment for proper operation, followed by each sub-system, followed by entire system, followed by any inter-ties of other major systems.

.5 All special testing materials and equipment shall be provided by the appropriate contractor.

.6 Provide three copies of all test reports and records to the Consultant.

.8 The verification testing procedures shall address all operating characteristics of all HVAC equipment and systems, including:

Equipment Checklist
Rooftop Heating/Cooling Unit(s)
Exhaust Fans
Relays/Sensors/Transducers

1.4 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTION

.1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, troubleshooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.2 HVAC Contractor to schedule and coordinate the demonstration all on the same day, starting at a pre-approved time and continuing consequently until complete.

.3 Where specified elsewhere in HVAC Division, qualified manufacturers' representatives who are knowledgeable about the project to provide demonstrations and instructions.

.4 Use operation and maintenance manual, as-built drawings, audio visual aids, etc. as part of instruction materials.

.5 Instruction duration time requirements as specified in appropriate sections.

.6 Where deemed necessary, Consultants may record these demonstrations on video tape for future reference.

1.5 TRIAL USAGE

.1 Consultant or Owner may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:

.1 HVAC

.2 Exhaust air

.3 Control systems

1.6 DEFICIENCIES

.1 During the course of construction, the Consultants will monitor construction and provide written reports of work progress, discussions, and instruction to correct work.

.2 Instruction to correct work shall be done within the work period before the next review.

.3 The Contractor shall not conceal any work until inspected.

.4 The Contractor shall expedite 100% complete rough-in work and have inspected prior to concealing services and equipment especially above ceiling.

.5 Upon completion of the project, the Consultant will do a final review. Upon receiving the final inspection report, the Contractor must correct and sign back the inspection report indicating the deficiencies are completed. A re-inspection will only be done once Consultant receives this in writing.

1.7 EQUIPMENT INSTALLATIONS

.1 Unions or flanges: Provide for ease of maintenance and disassembly.

.2 Space for servicing, disassembly and removal of equipment and components: Provide as recommended by manufacturer or as indicated.

.3 Equipment drains: Pipe to floor drains.

.4 Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines.

1.8 ANCHOR BOLTS AND TEMPLATES

.1 Supply anchor bolts and templates for installation by other divisions.

1.9 PROTECTION OF OPENINGS

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.10 ELECTRICAL

.1 Electrical work to conform to Electrical Division including the following:

.1 Supplier and installer responsibility and related HVAC responsibility is indicated in Equipment Schedule on HVAC and/or electrical drawings.

.2 Power wiring and conduit is specified in Electrical Division except for conduit, wiring and connections below 50 V which are related to control systems specified in HVAC Division. Follow Electrical Division for quality of materials and workmanship.

.3 Electrically operated equipment shall be C.S.A. approved label. Special Inspection Label of Provincial Authority having jurisdiction will be accepted in lieu of C.S.A. approval. Each motor shall have an approved starter. Starter will be supplied and installed by Electrical Division unless otherwise indicated.

.4 All starters for HVAC equipment to be provided by this contractor. Wired by Electrical Division.

1.11 CONTROL WIRING

.1 Furnish and install all components, devices, and control wiring for all HVAC equipment, HVAC systems, lighting, and other electrical loads to make all equipment operable to satisfaction of Owner and Consultant and to manufacturer's requirements and recommendations.

.2 All electrical wiring, HVAC wiring and installations shall comply with local and national electrical and HVAC codes.

.3 Supply and install wiring as required for all devices and systems. Install wiring in EMT conduit and otherwise comply with all requirements of the Electrical Division. Approved plenum wire may be used for sensor and network communication wiring where it complies with appropriate building codes and regulatory authorities.

.4 All wiring concealed in walls and chases, and all exposed wiring shall be run in conduit.

.5 Provide recessed conduit and backer boxes where controls are wall mounted. Surface mounted boxes and conduit are acceptable in service rooms.

.6 Free-run plenum rated cable shall be run in cable hangers where provided by electrical division or tied neatly to pipe and duct hangers in the ceiling. Avoid wiring that droops. Follow building lines and do not run wiring "as the crow flies".

1.12 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to equipment unless specified or indicated otherwise. Coordinate with block coursing (if applicable).

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install equipment at following heights unless indicated otherwise.

.1	Thermostats (Operable, Barrier Free)	1200 mm (47.2")
.2	Thermostats (Non Barrier Free)	1500 mm (59")

.4 Also follow direction of architectural drawings and where discrepancies occur clarify prior to rough-in.

1.13 MOTORS

.1 Provide high efficiency motors for HVAC equipment as specified.

.2 If delivery of specified motor will delay delivery or installation of any equipment, install motor approved by Consultant for temporary use. Final acceptance of equipment will not occur until specified motor is installed.

.3 Motors under 373 W, (1/2 hp): speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, voltage as indicated.

.4 Motors 373 W, (1/2 hp) and larger: EEMAC Class B, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 40°C (72°F), 3 phase, voltage as indicated.

1.14 BELT DRIVES

.1 Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.

.2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise specified.

.3 For motors under 7.5 kW 10 hp: Standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified r/min.

.4 For motors 7.5 kW 10 hp and over: Sheave with split tapered bushing and keyway having fixed pitch unless specifically required for item concerned. Provide sheave of correct size to suit balancing.

.5 Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.

.6 Motor slide rail adjustment plates to allow for centre line adjustment.

.7 Provide sheave changes as required for final air balancing.

1.15 GUARDS

.1 Provide guards for unprotected devices.

.2 Guards for belt drives:

- .1 Expanded metal screen welded to steel frame.
- .2 Minimum 1.2 mm (18 gauge) thick sheet metal tops and bottoms.
- .3 40 mm (1 1/2") diameter holes on both shaft centres for insertion of tachometer.
- .4 Removable for servicing.

.3 Provide means to permit lubrication and use of test instruments with guards in place.

.4 Install belt guards to allow movement of motors for adjusting belt tension.

.5 Guard for flexible coupling:

- .1 "U" shaped, minimum 1.6 mm (16 gauge) thick galvanized mild steel.
- .2 Securely fasten in place.

.3 Removable for servicing.

.6 Unprotected fan inlets or outlets:

.1 Wire or expanded metal screen, galvanized, 20 mm (3/4") mesh.

.2 Net free area of guard: not less than 80% of fan openings.

.3 Securely fasten in place.

.4 Removable for servicing.

.7 Duct Openings

.1 Provide reinforced expanded mesh grating, style 3 (3 lbs/sq.ft.) cover on accessible unprotected duct openings over 300 mm (12") wide and as indicated. This includes all ductwork terminating in air handling units and plenums.

.2 Securely fasten in place.

.3 Removable for servicing.

1.16 PIPING AND EQUIPMENT SUPPORTS

.1 Equipment supports supplied by equipment manufacturer: Specified elsewhere in HVAC Division.

.2 Piping and equipment supports not supplied by equipment manufacturer: Fabricate from structural grade steel meeting requirements of - Structural Steel Section. Submit structural calculations with shop drawings.

.3 Mount base mounted equipment on chamfered edge housekeeping pads, minimum of 100 mm (4") high and 150 mm (6") larger than equipment dimensions all around. Concrete specified elsewhere.

.4 Where housekeeping pads incorporate existing pads provide 10 mm dowels into existing pads. New pad height shall match existing.

1.17 SLEEVES

.1 Pipe sleeves: at points where pipes pass through masonry, concrete or fire rated assemblies and as indicated. Grout sleeves in place.

.2 Schedule 40 steel pipe.

.3 Sleeves with annular fin continuously welded at midpoint:

.1 Through foundation walls.

.2 Where sleeve extends above finished floor.

.3 Through fire rated walls and floors.

.4 Sizes: minimum 6 mm (1/4") clearance all around, between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm (1") above other floors.

.6 Fill voids around pipes:

.1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.

.2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.

.3 Ensure no contact between copper tube or pipe and ferrous sleeve.

.4 Fill future-use sleeves with lime plaster or other easily removable filler.

.5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+Amdt-Mar-78.

.7 Provide minimum 20 gauge duct sleeves where ducts pass through masonry concrete or fire rated assemblies. Maintain minimum 25 mm clearance all around or to the requirements of the authority having jurisdiction. Seal at wall as indicated.

1.18 FIRE STOPPING

.1 This contractor shall work with all other contractors on the project in providing one common method of fire stopping all penetrations made in fire rated assemblies.

.2 Approved fire stopping and smoke seal material in all fire separations and fire ratings within annular space between pipes, ducts, insulation and adjacent fire separation and/or fire rating.

.3 Do not use cementitious or rigid seals around penetrations for pipe or ductwork where penetrating through walls, floors, ceilings, etc.

.4 Insulated pipes and ducts: ensure integrity of insulation and vapour barrier at fire separation.

.5 Provide materials and systems capable of maintaining effective barrier against flame, smoke and gases. Ensure continuity and integrity of fire separation.

.6 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.

.7 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation. Provide “fire wrap” blanket around services penetrating fire walls. Extent of blanket must correspond to ULC recommendations.

.8 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens and volatile solvents.

.9 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

.10 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes. Exposed surfaces are to be acceptable to consultant prior to application of finish.

.11 Firestopping shall be inspected and approved by local authority prior to concealment or enclosure.

.12 Install material and components in accordance with ULC certification, manufacturers instructions and local authority.

.13 Submit product literature and installation material on fire stopping in shop drawing and product data manual. Maintain copies of these on site for viewing by installers and consultant.

.14 Manufacturer of product shall provide certification of installation. Submit letter to the consultant.

.15 Acceptable Alternate Manufacturers to approval of local authority:

.1 Minnesota Mining and Manufacturing
.2 Fryesleeve Industries Inc.
.3 General Electric Pensil Firestop Systems
.4 International Protective Coatings Corp.
.5 Rectorseal Corporation (Metacaulk)
.6 Proset Systems
.7 3M
.8 AD Systems
.9 Hilti

.16 Ensure firestop manufacturer representative performs onsite inspections and certifies installation. Submit inspection reports/certification at time of substantial completion.

1.19 ESCUTCHEONS

.1 On pipes and ductwork passing through walls, partitions, floors and ceilings in exposed finished areas and on water and drain pipes inside millwork and cabinets.

.2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.

.3 Outside diameter to cover opening or sleeve.

.4 Inside diameter to fit around finished pipe.

1.20 PAINTING

.1 Refer to Section Interior Painting and specified elsewhere.

.2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

.3 Apply two coats of paint to exposed piping service in service room, base colour as specified in HVAC Identification Section.

.4 Prime and touch up marred finished paintwork to match original.

.5 Restore to new condition, or replace equipment at discretion of consultant, finishes which have been damaged too extensively to be merely primed and touched up.

1.21 SPARE PARTS

.1 Furnish spare parts in accordance with general requirements and as follows:

.1 One set of belts for each type or each size of machinery.

.2 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.

.2 Provide list of equipment in maintenance manuals indicating corresponding spare parts required. List of spare parts to be signed off by receiving personnel.

1.22 SPECIAL TOOLS

.1 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Maintenance Materials Special Tools and Spare Parts.

1.23 ACCESS DOORS

.1 Provide access doors to concealed HVAC equipment for operating, inspecting, adjusting and servicing.

.2 Flush mounted 600 x 600 mm (24" x 24") for body entry and 300 x 300 mm (12" x 12") for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.

.3 Material:

.1 Special areas such as tiled or marble surfaces: Use stainless steel with brushed satin or polished finish as directed by Consultant.

.2 Remaining areas: Use prime coated steel.

.3 Fire rated areas: Provide ULC listed access doors.

.4 Washrooms or high moisture area ceilings: Aluminum with mill finish suitable for painting.

.4 Installation:

.1 Locate so that concealed items are accessible.

.2 Locate so that hand or body entry (as applicable) is achieved.

.5 Acceptable Manufacturers:

.1 Le Hage

.2 Zurn

.3 Acudor

.4 Nailor Industries Inc.

1.24 DIELECTRIC COUPLINGS

.1 General:

.1 To be compatible with and to suit pressure rating of piping system.

.2 Where pipes of dissimilar metals are joined.

.2 Pipes NPS 50 mm (2") and under: Isolating unions.

.3 Pipes NPS 65 mm (2 1/2") and over: Isolating flanges.

1.25 DRAIN VALVES

.1 Locate at low points and at section isolating valves unless otherwise specified.

.2 Minimum NPS 20 mm (3/4") unless otherwise specified: bronze, with hose end male thread and complete with cap and chain.

.3 Drain valves on potable water systems shall be complete with vacuum breaker.

1.26 REPAIRS, CUTTING, AND RESTORATION

.1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

.2 Each Section of this Division shall bear expense of cutting, patching, and repairing to install their work and/or replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

.3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

.4 All patching, painting and making good of the existing walls, floors, ceilings, partitions and roof will be at the expense of this Contractor, but performed by the Contractor specializing in the type of work involved unless otherwise noted.

1.27 EXISTING SYSTEMS

.1 Connections into existing systems to be made at time approved by Consultant. Request written approval of time when connections can be made.

.2 Be responsible for damage to existing plant by this work.

1.28 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units prior to turn over to owner.

.2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition including replacement of all filters in all air and piping systems.

1.29 DISCONNECTION AND REMOVAL

.1 Disconnect and/or remove equipment, piping, ductwork, etc. as indicated.

.2 Cap and conceal all redundant and obsolete connections.

.3 Provide a list of equipment to be removed to the owner, for his acceptance of same. Remove all equipment from site, which the owner does not retain.

.4 Store equipment to be retained by owner on site where directed by consultant.

1.30 OWNER SUPPLIED EQUIPMENT

.1 Connect to equipment supplied by the owner and make operable.

1.31 EXISTING CONCRETE SLAB X-RAY/SCANNING

.1 This Contractor shall retain the services of a qualified company to provide an X-ray and/or scan of the existing buried services in wall and/or floors prior to starting any work in the affected area.

.2 Failure to locate existing piping, conduit, rebar, etc. shall not relieve this Contractor of repair of same prior to installing his service.

.3 This Contractor shall be responsible for all repairs and/or replacement of existing services caused by cutting the existing concrete slabs and/or walls.

1.32 CONFINED SPACES

.1 Certain areas of the building may be defined as a “Confined Space”. Any personnel working in these areas must have confined space training, appropriate equipment and undertake all work in conformance with appropriate codes and standards.

.2 Refer to building documentation for any spaces deemed “Confined Space”.

1.33 TSSA INSPECTION

.1 Prior to final completion of the project, this contractor shall make application, arrange, and pay for a TSSA inspection of all piping systems and equipment installations, including, but not limited to medical gasses, refrigeration, fuel piping, compressed air, heating plant, cooling plant, and associated equipment installed under the contract.

.2 Provide a copy of the TSSA report in the maintenance manuals for each system.

1.34 REFRIGERANT CONTAINING EQUIPMENT

.1 A2L refrigerants are classified as mildly flammable. CSA B52-2023 has specific safety clauses related to the use of refrigerants with this classification within buildings.

.2 This Contractor shall be responsible to ensure that the installation requirements of CSA B52-2023 are met.

.3 Throughout this specification various pieces of equipment have been specified with refrigerant leak detection systems. Field wiring of the alarm status of this system to various downstream system components is required under Annex P of the standard and is the responsibility of this Contractor. These devices include the following:

.1 Open all zone dampers connected to the affected system.

.2 Disable electric reheat coils within the affected system.

.3 Activate field installed safety shut off valves on the affected refrigeration systems.

.4 De energize any potential sources of ignition with the ductwork system of the affected system.

.5 Energize fans within the ductwork system.

.6 Activate any designated refrigeration leak ventilation systems.

1.35 FREEZE PROTECTION

.1 Do not run lines in outside walls, or locations where freezing may occur. Piping next to outside walls shall be in furred spaces with insulation between the piping and the outside wall. Insulation of piping shall not be considered freeze protection.

1.36 SCAFFOLDING, RIGGING, AND HOISTING

.1 Provide all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished; remove same from premises when no longer required. Conform to OSHA requirements and standards.

1.37 COOPERATION WITH OTHER TRADES

.1 Give full cooperation to other trades and furnish in writing to other trades, with copies to the engineer, any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

.2 Where plumbing work will be installed in close proximity to, or will interfere with work of other trades, assist in working out space conditions to make a satisfactory adjustment. Prepare composite working drawings and sections at a suitable scale, not less than ¼ inches = 1-foot – 0-inches, clearly showing how the HVAC work is to be installed in relation to the work of other trades. If work is installed before coordinating with other trades, or if it causes any interference with work of other trades, make the necessary changes in the work to correct the conditions and bear all costs.

.3 Furnish to other trades necessary templates, patterns, setting drawings, and shop details for the proper installation of work and for coordinating adjacent work.

1.38 WATERPROOFING SEAL MATERIALS

.1 Modular, compressed seal assemblies consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and pipe sleeve or wall opening, assembled with stainless steel bolts and pressure plates and designed so when bolts are tightened the links expand to seal the opening watertight. Select seal assemblies to suit pipe size and sleeve size or wall opening size.

.2 Standard of quality assurance manufacturers are:

.1 Thunderline Corp. (Power Plant Supply Co.) “Link Seal” Model S-316

.2 The Metraflex Co. “MetraSeal” type ES

.3 Or approved equivalent.

1.39 SLEEVE, CUT, AND FORMED OPENING LOCATION DRAWINGS

.1 Prepare and submit for review, drawings indicating size and location of required sleeves, recesses, and formed openings in poured or precast concrete work.

.2 Such drawings are to be completely and accurately dimensioned and relate sleeve, recesses, and formed openings to suitable grid lines and elevation datum, and are to take into account structural items such as grade beams, column caps, and column drop slabs.

.3 Begin to prepare such drawings immediately upon notification of acceptance of bid and award of Contract.

1.40 SUSTAINABLE CONSTRUCTION

.1 Construction Waste Management:

.1 Recycle all waste materials to avoid land fill sites where possible.

.2 All metal contents shall be recycled.

.3 All cardboard and paper shall be recycled.

.4 All plastic packaging shall be recycled.

.5 All wood shall be directed to the appropriate recycled wood section at the landfill site.

.2 This Contractor is responsible for their own waste management system and cost associated with the disposal. This can be their own on site system, daily removal, back to shop, or a communal system shared with other contractors on site.

.3 In all cases the cost to remove materials on site are the cost of this Contractor.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

.1 Conform to the General Provisions of General Requirements Section.

.2 This project is one of a retrofit nature in part, and which will require some demolition.

.3 Allow for all remedial work in areas indicated on the drawings and as generally defined in the relevant sections of the specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1 Electrical Division.

1.3 SCOPE OF WORK

.1 The scope of work is essentially the selected disconnection and/or removal of services and/or equipment, piping, ductwork, etc. as indicated or required to complete the work.

Part 2 Products

2.1 GENERAL

.1 This Division is to liaise with the Owners or Consultant for equipment being removed that may be suitable for reuse to that specified or handed over to the Owner.

.2 This Division is to take full responsibility for any special tools or equipment required to disassemble or remove material from building.

Part 3 Execution

3.1 GENERAL

.1 The general requirements are indicated on the drawings and on the outline specification in Division 1.

.2 The general execution of the demolition is to be carried out in a clean and efficient manner.

.3 Demolition of existing ceilings, walls, etc., to facilitate removal of existing services or equipment or installation of new to be kept to a minimum and then restored to match existing.

.4 All openings or holes created by removal of existing HVAC systems which are not being reused are to be patched with the same material surrounding surfaces.

.5 All new holes and openings to facilitate HVAC systems are to be patched to match surrounding surfaces.

.6 Protect all existing furnishings, materials, and equipment. Any damage occurring as a result of the work of this Division shall be repaired or replaced at the expense of this Division.

.7 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Owners in an expedient manner with minimum disruption to the facility and systems downtime.

.8 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

.9 Where the location of any services has been shown on the plans, such information is not guaranteed. It is this Division's responsibility to verify locations, invert elevations, etc., immediately after moving on site. Should for any reason the information obtained necessitate changes in procedure or design, advise the Consultant at once. If verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Division's.

.10 Disconnect and/or remove equipment, piping, ductwork, etc. as indicated.

.11 Cap and conceal all redundant and obsolete connections.

.12 Provide a list of equipment to be removed to the Owner, for his acceptance of same. Remove all equipment from site which the Owner does not retain.

.13 Maintain equipment to be retained by Owner on site where directed by Consultant.

.14 Demolition of all parts of the work must be completed within the confines of the work area and in such a way as the dust produced and risk to injury of will not adversely affect the building users.

.15 Demolished areas of the existing building will remain in their current use in some cases. Demolition in these areas must be kept to the minimum required to complete the work.

.16 Demolition shall take place within areas isolated from all other areas with appropriate hoarding, scaffolding, netting, fencing or other means of security between building users and the work.

.17 Co-ordinate making safe electrical devices, capping plumbing and removal of fixtures prior to commencement of demolition.

.18 All piping and equipment to be removed and/or abandoned shall be drained prior to capping and/or abandoning. Disposal of all liquids shall be to the approval of authority of having jurisdiction and/or provincial regulations.

3.2 EXISTING SYSTEM DRAINAGE

.1 Drain all existing piping systems including all related equipment as required to facilitate system renovations.

.2 Disposal of existing system shall be to the requirements of the local and/or provincial regulations.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME)

.1 ANSI/ASME B31.1, Power Piping, (SI Edition).

.3 American Society for Testing and Materials (ASTM)

.1 ASTM A 125, Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A 563, Specification for Carbon and Alloy Steel Nuts.

.4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)

.1 MSS SP-58, Pipe Hangers and Supports - Materials, Design, Manufacture Selection, Application, and Installation.

.5 CSA B272-93 – Prefabricated Self-Sealing Roof Vent Flashings

.6 CRCA (Canadian Roofing Contractor’s Association)

.7 SPRI (Single Ply Roofing Institute)

.8 CUFCA (Canadian Urethane Foam Contractor’s Association) and CGSB-51-GP-46MP, Manual for “Installers of Spray Polyurethane Foam Thermal Insulation”

.9 CSA G40.21-M1987, M350W, and M300W (Structural Quality Steels)

.10 CSA W47.1-1983 (Certificate of Companies for Fusion Welding of Structural Steel)

.11 CSA W59-M1989 (Welded Steel Construction – Metal Arc Welding)

.12 CSA G164-M1981 (Hot Dip Galvanizing of Irregularly Shaped Articles)

1.2 RELATED SECTIONS

.1 Section 03300 – Cast-in-place Concrete

.2 Section 05210 – Steel Joists

.3 Section 05300 – Metal Deck

.4 Section 06100 – Rough Carpentry

.5 Section 07200 – Thermal Protection

.6 Section 07500 – Membrane Roofing

.7 Section 07900 – Joint Sealers

1.3 DESIGN REQUIREMENTS

.1 Construct support systems to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.

.2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP-58.

.3 Design supports to support systems under all conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.

.4 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment to be in accordance with MSS SP-58.

1.4 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements.

.2 Submit shop drawings and product data for following items:

.1 All bases, hangers and supports.

.2 Connections to equipment and structure.

.3 Structural assemblies.

.3 Manufacturer’s installation instruction.

1.5 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

1.6 QUALITY ASSURANCE

.1 Roof accessories manufactures to have minimum five (5) years documented experience in the design and fabrication of roofing specialties and accessories.

1.7 SPECIAL WARRANTY

.1 Warrant products installed under this section of work to be free of leaks, condensation, and defects in materials and/or manufacture for a period of twenty (20) years when installed in accordance with the manufacturer’s written instructions.

Part 2 Products

2.1 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

.1 Provide templates to ensure accurate location of anchor bolts.

2.2 ROOF CURB MOUNTED EQUIPMENT

.1 Install as per manufacturer’s instructions on roof curbs provided by manufacturer as indicated.

.2 Provide all necessary continuous pressure treated wood blocking and 24 gauge metal liner on all exposed wood as required to install roof curb level.

2.3 PIPING THROUGH ROOF

.1 Provide Thaler MEF-9 or equal gas piping flashing where pipe and/or relief vent penetrates roof.

Part 3 Execution

3.1 INSTALLATION

.1 Roof support install in accordance with:

.1 Manufacturer's instructions and recommendations.

.2 Provide protection against deterioration due to contact of dissimilar metals.

.2 Flashing Installation:

.1 Install roof support flashing in accordance with manufacturer’s printed instructions.

.3 Vibration Control Devices:

.1 Install as indicated and at all roof mounted equipment that is not internally isolated.

.4 Clevis plates:

.1 Attach to concrete with 4 minimum concrete inserts at each corner.

.5 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

3.2 EXAMINATION

.1 Report to the contractor in writing, defects of work prepared by other trades and other unsatisfactory site conditions. Verify site dimensions. Commencement of work will imply acceptance of prepared work.

3.3 ADJUSTING

.1 Verify that all manufactured units have been installed in accordance with specifications and details and will function as intended. Adjust any items where necessary to ensure proper operation.

3.4 CLEANING

.1 Clean manufactured units using materials and methods approved by manufacturer. Do not use cleaning techniques which could impair performance of the roofing system.

END OF SECTION

Part 1 General

1.1 APPLICATION

.1 Seismic restraint is becoming more prominent with improved soil testing equipment. Seismic requirement is not site specific by geographical area but determined by site soil conditions.

.2 Where the structural engineer or architect documents have Ie*Sa(0.2)*Fa<3.5 seismic is not required on the plumbing, HVAC, electrical, or fire protection systems.

.3 Where the structural engineer or architect documents have Ie*Sa(0.2)*Fa≥3.5 seismic is required on the plumbing, HVAC, electrical, or fire protection systems.

.4 Seismic will always be required on fire protection systems when required by NFPA codes.

.5 Seismic will always be required on any “Disaster Relief Building.” For example, hospitals, police stations, ambulance building, etc.

.6 When it is unclear in the tender documents request information from the structural engineer or architect for clarification.

1.2 SECTION INCLUDES

.1 Seismic Requirements for single rod hanger support for conduit, pipe and other similar systems.

.2 Seismic Requirements for trapeze type supports for cable tray, conduit, pipe and other similar systems.

.3 Seismic requirements for all equipment and piping.

1.3 RELATED WORK SPECIFIED ELSEWHERE

.1 Vibration Isolation Measures.

1.4 REFERENCE STANDARDS

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 National Building Code of Canada (NBC).

.3 Canadian Standards Association

.1 CSA S832, Seismic Risk Reduction of Operation and Functional Components (OFCs) of Buildings.

.2 CAN/CSA-S16.1 Limit States Design of Steel Structures

.3 CAN3-S136 Design of Cold Steel Structural Members

.4 CSA W47.1 Certification of Companies for Fusion Welding of Steel

.5 CSA W59 Welded Steel Construction

.4 SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems

.5 Canadian Institute of Steel Construction

.6 Canadian General Standards Board

.7 Underwriter Laboratories of Canada

.8 Workers Compensation Board of BC

.9 American Society of Testing and Materials

.1 ASTM A653/S653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (galvannealed) by the Hot Dip Process.

.2 ASTM A879M Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface.

.3 ASTM A307 Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.4 ASTM A325M Specification for Structural Bolts, Heat Treated 830MPa Minimum Tensile Strength.

.10 All local codes.

.11 NFPA-13: Installation of Fire Sprinkler Systems.

.12 FEMA: Federal Emergency Management Activity.

.13 FEMA: Seismic Restraint Installation Manuals 412. 413 and 414

.1 FEMA 412: Installing Seismic Restraints for Mechanical Equipment

.2 FEMA 413: Installing Seismic Restraints for Electrical Equipment

.3 FEMA 414: Installing Seismic Restraints for Duct and Pipe

.14 ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.).

.15 ASHRAE Applications Handbook; Seismic and Wind Restraint Design Chapter.

1.5 DEFINITIONS

.1 A_v: Effective peak velocity related acceleration coefficient BOCA, SBC Code.

.2 S_1: Mapped Long Period Seismic Acceleration Coefficient IBC, TI-809-04, ASCE7.

.3 S_s: Mapped Short Period Seismic Acceleration Coefficient IBC, TI-809-04, ASCE7.

.4 v: Zonal Velocity Coefficient NBC-Canada.

.5 VISCMA: The Vibration Isolation and Seismic Control Manufacturers Association has developed Testing and Rating Standards for Seismic Restraint Components that comply with Code and ASHRAE based requirements.

.6 VISCMA 102-2007: Static Qualification Standards for Obtaining a VISCMA Compliant Seismic Component Rating.

.7 Z: Seismic Zone defines Seismic Coefficient C_a used by UBC Code.

1.6 PERFORMANCE REQUIREMENTS

.1 Design Ground Acceleration Coefficient (A_v, S_s, v, or Z depending on Code = X.XX).

.2 (If IBC or TI-809-04) Design Long Period Ground Acceleration Coefficient (S_1 = X.XX).

.3 Design Soil Type = (S_a, S_b, S_c, S_d) as appropriate. (If NBC Canada, the Foundation Factor).

.4 Importance or Performance Factor appropriate to structure = I_p = X.XX.

.5 If UBC Zone 4, Proximity to Fault and, if less than 10km, Fault Type.

.6 Schedule or drawings indicating critical (Ip = 1.5) Duct/Piping systems, including systems whose importance factor may be increased by proximity to critical components.

1.7 DESCRIPTON OF SYSTEM

.1 It shall be understood that the requirements of this seismic restraint section are in addition to other requirements as specified elsewhere for the support and attachment of equipment and HVAC services, and for the vibration isolation of same equipment. Nothing on the project drawings or specifications shall be interpreted as justification to waive the requirements of this seismic restraint section.

.2 The work under this section shall include furnishing all labour, materials, tools, appliances, and equipment, and performing all operations necessary for the complete execution of the installation of seismic snubber restraint assemblies as shown, detailed, and/or scheduled on the drawing and/or specified in this section of the specifications.

.3 All seismic snubber restraint assemblies shall meet the following minimum requirements:

.1 The snubber/restrained isolator for isolated equipment shall include a resilient element that will ensure that no un-cushioned shock can occur (this does not include cable restraints).

.2 It shall be possible to visually inspect the resilient material for damage and allow for replacement, if necessary.

.3 All snubbers are to include a maximum air gap of 0.25 in (6 mm).

.4 Seismic restraint systems shall be designed to offer seismic restraint in all directions, unless otherwise noted.

.5 Seismic restraint capacities to be verified by an independent test laboratory or certified by a registered Professional Engineer to ensure that the design intent of this specification is realized. Verification shall be by one of the following methods:

.1 An NRTL (National Recognized Testing Laboratory), or laboratory recommended by VISCMA.

.2 Certified by a Professional Engineer with at least 5 years of experience, using industry standard methods of analysis, which employ common engineering practices. Adherence to the ratings standard within ASHRAE SPC171 and VISCMA 102-2007 is required.

.3 By a nationally recognized agency, such as VISCMA, that has reviewed and approved the restraint.

1.8 SYSTEM DESIGN

.1 Seismic restraint manufacturer shall be responsible for the structural design of attachment hardware as required to attach snubbers/restraints to both the equipment and supporting structure on vibration isolated equipment, or to directly attach equipment to the building structure for non-isolated equipment.

.2 The contractor shall furnish, to the seismic restraint manufacturer, a complete set of approved shop drawings of all equipment that is to be restrained, from which the selection and design of seismic restraint devices and/or attachment hardware will be completed. The shop drawings furnished shall include, at a minimum, basic equipment layout, length, and width dimensions, and installed operating weights of the equipment to be restrained.

.3 All piping, ductwork and equipment is to be restrained to meet code requirements. At a minimum, the seismic restraint manufacturer shall provide documentation on maximum restraint spacing for various restraint sizes and anchors, as well as “worst case” reaction loads for each restraint and/or anchor size.

.4 The contractor shall ensure that all housekeeping pads used are adequately reinforced and are properly dowelled to the building structure, so as to withstand calculated seismic forces. In addition, the size or the housekeeping pad is to be coordinated with the seismic restraint manufacturer to ensure that adequate edge distances exist in order to obtain the desired equipment anchor capacities.

1.9 SEISMIC BRACING AND SUPPORT DESIGN REQUIREMENTS

.1 Seismic restraint designer shall co-ordinate all attachments with the structural engineer of record.

.2 Design analysis shall include calculated dead loads, static seismic loads, and capacity of materials utilized for the connection of the equipment or system to the structure.

.3 Analysis shall detail anchoring methods, bolt diameter, and embedment depth.

.4 All seismic restraint devices shall be designed to accept without failure the forces calculated per the applicable building code and as summarized in Section 3.01.

.5 Friction from gravity loads shall not be considered resistance to seismic forces.

.6 Fire protection systems shall meet the requirements of NFPA-13 and NFPA-14. Sway bracing used for seismic restraint purposes must be fitted with provisions to resist the vertical force component of the diagonal brace. Single diagonal brace for seismic restraint will not be approved.

1.10 ALTERNATE SYSTEMS

.1 Provisions of the General Conditions and Supplemental Conditions of the specifications shall govern the use of alternate systems to those specified.

.2 Manufacturers not listed as approved in “Part 2 Materials” of this section must secure approval to bid a minimum of ten (10) days prior to the project bid date.

.3 Uncertified internal equipment seismic restraint systems are disallowed for use on this project.

1.11 QUALITY ASSURANCE

.1 The contractor shall provide pre-engineered seismic restraint systems to meet total design lateral force requirements for support and restraint of piping, conduit, cable trays and other similar systems and equipment where required by the applicable building code.

.2 System Supports/Restraints: Firms regularly engaged in the manufacture of products of the types specified in this section, whose products have been in satisfactory use in similar service for not less than 5 years.

.3 Bolted framing channels and fittings shall have the manufacturers name, part number, and material heat code identification number stamped in the part itself for identification. Material certification sheets and test reports must be made available by the manufacturer upon request.

.4 Only companies experienced in performing the work of this section shall do the installation.

.5 All seismic restraint installations shall be independently reviewed by the Owners Representative for compliance with project specifications.

1.12 SUBMITTALS

.1 Product Data: Include Seismic Rating Curve for each seismically rated isolator or restraint component.

.2 Samples: The contractor shall submit samples of specified seismic snubber devices for approval.

.3 Shop Drawings shall include the following:

.1 Design Calculations: Calculate requirements for selecting seismically rated vibration isolators and seismic restraints. Certification documents to be signed and sealed by a qualified Professional Engineer with at least 5 years of experience in the design of seismic restraints. Professional engineer shall have local jurisdiction and provide periodic field review and final certification upon completion of the project. All costs and fees associated with the engineering shall be the responsibility of this contractor.

.2 Vibration Isolation Bases: Dimensional drawings including anchorage and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, base weights, equipment static loads.

.3 Seismic-Restraint Details: Detailed submittal drawings of seismic restraints and snubbers. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors. Include ratings for loads.

.4 Equipment Manufacturer Seismic Qualification Certification: The Equipment Manufacturer must submit certification that each piece of provided equipment will withstand seismic forces identified in "Performance Requirements" Article above. Include the following:

.1 Basis for Certification: Indicate whether the "withstand" certification is based on actual test assembled components or on calculations.

.2 Indicate the equipment is certified to be durable enough to:

.1 structurally resist the design forces and/or

.2 will remain functional after the seismic event.

.5 Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

.6 Detailed description of the assumed equipment anchorage devices on which the certification is based.

1.13 DELIVERY, STORAGE, AND HANDLING

.1 Deliver strut systems, pipe hangers and components carefully to avoid breakage, denting, and scoring finishes. Do not install damaged equipment.

.2 Store strut systems, pipe hangers and components in original cartons and in clean dry space; protect from weather and construction traffic.

1.14 WORK FURNISHED BUT NOT INSTALLED

.1 The materials and systems specified in this section shall be purchased by the HVAC contractor from a single seismic snubber restraint materials manufacturer to assure sole source responsibility for the performance of the seismic restraints used.

.2 The materials and systems specified in this section can, at the contractor's option, be installed by the subcontractor who installs the seismic services.

1.15 COORDINATION

.1 Coordinate size, shape, reinforcement and attachment of all housekeeping pads supporting seismically rated equipment. Concrete shall have a minimum compressive strength of 3,000 psi or as specified by the consultant.

.2 Coordinate with seismic restraint manufacturer to locate and size structural supports underneath seismically restrained equipment (e.g. roof curbs, cooling towers, and other similar equipment).

1.16 INSTALLATION

.1 Installation of all seismic restraint materials specified herein shall be accomplished following the manufacturer's written instructions. Installation instructions shall be submitted to the engineer for approval prior to the beginning of the work.

Part 2 Products

2.1 MATERIALS

.1 Unless otherwise specified materials used in the Work shall conform to the following:

.1 All steel rolled sections and steel plates shall conform to CAN/CSA G40.21M-300W

.2 All steel hollow structural steel sections shall conform to CAN/CSA G40.21-350W Class C

.3 Structural steel bolts, nuts and washers shall conform to ASTM A325M

.4 Weld electrodes shall be SMAW-E-E480XX and SAW-F480-EXXX.

2.2 ACCEPTABLE MANUFACTURERS

.1 All seismic snubbers and combination restraint/vibration isolation materials specified herein shall be provided by a single manufacturer to assure sole source responsibility for the proper performance of the materials used. Manufacturer is to be a member of VISCMA.

.2 Anchor types and sizes are to be per the design data as provided by the seismic restraint manufacturer.

.3 Materials and systems specified herein and detailed or scheduled on the drawings are based upon materials manufactured by Kinetics Noise Control Inc. Materials and systems provided by other manufacturers are acceptable, provided that they meet all requirements as listed in this specification.

.4 Kinetics Noise Control Inc.

.5 Cooper ‘B’ Line.

.6 Unistrut Building Systems.

.7 Mason Industries.

2.3 SEISMIC SNUBBER TYPES

.1 GENERAL

(Isolator/Snubber Types contained herein are per ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.) Handbook, HVAC Applications, Seismic and Wind Restraint Design)

.1 Type A, Coil Spring Isolator Incorporated Within a Ductile Iron or Cast Aluminum Housing.

.1 Cast iron or aluminum housings are brittle when subjected to shock loading and are therefore not approved for seismic restraint applications.

.2 Type B, Coil Spring Isolator Incorporated Within A Steel Housing

.1 Spring isolators shall be seismic control restrained spring isolators, incorporating a single or multiple coil spring element, having all of the characteristics of free standing coil spring isolators as specified in the vibration isolation portion of this specification. Springs shall be restrained using a housing engineered to limit both lateral and vertical movement of the supported equipment during an earthquake without degrading the vibration isolation capabilities of the spring during normal equipment operating conditions.

.2 Vibration isolators shall incorporate a steel housing and neoprene snubbing grommet system designed to limit motion to no more than ¼" (6 mm) in any direction and to prevent any direct metal-to-metal contact between the supported member and the fixed restraint housing. The restraining system shall be designed to withstand the seismic design forces in any lateral or vertical direction without yield or failure. Where the capacity of the anchorage hardware in concrete is inadequate for the required seismic loadings, a steel adapter base plate to allow the addition of more or larger anchors will be fitted to fulfill these requirements. In addition to the primary isolation coil spring, the load path will include a minimum ¼" (6 mm) thick neoprene pad.

.3 Spring elements shall be colour coded or otherwise easily identified. Springs shall have a lateral stiffness greater than 1.2 times the rated vertical stiffness and shall be designed to provide a minimum of 50% overload capacity. Non-welded spring elements shall be epoxy powder coated and shall have a minimum of a 1000-hour rating when tested in accordance with ASTM B-117.

.4 To facilitate servicing, the isolator will be designed in such a way that the coil spring element can be removed without the requirements to lift or otherwise disturb the supported equipment.

.5 Spring isolators shall be Model FHS as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (2).

.3 Type C, Coil Spring Isolator Incorporated Within a Steel Housing

.1 Spring isolators shall be seismic control restrained spring isolators, incorporating one or more coil spring elements, having all the characteristics of free standing coil spring isolators per the vibration isolation section of this specification, for equipment which is subject to load variations and/or large external forces. Isolators shall consist of one or more laterally stable steel coil springs assembled into fabricated welded steel housings designed to limit movement of the supported equipment in all directions.

.2 Housing assembly shall be made of fabricated steel members and shall consist of a top load plate complete with adjusting and leveling bolts, adjustable vertical restraints, isolation washers, and a bottom load plate with internal non-skid isolation pads and holes for anchoring the housing to the supporting structure. Housing shall be hot dipped galvanized for outdoor corrosion resistance. Housing shall be designed to provide a constant free and operating height within ⅛" (3 mm).

.3 The isolator housing shall be designed to withstand the project design seismic forces in all directions.

.4 Coil spring elements shall be selected to provide static deflections as shown on the vibration isolation schedule or as indicated or required in the project documents. Spring elements shall be colour coded or otherwise easily identified. Springs shall have a lateral stiffness greater than 1.2 times the rated vertical stiffness and shall be designed to provide a minimum of 50% overload capacity. Non-welded spring elements shall be epoxy powder coated and shall have a minimum of a 1000-hour rating when tested in accordance with ASTM B-117.

.5 Spring isolators shall be Model FLS and FLSS as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (3).

.4 Type D, Coil Spring Isolator Incorporated with Integral Seismic Restraint

.1 Spring isolators shall be single or multiple coil spring elements which have all of the characteristics of freestanding coil spring isolators as specified in the vibration isolation portion of this specification, incorporating lateral and vertically restrained seismic housing assemblies. Spring elements shall be readily replaceable without the need to list or remove the supported equipment.

.2 Restraint housing shall be sized to meet or exceed the force requirements of the application and shall have the capability of accepting coil springs of various sizes, capabilities, and deflections as required to meet the required isolation criteria. All spring forces shall be contained within the coil/housing assembly, and the restraint anchoring hardware shall not be exposed to spring generated forces under conditions of no seismic force. Spring element leveling adjustment shall be accessible from above and suitable for use with a conventional pneumatic or electric impact wrench.

.3 Restraint element shall incorporate a steel housing with elastomeric elements at all dynamic contact points. Elastomeric elements shall be replaceable. Restraint shall allow ¼" (6 mm) free motion in any direction from the neutral position. Restraint shall have an overturning factor (ratio of effective lateral snubber height to short axis anchor spacing) of 0.33 or less to ensure optimum anchorage capacity.

.4 Spring isolators shall be Model FMS as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (4).

.5 Type E, All Direction Neoprene Isolator

.1 Vibration Isolators shall be neoprene, molded from oil resistant compounds, designed to operate within the strain limits of the isolator so to provide the maximum isolation and longest life expectancy possible using neoprene compounds. Isolators shall include encapsulated cast-in-place top steel load transfer plate for bolting to equipment and a steel base plate with anchor holes for bolting to the supporting structure. Ductile iron or cast aluminum components are not acceptable alternatives and shall not be used due to brittleness when subjected to shock loading.

.2 Isolator shall be capable of withstanding the design seismic loads in all directions with no metal-to-metal contact.

.3 Isolator shall have minimum operating static deflections as shown on the project Vibration Isolation Schedule or as otherwise indicated in the project documents and shall not exceed published load capacities.

.4 Neoprene isolators shall be Model RQ as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections .2.01, 2.02 and 2.03 (5).

.6 Type F, Light Capacity All Direction 3-Axis External Seismic Snubber Assembly

.1 Equipment shall be restrained against excessive movement during a seismic event by the use of 3-axis resilient snubbers, designed to withstand the project required seismic forces. A minimum of two (2) snubbers are to be used at each equipment installation, oriented to effectively restrain the isolated equipment in all three directions, and additional snubbers shall be used as required by seismic design conditions.

.2 Snubbers shall be of interlocking steel construction and shall be attached to the equipment structure and equipment in a manner consistent with anticipated design loads. Snubbers shall limit lateral and vertical equipment movement at each snubber location to a maximum of ¼" (6 mm) in any direction.

.3 Snubbers shall include a minimum ¼" (6 mm) thick resilient neoprene pads to cushion any impact and to avoid any potential for metal-to-metal contact. Maximum neoprene bearing pressure shall not exceed 1500 pounds / sq. inch (10.4 N / sq. mm). Snubber shall be capable of withstanding an externally applied seismic force of up to 3,000 pounds (1360 kg) in any direction. Snubber shall be installed only after the isolated equipment is mounted, piped, and operating so as to ensure that no contact occurs during normal equipment operation.

.4 Three-axis seismic snubbers shall be Model HS-5 as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and 2.01, 2.02, and 2.03 (6).

.7 Type G, Lateral 2-Axis External Seismic Snubber Assembly

.1 Equipment shall be restrained against excessive lateral movement during a seismic event by the use of 2-axis horizontal resilient snubbers, designed to withstand the project required seismic forces. A minimum of two (2) snubbers are to be used at each equipment installation, oriented to effectively restrain the isolated equipment in all horizontal directions, and additional snubbers shall be used as required by seismic design conditions.

.2 Snubbers shall be interlocking steel construction and shall be attached to the equipment structure and equipment in a manner consistent with anticipated design loads. Snubbers shall limit lateral equipment movement at each snubber location to a maximum of ¼" (6 mm).

.3 Snubbers shall include a minimum of ¼" (6 mm) thick resilient neoprene pads to cushion any impact and to avoid any potential for metal-to-metal contact. Snubber shall be installed only after the isolated equipment is mounted, piped, and operating so as to ensure that no contact occurs during normal equipment operation.

.4 Two-axis lateral seismic snubbers shall be Model HS-2 as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (7).

.8 Type H, Heavy Capacity All Direction 3-Axis External Seismic Snubber Assembly

.1 Equipment shall be restrained against excessive vertical and horizontal movement during a seismic event by the use of 3-axis resilient snubbers, designed to withstand the project required seismic forces. A minimum of two (2) snubbers are to be used at each equipment installation, oriented to effectively restrain the isolated equipment in all three directions, and additional snubbers shall be used as required by seismic design conditions.

.2 Snubbers shall be of welded interlocking steel construction and shall be attached to the equipment structure and equipment in a manner consistent with anticipated design loads. Snubbers shall limit lateral and vertical equipment movement at each snubber location to a maximum of ¼" (6 mm) in any direction.

.3 Snubbers shall include resilient neoprene pads with a minimum thickness of ¼" (6 mm) to cushion any impact and to avoid any potential for metal-to-metal contact. Snubber shall be capable of withstanding an externally applied seismic force up to 10,000 pounds (4,540 kg) in any direction. Snubber shall be installed only after the isolated equipment is mounted, piped, and operating so as to ensure that no contact occurs during normal equipment operation.

.4 Three-axis seismic snubbers shall be Model HS-7 as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (8).

.9 Type I, Horizontal 1-Axis External Seismic Snubber Assembly

.1 Equipment shall be restrained against excessive horizontal one-axis movement during a seismic event by the use of single-axis resilient snubbers, designed to withstand the project required seismic forces. A minimum of four (4) snubbers are to be used at each equipment installation, oriented to effectively restrain the isolated equipment in all lateral directions.

.2 Snubbers shall be of steel construction and shall be attached to the equipment structure and equipment in a manner consistent with anticipated design loads. Snubbers shall limit lateral equipment movement at each snubber location in the direction of impact to a maximum of ¼" (6 mm).

.3 Snubbers shall include resilient neoprene pads with a minimum thickness of ¼" (6 mm) to cushion any impact and to avoid any potential for metal-to-metal contact. Snubber shall be installed only after the isolated equipment is mounted, piped, and operating so as to eliminate any contact during normal equipment operation.

.4 Single-axis seismic snubbers shall be Model HS-1 as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (9).

.10 Type J, Cable Restraints for Suspended Piping and Ductwork

.1 Seismic wire rope cable restraints shall consist of steel wire strand cables, sized to resist project seismic loads, arranged to offer seismic restraint capabilities for piping, ductwork, and suspended equipment in all lateral directions.

.2 Building and equipment attachment brackets at each end of the cable shall be designed to permit free cable movement in all directions up to a 45-degree misalignment. Protective thimbles shall be used at sharp connection points as required to eliminate potential for dynamic cable wear and strand breakage.

.3 Restraints shall be sized to the capacity of the cable or to the capacity of the anchorage, whichever is lesser.

.4 Seismic wire rope connections shall be made using overlap wire rope “U” clips or seismically rated tool-less wedge insert lock connectors.

.5 Vertical suspension rods shall be braced as required to avoid potential for buckling due to vertical “up” forces. Braces shall be structural steel angle uniquely selected to be of sufficient strength to prevent support rod bending. Brace shall be attached to the vertical suspension rod by a series of adjustable straps. Clips shall be capable of securely locking brace to suspension rod without the need for hand tools.

.6 Where clevis hanger brackets are used for seismic restraint attachment, they will be fitted with clevis internal braces to prevent buckling of the hanger brackets.

.7 Seismic cable shall be as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.03 through 1.07 inclusive, and sections 2.01, 2.02, and 2.03 (10).

.8 Seismic cable building and equipment attachment brackets shall be Model KSCA, KSCU, or KSCC as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (10).

.9 Seismic cable concrete anchor bolts shall be Model KCAB Wedge, Model KCCAB Cracked Concrete, or Model KUAB Undercut, as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (10).

.10 Seismic wire rope connectors shall be (Model KWRC - 'U’ clamp) / (Model KWGC - Tool-less wedge lock) as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (10).

.11 Seismic vertical suspension stiffener rod clips shall be Model KHRC as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (10).

.12 Clevis Internal Braces shall be Model KCHB as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed in sections 1.04 through 1.09 inclusive, and sections 2.01, 2.02, and 2.03 (10).

2.4 SEISMIC BRACING COMPONENTS

.1 Steel strut shall be 1-5/8 wide in varying heights and mig-welded combinations as required to meet load capacities and designs. A material heat code, part number, and manufacturer’s name shall be stamped on all strut and fittings to maintain traceability to material test reports.

.2 Material for epoxy painted strut: ASTM A1011, SS, Grade 33.

.3 Material for pre-galvanized strut: ASTM A653, SS, Grade 33.

.4 Material for hot-dip galvanized strut: ASTM A1011, SS, Grade 33 and hot-dip galvanized after fabrication in accordance with ASTM A123.

.5 Material for fittings and accessories: ASTM A907, Grade 33, Structural Quality or ASTM A1011, SS, Grade 33.

.6 Fittings and accessories: Products shall be of the same manufacturer as strut and designed for use with that product.

2.5 UNIFORM BUILDING CODE REQUIREMENTS

.1 Seismic Zone Factor to Table 16-I for area of jurisdiction.

.2 Soil Profile Type to Table 16-J for area of jurisdiction.

.3 Seismic Importance Factor to Table 16-K for area of jurisdiction.

.4 Component Amplification Factor to Table 16-O for area of jurisdiction.

.5 Component Response Mod. Factor to Table 16-O for area of jurisdiction.

.6 Seismic Coefficient to Table 16-Q for area of jurisdiction.

.7 The total height of the structure (h_r) and the height of the system to be restrained within the structure (h_x) shall be determined in co-ordination with architectural plans and the General Contractor.

.8 Forces shall be calculated for individual supports using the above information. Exceptions to Table 16-O may be utilized. However, all use of exceptions shall be noted on submitted seismic bracing plan documents.

Part 3 Execution

3.1 GENERAL INSTALLATION

.1 Installation of all seismic restraint materials specified in this section shall be accomplished as per the manufacturer's written instructions.

.2 Refer to FEMA Manuals 412, 413, and 414 for typical industry standard installation guidelines.

.3 Upon completion of installation of all seismic restraint materials and before start-up of restrained equipment, all debris shall be cleaned from beneath all protected equipment, leaving equipment free to contact snubbers/restraints.

.4 Torque anchor bolts according to anchor manufacturer's written instructions to resist seismic forces.

.5 All seismic restraint systems shall be installed in strict accordance with the manufacturer's seismic restraint guidelines manual and all certified submittal data.

.6 Prior to installation, bring to the architect's/engineer's attention any discrepancies between the specifications and the field conditions, or changes required due to specific equipment selection.

.7 Brace support rods when necessary to accept compressive loads. Welding of compressive braces to the vertical support rods is not acceptable.

.8 Seismic restraints shall be attached to the structural system. Looping restraints around the system is not acceptable.

.9 Do not brace a system to two independent structures such as ceiling and wall.

.10 Provide appropriately sized openings in walls, floors, and ceilings for anticipated seismic movement. Provide fire seal systems in fire-rated walls.

.11 Seismic restraint cables shall be adjusted such that they are not visibly slack, or the flexibility is approximately 25mm under thumb pressure for a 1500mm cable length (equivalent ratio for other cable lengths).

.12 All seismic restraint cables shall be at least 25mm clear of all other equipment and services.

3.2 EQUIPMENT INSTALLATION

.1 All external utility connections to restrained equipment shall be designed to allow differential seismic motion without damage to the equipment or utility connections.

.2 Adjust isolators and restraints after piping systems have been filled and equipment is at its operating weight, following the manufacturer's written instructions.

.3 After equipment installation is completed, adjust limit stops following manufacturer's written instructions so that they are out of contact during normal operation.

.4 Adjust snubbers according to manufacturer's written instructions.

.5 Installation of seismic restraints shall not cause any change in position of equipment, resulting in stresses or misalignment.

.6 No rigid connections between equipment and the building structure shall be made that degrade the noise and vibration isolation system specified.

.7 Do not install any seismic restraint for equipment, cable trays or conduit that compromises isolation specified.

3.3 PIPING INSTALLATION

.1 Hold down clamps must be used to attach pipe to all trapeze members before applying restraints.

.2 Branch lines may not be used to restrain main lines.

.3 Piping crossing building seismic or expansion joints, passing from building to building, or supported from different portions of the building shall be installed to allow differential support displacements without damaging the pipe, equipment connections, or support connections. Pipe offsets, loops, anchors, and guides shall be installed as required to provide specified motion capability and limit motion of adjacent piping.

.4 Attach piping to the trapeze per seismic restraint manufacturer's design. Install cables so they do not bend across sharp edges of adjacent equipment or building structures.

3.4 FASTENING TO STRUCTURE

.1 Bracing may occur from flanges of structural beams, upper truss cords of bar joists, cast in place inserts, or wedge-type concrete anchors. Consult structural engineer of record.

.2 Overstressing of the building structure shall not occur from overhead support of equipment. Bracing attached to structural members may present additional stresses. The contractor shall submit loads to the structural engineer of record for approval in this event.

.3 Coring is not permitted for the installation of concrete anchors. Use ground penetrating radar or equivalent method of embedment item detection to locate all embed items including reinforcing steel and electrical conduits. Concrete reinforcing steel and electrical conduits shall not be cut or damaged under any circumstances.

.4 Install vertical braces to stiffen hanger rods and prevent buckling per seismic restraint manufacturer's design. Clamp vertical brace to hanger rods. Requirements apply equally to hanging equipment. Do not weld vertical braces to hanger rods.

.5 If mounting hole diameter exceeds bolt diameter by more than 0.125" (3 mm), reduce clearance in hole with epoxy grout, flanged elastomeric bushings or welded washer.

.6 Housekeeping Pads must be adequately reinforced and adequately sized for proper installation of equipment anchors. Refer to seismic restraint manufacturer's written instructions.

3.5 INSPECTION

.1 The contractor shall notify the local representative of the seismic restraint materials manufacturer prior to installing any seismic restraint devices. The contractor shall seek the representative's guidance in any installation procedures with which he/she is unfamiliar.

.2 Upon completion of the installation of all seismic restraint devices herein specified, the local representative of the seismic restraint manufacturer shall, at the contractor's request, inspect the completed system and report in writing any installation errors, improperly selected snubber devices, or other fault in the system which could affect the performance of the system.

.3 The installing contractor shall submit a report upon request to the building architect and/or engineer, including the manufacturer's representative's final report, indicating that all seismic restraint material has been properly installed, or steps that are to be taken by the contractor to properly complete the seismic restraint work as per the specifications.

3.6 PIPING

.1 Seismically restrain all piping listed below. Use Type J Cable Restraints for all piping supported by vibration isolation hanger assemblies, including:

.1 Natural gas piping, medical gas piping, vacuum piping, petroleum based liquid piping, and compressed air piping equal to or greater than 1" (25 mm) in inside diameter.

.2 Brace remainder of piping to code requirements (IBC or TI-809-04) on in conformance with SMACNA (Sheet Metal and Air Conditioning Contractors National Association, Inc.) “Seismic Restraint Manual Guidelines for Mechanical Systems”, Second Edition (Remaining Codes).

3.7 DUCTWORK

.1 Seismically restrain all ductwork listed below. Use Type J Cable Restraints for all ductwork supported by vibration isolation hanger assemblies, including:

.1 All rectangular and oval ducts with cross sectional area equal to or greater than 6 sq. ft. (0.55 sq. meters).

.2 All round ducts with diameters equal to or greater than 32" (812 mm).

.3 Brace remaining ductwork to code requirements (IBC or TI-809-04) or in conformance with SMACNA (Sheet Metal and Air Conditioning Contractors National Association, Inc.) “Seismic Restraint Manual Guidelines for Mechanical Systems”, Second Edition (Remaining Codes).

3.8 CONDUIT

.1 Seismically restrain all electrical conduit listed below. Use Type J Cable Restraints for all conduit supported by vibration isolation hanger assemblies, including:

.1 All round ducts with diameters equal to or greater than 32" (812 mm).

.2 Brace all conduit to code requirements (IBC or TI-809-04) or in conformance with SMACNA (Sheet Metal and Air Conditioning Contractors National Association, Inc.) “Seismic Restraint Manual Guidelines for Mechanical Systems”, Second Edition (Remaining Codes).

3.9 FIRE PROTECTION PIPING

.1 Fire protection, sprinkler piping, and related equipment is considered as “Life Safety Equipment” and is to be seismically restrained per guidelines as published by NFPA (National Fire Protection Association).

3.10 ROOF MOUNTED EQUIPMENT

.1 Provide seismic restraint for all isolated and non-isolated roof curbs and associated equipment.

.2 Provide seismically restrained steel coil spring isolation systems where isolation curbs are indicated and non-isolated seismic restraints for all other roof curb systems.”

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ASHRAE Handbook (2013) – Noise and Vibration Control chapter.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Provide separate shop drawings for each isolated system complete with performance and product data.

.3 Provide detailed engineered shop drawings, outlining the manufacturer's recommended product for each piece of mechanical equipment. Submission shall be specific to the reviewed and returned shop drawings for equipment on the project.

1.3 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 GENERAL

.1 Size and shape of bases type and performance of vibration isolation to be as indicated.

.2 To be of the same manufacturer for all isolation.

.3 Acceptable materials:

.1 Kinetics Noise Control

.2 Korfund

.3 Mason Industries

2.2 BASE TYPES

.1 Provide Base Type as indicated in Table under section 2.4 of this specification.

.2 Type A: No base, isolators attached directly to equipment. Refer to section 2.3 of this specification for isolator details.

.3 Type B: Steel Equipment Base. Bases shall be of welded construction with cross members to form an integral support platform. Structural steel members shall be designed to match supported equipment.

.1 Vibration bases for fans shall have adjustable motor slide rails and shall accommodate motor overhang.

.2 Bases for exterior use shall be painted or hot-dipped galvanized for complete corrosion resistance.

.3 Minimum clearance under steel equipment bases shall be 25 mm (1").

.4 Used with spring or rubber isolators. Refer to section 2.3 of this specification for isolator details.

.4 Type D: Roof Curbs

.1 Curb-Mounted Spring Rail:

.1 Full-perimeter rail type isolator, spring components shall be **1"/25 mm deflection**, free-standing, un-housed, laterally stable steel springs. Springs shall have a lateral stiffness greater than 1.0 times the rated vertical stiffness and shall be designed for 50% overload to solid. Vibration restrained for seismic or high wind load applications.

2.3 ISOLATOR TYPES

.1 Type 3 (Free Standing Steel Springs)

.1 Type B:

.1 Free Spring Ceiling Mounted Isolation Hangers:

Vibration isolators for suspended equipment, with minimum static deflection requirement exceeding 0.4", shall be hangers consisting of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket.

.2 Type C:

.1 Free Spring Floor Mounted Isolators:

Vibration isolators shall be free standing, un-housed, laterally stable springs wound from high strength spring steel. Springs shall have a lateral stiffness greater than 0.8 times the rated vertical stiffness and shall be designed to provide up to 50% overload capacity. Springs shall be supported either with a neoprene cup or a metal base plate complete with a ribbed neoprene pad, minimum 6 mm (0.25") thick, bonded to the base plate. To be weatherproof.

2.4 ROOF CURB ACOUSTIC LINING

.1 Panels to be minimum 7 – ¼" thick and comprised of alternating fiberglass absorption media and acoustically dampened sheet rock. Integrate additional layers as required to meet required STC rating.

.2 Provide on all HVAC equipment over 4,000 cfm capacity.

.3 Required STC Rating: 60.

.4 Notes:

.1 For large equipment capable of generating substantial vibratory forces and structure borne noise, increase isolator deflection, if necessary, so isolator stiffness is less than one-tenth the stiffness of the supporting structure, as defined by the deflection due to load at the equipment support.

.2 Wind load conditions must be considered. Provide restrained spring isolators (type 4), supplemental bracing, snubbers, or limit stops.

.3 Fans and Air-Handling Equipment:

.1 For fans operating under 300 rpm, select isolator deflection so the isolator natural frequency is 40% or less than the fan speed.

.2 Flexible duct connectors must be installed at the intake and discharge of all fans and air-handling equipment to reduce vibration transmission

.3 Inertia bases (type C) are required for all class 2 and 3 fans and air-handling equipment.

.4 To avoid isolator resonance problems, select isolator deflection so that resonance frequency is 40% or less of the lowest normal operating speed of equipment. Equipment such as variable-frequency drives, and high-speed equipment, such as screw chillers and vane axial fans, contain very-high-frequency vibration. To reduce high-frequency vibration transmission, add a 25 mm thick pad (type 1) to the base plate of spring isolators (type 3).

.5 To limit undesirable movement, thrust restraints (type 5) are required for all ceiling-suspended and floor-mounted units operating at 1500 Pa or more total static pressure.

Part 3 Execution

3.1 INSTALLATION

.1 Install vibration isolation equipment in accordance with manufacturers instructions and adjust mountings to level equipment.

.2 Ensure piping, ducting and electrical connections to isolated equipment do not reduce system flexibility and that piping, conduit and ducting passage through walls and floors do not transmit vibrations.

.3 Unless indicated otherwise, support piping connected to isolated equipment with spring mounts or spring hangers with 25 mm (1") minimum static deflection as follows:

.1 Up to NPS 100 mm (4"): first 3 points of support. NPS 125 mm (5") to NPS 200 mm (8"): first 4 points of support. NPS 250 mm (10") and Over: first 6 points of support.

.4 Where isolation is bolted to floor use vibration isolation rubber washers.

.5 Block and shim level bases so that ductwork and piping connections can be made to a rigid system at the operating level, before isolator adjustment is made. Ensure that there is no physical contact between isolated equipment and building structure.

.6 Rooftop Units and Central Air Handling Units

.1 Packaged rooftop units shall be provided with standard curb mounted spring rails.

.7 Spring isolators shall not be used in series to ensure no harmonics issues. This contractor shall review internally isolated equipment against method of spring isolation and ensure no overlap.

3.2 SITE VISIT

.1 Manufacturer to visit site and provide written certification that installation is in accordance with manufacturer's instructions and submit report to Consultant.

.2 Provide Consultant with notice 24 h in advance of visit.

.3 Make adjustments and corrections in accordance with written report.

3.3 TESTING

.1 Experienced and competent sound and vibration testing professional engineer to take vibration measurement for HVAC systems after start up and TAB of systems to Testing Adjusting and Balancing Section.

.2 Vibration measurements shall be taken for equipment-listed below:

.3 Provide Consultant with notice 48 h in advance of commencement of tests.

.4 Establish adequacy of equipment isolation and acceptability of noise levels in occupied areas and where appropriate, remedial recommendations including sound curves.

.5 Submit complete report of test results including sound curves.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.

.2 CAN/CGSB-24.3, Identification of Piping Systems.

.3 Canadian Standards Association (CSA).

.1 Natural Gas and Propane Installation Code CSA B149.1.

.4 National Fire Protection Association

.1 NFPA 13, Installation of Sprinkler Systems.

.2 NFPA 14, Standpipe and Systems.

1.2 PRODUCT DATA

.1 Submit product data in accordance with General Requirements.

.2 Product data to include paint colour chips, all other products specified in this section.

1.3 PRODUCT LITERATURE

.1 Submit product literature in accordance with General Requirements.

.2 Product literature to include nameplates, labels, tags, lists of proposed legends.

Part 2 Products

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

.1 Metal or plastic lamicoid nameplate mechanically fastened to each piece of equipment by manufacturer.

.2 Lettering and numbers to be raised or recessed.

.3 Information to include, as appropriate:

.1 Equipment: Manufacturer's name, model, size, serial number, capacity.

.2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

.1 Colours:

.1 Hazardous: red letters, white background.

.2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).

.2 Construction:

.1 3 mm (1/8") thick laminated plastic, matte finish, with square corners, letters accurately aligned, and machine engraved into core.

.3 Sizes:

.1 Conform to following table:

Size	No. of Sizes mm (")	Height of Line mm (")	Letters mm (")
1	10 x 50 (3/8" x 2")	1 (3/64")	3 (1/8")
2	15 x 75 (1/2" x 3")	1 (3/64")	6 (1/4")
3	15 x 75 (1/2" x 3")	2 (5/64")	3 (1/8")
4	20 x 100 (3/4" x 4")	1 (3/64")	10 (3/8")
5	20 x 100 (3/4" x 4")	2 (6/64")	6 (1/4")
6	20 x 200 (3/4" x 8")	1 (3/64")	10 (3/8")
7	25 x 125 (1" x 5")	1 (3/64")	15 (1/2")
8	25 x 125 (1" x 5")	2 (5/64")	10 (3/8")
9	32 x 200 (1¼" x 8")	1 (3/64")	20 (3/4")

.2 Use maximum of 25 letters/numbers per line.

.4 Locations:

.1 Terminal cabinets, control panels: Use size #5.

.2 Equipment in Mechanical Rooms: Use size #9.

.3 Roof top equipment: use size #9.

.4 Equipment above ceiling: use size #1 riveted to ceiling suspension system.

2.3 FIRE DAMPER/FIRE STOP FLAP NAMEPLATES/FIRE SMOKE DAMPER

.1 Colours:

.1 Black letters, yellow background.

.2 Construction:

.1 Self adhesive 50 mm x 25 mm, matte finish, with round corners.

.3 Locations:

.1 Install on adjacent ceiling grid. Where fire stop flap is installed in gypsum ceiling install on diffuser/grille frame. Where fire damper is installed above gypsum ceiling install on adjacent wall.

2.4 EXISTING IDENTIFICATION SYSTEMS

.1 Apply existing identification system to new work.

.2 Where existing identification system does not cover for new work, use identification system specified this section.

.3 Before starting work, obtain written approval of identification system from Consultant.

.4 Upon completion of this project all references to room names and numbering shall be to the Owner's requirements which may or may 'NOT' be the numbering system used on the drawings. Each contractor shall verify the proper numbering scheme to be used prior to project completion.

.5 All equipment shall be identified in sequence from the existing equipment and "NOT" duplicate numbering of equipment.

2.5 PIPING SYSTEMS GOVERNED BY CODE

.1 Identification:

.1 Natural and propane gas: To CSA B149.1-00 and authority having jurisdiction and as indicated elsewhere.

.2 Sprinklers: To NFPA 13.

.3 Standpipe and hose systems: To NFPA 14.

2.6 IDENTIFICATION OF PIPING SYSTEMS

.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

.2 Legend:

.1 Block capitals to sizes and colours listed in CAN/CGSB-24.3.

.3 Arrows showing direction of flow:

.1 Outside diameter of pipe or insulation less than 75 mm (3"): 100 mm (4") long x 50 mm (2") high.

.2 Outside diameter of pipe or insulation 75 mm (3") and greater: 150 mm (6") long x 50 mm (2") high.

.3 Use double-headed arrows where flow is reversible.

.4 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

.2 Length to accommodate pictogram, full length of legend and arrows.

.5 Materials for background colour marking, legend, arrows:

.1 Pipes and tubing 20 mm (3/4") and smaller: Waterproof and heat-resistant pressure sensitive plastic marker tags.

.2 All other pipes: Pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150°C (300°F) and intermittent temperature of 200°C (395°F).

.6 Colours and Legends:

.1 Where not listed, obtain direction from Consultant.

.2 Colours for legends, arrows: To following table:

Background colour:	Legend:	Arrows:
Yellow	White	Black
Green	White	Black
Red	White	Black

.7 Pictograms:

.1 Where required, to Workplace Hazardous Materials Information System (WHMIS) regulations.

.8 Background colour marking and legends for piping systems:

CONTENTS	BACKGROUND COLOUR MARKING	LEGEND
Natural gas	Yellow	NATURAL GAS
Gas regulator vents		to Codes
Conduit for low voltage Control wiring	White	CONTROL WIRING___VOLTS

2.7 IDENTIFICATION DUCTWORK SYSTEMS

.1 50 mm (2") high stencilled letters and directional arrows 150 mm (6") long x 50 mm (2") high.

.2 Colours: Black, or co-ordinated with base colour to ensure strong contrast.

2.8 VALVES, CONTROLLERS

.1 Brass tags with 15 mm (1/2") stamped identification data filled with black paint.

.2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

.3 Provide adhesive coloured tab (max. size 15 mm) indication on ceiling to locate valves/equipment above. Same applies to grid. Colour to be approved by consultant.

2.9 CONTROLS COMPONENTS IDENTIFICATION

.1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.

.2 Inscriptions to include function and (where appropriate) fail-safe position.

.3 Provide equipment identification and/or indication on ceiling to locate devices/equipment above ceiling. Install identification on grid. Colours to be approved by consultant.

2.10 LANGUAGE

.1 Identification to be in English.

Part 3 Execution

3.1 TIMING

.1 Provide identification only after all painting specified has been completed.

3.2 INSTALLATION

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

.2 Provide ULC and/or CSA registration plates as required by respective agency.

3.3 NAMEPLATES

.1 Locations:

.1 In conspicuous location to facilitate easy reading and identification from operating floor.

.2 Standoffs:

.1 Provide for nameplates on hot and/or insulated surfaces.

.3 Protection

.1 Do not paint, insulate or cover in any way.

3.4 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

.1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels not more than 1.7 m (5'-8") intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.

.2 Adjacent to each change in direction.

.3 At least once in each small room through which piping or ductwork passes.

.4 On both sides of visual obstruction or where run is difficult to follow.

.5 On both sides of separations such as walls, floors, partitions.

.6 Where system is installed in pipe chases, ceiling spaces, galleries, other confined spaces, at entry and exit points, and at each access opening.

.7 At beginning and end points of each run and at each piece of equipment in run.

.8 At point immediately upstream of major manually operated or automatically controlled valves, dampers, etc. Where this is not possible, place identification as close as possible, preferably on upstream side.

.9 Identification to be easily and accurately readable from usual operating areas and from access points.

.1 Position of identification to be approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 VALVES, CONTROLLERS

.1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.

.2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Consultant. Provide one copy (reduced in size if required) in each operating and maintenance manual.

.3 Number valves in each system consecutively. Where existing numbering system is installed start new numbering system at 100.

END OF SECTION

Part 1 General

1.1 CONTRACT REQUIREMENTS

.1 TAB contractor will work for the owner from the cash allowance in the Mechanical Allowances section.

.2 This contractor must co-ordinate their work with that of the TAB contractor.

.3 Prequalified TAB contractors are to submit quotes to the engineers on or before the tender closing time specified in Division 1.

.4 Should the Engineer's Office not receive the quotes it will be the successful mechanical contractor's responsibility to obtain the quotations.

.5 If required, the successful mechanical contractor shall:

.1 Provide copies of specified drawings and addendums to the NEBB certified Testing and Balancing contractors listed below.

.2 Obtain quotations for Testing and Balancing services.

.3 Submit quotations to the engineer's office for review.

.6 The Engineer's Office will issue required instruction for the initiation of Testing and Balancing agency's work.

1.2 GENERAL

.1 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do all other work as specified in this section including all air handling systems and equipment, all plumbing systems and equipment and all temperature controls system, building automation systems and equipment.

.2 This contractor must co-ordinate their work with that of the TAB contractor.

1.3 QUALIFICATIONS OF TAB AGENCIES

.1 Names of all personnel it is proposed to perform TAB to be submitted to and approved by Consultant within 30 days of start of work.

.2 Provide documentation confirming qualifications, successful experience.

.3 Only the following NEBB (National Environmental Balancing Bureau) TAB contractors may quote:

.1 Air Audit Inc.
110 Turnbull Court, Unit 11
Cambridge, ON N1T 1K6
(519) 740-0871

.2 Air Velocities Control Ltd.
206 Lawlor Avenue
Toronto, ON M4E 3M1
(905) 279-4433

.3 Flowset Balancing Ltd.
431 Willis Drive .
Oakville, ON L6L 4V6
(416) 410-9793

.4 Clark Balancing Ltd.
8094 Esquesing Line
Milton, ON L9T 2X9
(905) 693-1518

.5 Dynamic Flow Balancing Ltd.
1200 Speers Road, Unit 36
Oakville, ON L6L 2X4
(905) 338-0808

.6 Airwaso Canada Inc. (WRDSB)
3365 Paulpeel Avenue
London, ON N6L 0A4
(519) 652-4040

1.4 PURPOSE OF TAB

.1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average (95% design) and low (75% of design) loads using actual or simulated loads. TAB contractor to perform equipment evaluation upon start up and once during each season in the first year of operation.

.2 Adjust and regulate equipment and systems so as to meet specified performance requirements and to achieve specified interaction with all other related systems under all normal and emergency loads and operating conditions. Confirm all equipment interlocks and functions of associated systems.

.3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges and temperatures. Refer to BAS for system operating functions.

1.5 EXCEPTIONS

.1 TAB of systems and equipment regulated by codes, standards to be to satisfaction of authority having jurisdiction.

1.6 CO-ORDINATION

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule so as to ensure completion before acceptance of project.

.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems. Co-ordinate with other trades to ensure all systems are interlocked as indicated elsewhere prior to TAB.

1.7 PRE-TAB REVIEW

.1 Review contract documents before project construction is started and confirm in writing to Consultant adequacy of provisions for TAB and all other aspects of design and installation pertinent to success of TAB.

.2 Review specified standards and report to Consultant in writing all proposed procedures which vary from standard.

.3 During construction, co-ordinate location and installation of all TAB devices, equipment, accessories, measurement ports and fittings.

.4 During construction indicate all tolerances of piping, ductwork etc conforms to specifications.

1.8 START-UP

.1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.

.2 Follow special start-up procedures specified elsewhere in the Mechanical Division.

1.9 OPERATION OF SYSTEMS DURING TAB

.1 Operate systems for length of time required for TAB and as required by Consultant for verification of TAB reports.

1.10 START OF TAB

.1 Notify Consultant in writing 3 days prior to start of TAB.

.2 Start TAB only when building is essentially completed, including:

.1 Installation of ceilings, doors, windows, other construction affecting TAB.

.2 Application of weather-stripping, sealing, caulking.

.3 All pressure, leakage, other tests specified elsewhere in the Mechanical Division.

.4 All provisions for TAB installed and operational.

.5 Start-up, verification for proper, normal and safe operation of all mechanical and associated electrical and control systems affecting TAB including but not limited to:

.1 Proper thermal overload protection in place for electrical equipment.

.2 Air systems:

.1 Filters in place, clean.

.2 Duct systems clean.

.3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.

.4 Correct fan rotation.

.5 Fire, smoke, volume control dampers installed and open.

.6 Coil fins combed, clean.

.7 Access doors, installed, closed.

.8 All outlets installed, volume control dampers open.

1.11 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:

.1 HVAC systems: plus 10%, minus 5%.

1.12 ACCURACY TOLERANCES

.1 Measured values to be accurate to within plus or minus 2% of actual values.

1.13 INSTRUMENTS

.1 Prior to TAB, submit to Consultant list of instruments to be used together with serial numbers.

.2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

.3 Calibrate within 3 months of TAB. Provide certificate of calibration to Consultant.

1.14 SUBMITTALS

.1 Submit, prior to commencement of TAB:

.1 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.15 PRELIMINARY TAB REPORT

.1 Submit for checking and approval of Consultant, prior to submission of formal TAB report, sample of rough TAB sheets. Include:

.1 Details of instruments used.

.2 Details of TAB procedures employed.

.3 Calculations procedures.

.4 Summaries.

1.16 TAB REPORT

.1 Format to be in accordance with NEBB, AABC, or SMACNA.

.2 The following additional information shall be provided for all air systems:

.1 Minimum damper position (MAD/Economizer) and the corresponding BAS signal and the voltage to the actuator to meet the full ASHRAE occupied ventilation requirements.

.2 Minimum damper position (MAD/Economizer) and the corresponding BAS signal and the voltage to the actuator to meet the full ASHRAE unoccupied ventilation requirements.

.3 Static pressure reading for each HVAC/AHU unit with VAV/VVT boxes open to 80% of design airflow and bypass damper closed to 0%. Provide reading at normal MAD/economizer damper position, dampers fully closed and dampers fully open.

.3 TAB report to show all results in SI or imperial units as indicated on plans and to include:

.1 Project as-built drawings.

.2 System schematics.

1.17 VERIFICATION

.1 All reported results subject to verification by Consultant.

.2 Provide manpower and instrumentation to verify up to 30% of all reported results.

.3 Number and location of verified results to be at discretion of Consultant.

.4 Bear costs to repeat TAB as required to satisfaction of Consultant.

1.18 SETTINGS

.1 After TAB is completed to satisfaction of Consultant, replace drive guards, close all access doors, lock all devices in set positions, ensure sensors are at required settings. Replace all ceiling tile etc.

.2 Permanently mark all settings to allow restoration at any time during life of facility. Markings not to be eradicated or covered in any way.

1.19 COMPLETION OF TAB

.1 TAB to be considered complete only when final TAB Report received and approved by Consultant.

1.20 AIR SYSTEMS

.1 Standard: TAB to be to most stringent of TAB standards of NEBB, AABC, SMACNA, ASHRAE.

.2 Do TAB of all systems, equipment, components, controls specified in the Mechanical Division including but not limited to following:

.1 Air handling systems and equipment

.2 Duct testing to SMACNA standards.

.3 Qualifications: personnel performing TAB to be current member in good standing of NEBB.

.4 Quality assurance: Perform TAB under direction of qualified supervisor.

.5 Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.

.6 Locations of equipment measurements: To include, but not be limited to, following as appropriate:

.1 Inlet and outlet of each damper, filter, coil, humidifier, fan, and other equipment causing changes in conditions.

.2 At each controller, controlled device.

.7 Locations of systems measurements to include, but not be limited to, following as appropriate: Each main duct, main branch, sub-branch, grille, register or diffuser.

1.21 DUCT LEAKAGE TESTING

.1 Co-ordinate leakage testing with the sheet metal contractor. TAB contractor will be responsible for all duct testing.

.2 Duct to be tested in accordance with SMACNA HVAC Duct Leakage Test Manual and as indicated.

1.22 DOMESTIC HWC SYSTEMS

.1 Meet all requirements as specified for hydronic systems.

.2 Locations of equipment measurements: To include, but not be limited to, following as appropriate: Inlet and outlet of each heater, tank, pump, circulator, at each controller, controlled device.

.3 Locations of systems measurements to include, but not be limited to, following as appropriate: main, main branch, branch, sub-branch.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 The Mechanical Contractor shall provide the labour and material to conduct the closeout process as outlined in this specification section.

.2 The mechanical contractor shall perform the closeout requirements specified in conjunction with the independent commissioning consultant (CC) retained by the owner.

Part 2 Products

2.1 GENERAL

.1 The mechanical contractor and manufacturers shall provide all instrumentation and equipment necessary to conduct the tests specified. The Mechanical Contractor shall advise the Mechanical Consultant of instrumentation to be used and the dates the instruments were calibrated.

Part 3 Execution

3.1 THE CONTRACT CLOSE OUT PROCESS

.1 The mechanical contractor close out process shall consist of:

- Shop Drawings and As-built Drawings
- Installation inspection and equipment verification
- Plumbing and drainage system testing
- Testing of piping systems
- Testing of air systems
- Independent contractor balancing of air systems
- Testing of equipment and systems
- BAS Commissioning
- Verification of refrigeration leak detection systems
- Commissioning meetings
- Operating and maintenance manuals
- Training
- Systems Demonstration and turnover
- Testing forms
- Warranties
- Contractor to provide list of equipment maintenance including schedule of maintenance parts, quantities, and model fixtures, etc.

3.2 SHOP DRAWINGS AND AS-BUILT DRAWINGS

.1 Conform to General Requirements Section for shop drawings and as-built drawings requirements.

3.3 INSTALLATION INSPECTION AND EQUIPMENT VERIFICATION

.1 The Mechanical Contractor shall co-ordinate with the Consultant who will inspect the mechanical installation.

.2 The Mechanical Contractor shall complete the equipment verification forms for each piece of equipment. The forms shall be included in the operating and maintenance manual. The equipment data shall include:

- Manufacturers name, address and telephone number
- Distributors name, address and telephone number
- Make, model number and serial number
- Pumps - RPM, impeller sizes, rated flow
- Fans - belt type and size, shive type and size
- Electrical - volts, amps, fuse size, overload size
- Any other special characteristics.

3.4 THE CONTRACTOR'S TESTING OF PIPING SYSTEMS

.1 Test all piping systems in accordance with all applicable plumbing codes and General Requirements section.

.2 All tests for the systems shall be performed in the presence of the Consultant or Commissioning Consultant. Complete the testing forms and forward to the Consultant.

3.5 THE CONTRACTORS TESTING OF AIR SYSTEMS

.1 Conform with the specification section, Testing, Adjusting and Balancing.

.2 All tests shall be performed in the presence of the Mechanical Consultant or the Commissioning Consultant. Complete the testing forms and forward to the Consultant.

3.6 THE INDEPENDENT CONTRACTORS TESTING AND BALANCING OF AIR SYSTEMS

.1 Conform with specification section, Testing, Adjusting and Balancing.

.2 The Independent Contractor shall be hired by The Mechanical Contractor and shall report to the Commissioning Consultant.

3.7 TESTING OF EQUIPMENT AND SYSTEMS

.1 General:

.1 The Mechanical Contractor shall hire the services of the manufacturers technicians to test the equipment and associated systems. The technician shall record the results of the tests on the testing forms. The tests shall be witnessed by the Consultant or Owners representative. When the tests have been completed satisfactorily the technician and witnessing authority shall sign the forms. A copy of the forms shall be forwarded to the Consultant. The original shall be inserted into the operating and maintenance manual.

.2 Should equipment or systems fail a test, the test shall be repeated after repairs or adjustments have been made. The additional tests shall be witnessed.

.3 Tests which have not been witnessed shall not be accepted and shall be repeated.

.4 The equipment and systems to be tested shall include:
- Air Handling Units
- Building Automation Systems (BAS)

.2 BAS Testing:

.1 The BAS Contractor shall test the system as described in General Requirements and/or Controls Sections.

.2 Co-ordinate with the Consultant and submit completed test forms monthly.

.3 Demonstrate to the Owner and Consultant the operation of the BAS when all tests have been completed.

.3 Verification of Refrigeration Leak Detection System Operation:

.1 The commissioning process shall include the verification of the refrigeration leak detection system.

.2 All interlocks between leak detection systems installed and system components, as well as interlocks between field installed detection systems and associated safety system components shall be tested and verified to operate as per the requirements of CSA B52. Specifically, the following shall occur for each independent system on registration of a refrigerant leak:

.1 Open all zone dampers in the affected system.

.2 Disable all electric reheat coils within the affected system.

.3 Activate field installed safety shut off valves within the affected refrigeration system.

.4 Energize all fans within the affected ductwork system.

.5 Activate all refrigerant leak system specific ventilation systems.

.6 De-energize any other potential sources of ignition within the affected system.

3.8 CLOSEOUT SCHEDULE

.1 The Mechanical Contractor shall include the schedule for all tests and equipment start-up tests in the construction schedule.

.2 All testing forms and reports associated with the mechanical systems shall be directed to the Consultant with copies to the Owner and Consultant.

.3 The forms and reports to be issued shall include:

- Shop drawings, issued and accepted
- Equipment verification forms
- Testing forms
- Reports resulting from tests
- Testing schedule
- Equipment Start-up Forms

3.9 OPERATION AND MAINTENANCE MANUAL

.1 Conform to General Requirements section for the Operating and Maintenance Manual requirements.

3.10 OPERATOR TRAINING

.1 Conform to General Requirements section for requirements for Instruction to Operating Staff.

.2 The training shall be conducted in a classroom and at the equipment or system.

.3 Training will begin when the operating and maintenance manuals have been delivered to The Owner and approved by the Consultant.

.4 Each training session shall be structured to cover:

The operating and maintenance manual
- Operating procedures
- Maintenance procedures
- Trouble-shooting procedures
- Spare parts required
- Submit a course outline to the Mechanical Consultant before training commences. Provide course documentation for up to eight people.

.5 The training sessions shall be scheduled and co-ordinated by the Mechanical Contractor.

.6 Training shall be provided for the following systems:

System	Minimum Training Times
Air Handling Units	2 hours

.7 The minimum training for the BAS shall be 16 hours. The training shall include:

- A walk through of the installation for the Building Owner to review the installation and equipment
- Operation of the central computer
- Operation of portable terminals

- Control sequences
- Report set-up and generation
- Managing the system
- Maintenance requirements

Refer to Controls specification section for further information.

.8 The training requirement for the mechanical system shall include a walk-through of the building by the Mechanical Contractor. During the walk through the Mechanical Contractor shall:

- Identify equipment
- Identify starters associated with equipment
- Identify valves and balancing dampers
- Identify access doors
- Review general maintenance of equipment
- Review drain points in pipework systems
- Identify maintenance items

.9 When each training session has been completed The Owner shall sign the associated form to verify completion.

3.11 MECHANICAL SYSTEM DEMONSTRATION AND TURNOVER

.1 Refer to General Requirements section, Mechanical Project Completion.

.2 The system demonstration and turnover to The Owner shall occur when:

- The installation is complete
- The acceptance test conducted by the Mechanical Consultant has been completed successfully
- The Commissioning Consultant system performance testing has been completed successfully
- Training has been completed
- Operating and Maintenance Manuals have been accepted
- Shop-drawings have been updated
- As-built drawings have been completed

.3 The systems demonstration shall be conducted by the Mechanical Contractor and the manufacturers. The demonstration shall cover a demonstration of equipment installation and operation.

3.12 TESTING FORMS

.1 The Mechanical Contractor and manufacturers shall provide forms for testing. The forms must be approved by the Consultant and The Owner before they are used.

3.13 WARRANTIES

.1 Equipment and system warranties shall not begin until the system demonstration and turnover has been conducted successfully and accepted by The Owner.

.2 The Mechanical Contractor shall fill out the warranty form listing the equipment and systems and the start and finishing dates for warranty.

.3 Refer to the general conditions specification section for the requirements during the warranty period.

3.14 CLOSEOUT PROCESS ALLOCATION

.1 The mechanical contractor closeout process shall be as follows:

.1 3% for the first $500,000 of contract value.

.2 1% of the contract value for value between $500,000 to $5,000,000.

.3 0.5% of contract value for the value in excess of $5,000,000.

.4 Minimum Allocation for Close Out Documents is $5,000.

.2 The Mechanical Contractor shall submit all test and verification forms. The Consultant will use these forms to calculate percentage complete.

.3 The monies shall not be paid out until the performance testing, O & M manuals, systems demonstration, and training including all required paperwork have been completed to the satisfaction of the consultant. Refer to General Requirements section for contract breakdown.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 51-GP-52Ma-[89], Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.3 Underwriters Laboratories of Canada (ULC).

.1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.

.4 American Society for Testing and Materials (ASTM).

.1 ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Proprieties by Mean of the Guarded Hot-Plate Apparatus.

.2 ASTM C518 Standard Test Method for Steady-State Thermal Transmission Proprieties by Means of the Heat Flow Meter Apparatus.

.3 ASTM C 449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.4 ASTM C1729 Standard Specification for Aluminum Jacketing for Insulation.

.5 ASTM C1290 Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.

.6 ASTM C1393 Standard Specification for Perpendicularly Oriented Mineral Fiber Roll and Sheet Thermal Insulation for Pipes And Tanks.

.7 ASTM C553, Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.8 ASTM C612, Mineral Fiber Block and Board Thermal Insulation.

.9 ASTM C 411, Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.10 ASTM C 795, Specification for Thermal Insulation for Use with Austenitic Stainless Steel.

.11 ASTM C 921, Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.5 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

.1 ASHRAE Standard 90.1.

.6 Manufacturer's Trade Associations.

.1 Thermal Insulation Association of Canada (TIAC)

.2 North American Commercial and Industrial Insulation Standards.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for duct jointing recommendations.

.3 Submit completed detail plates from the North American Commercial and Industrial Insulation Standards manual, applicable to installation types required by this specification section.

1.3 INSTALLATION INSTRUCTIONS

.1 Submit manufacturer's installation instructions in accordance with general requirements.

.2 Installation instructions to include procedures to be used, installation standards to be achieved.

1.4 QUALIFICATIONS

.1 Installer to have successfully completed apprenticeship program.

.2 Installer to be specialist in performing work of this section and have at least 3 years successful experience in this size and type of project, qualified to standards of TIAC.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.

.2 Protect from weather and construction traffic.

.3 Protect against damage from any source.

.4 Store at temperatures and conditions required by manufacturer.

1.6 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - will mean "not concealed" as defined herein.

.3 "ASJ+" – All Service Jacket – vapor retarder laminate of aluminium foil inner layer, reinforced with fiberglass scrim, bonded to a bleached kraft paper, with outer poly film leaving no paper exposed.

.4 "ASJ" – All Service Jacket (no outer film) – vapor retarder laminate of aluminium foil inner layer, reinforced with fiberglass scrim, bonded to a bleached kraft paper outer layer.

.5 “FSK” – Foil Scrim Kraft – vapor retarder laminate of aluminium foil outer layer, reinforced with fiberglass scrim, bonded to a natural kraft paper inner layer.

.2 Insulation systems - insulation material, fasteners, jackets, and other accessories.

1.7 QUALITY ASSURANCE

.1 Products shall not contain formaldehyde, asbestos, lead, mercury or mercury compounds or PBDE fire retardants.

.2 **Products shall be Certified UL GREENGUARD Gold or Indoor Advantage Gold and formaldehyde free.**

.3 **Recycled content: Mineral fiber products will contain a minimum of 50% recycled glass content certified and UL validated and are to be constructed using bio-based thermosetting binder.**

Part 2 Products

2.1 LIMITATION ON MATERIALS

.1 Products shall not contain formaldehyde, asbestos, lead, mercury or mercury compounds or PBDE fire retardants.

.2 Materials shall be: "**Certified Asthma and allergy friendly" and "verified Healthy Air."**

2.2 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.3 INSULATION

.1 Mineral fibre as specified herein includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C (75°F) mean temperature when tested in accordance with ASTM C177 or ASTM C518.

.3 Type C-1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket meeting the requirement of ASTM C1136 Type II and IV (FSK):

.1 Jacket: to ASTM C1136 Type II and IV (FSK)

.2 Maximum "k" value: .033 W/M•°C (.23 BTU•IN/HR•FT^2•°F)

.4 Manufacturers:

.1 All materials must be supplied by the same manufacturer.

.2 Acceptable Manufacturers:

.1 Johns Manville **(with proof of Asthma and allergy friendly certification)**

.2 Knauf

.3 Manson

2.4 JACKETS

.1 Canvas:

.1 220 g/m² (6 oz/sq.yd.) cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.

.2 Lagging adhesive: Compatible with insulation.

2.5 ACCESSORIES

.1 Vapour retarder lap adhesive:

.1 Water based, fire retardant type, compatible with insulation.

.2 Indoor Vapour Retarder Finish:

.1 Compatible with insulation.

.3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C 449.

.4 ULC Listed Canvas Jacket:

.1 220 g/m² (6oz/yd^2) cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.

.5 Tape: self-adhesive, aluminum, reinforced, 75 mm (3") wide minimum.

.6 Contact adhesive: quick-setting Childers CP-82 or equal.

.7 Canvas adhesive: washable.

.8 Tie wire: 1.5 mm (16 gauge) stainless steel.

.9 Facing: 25 mm (1") stainless steel hexagonal wire mesh stitched on one face of insulation

.10 Fasteners: weld pins, length to suit insulation, with 40 mm (1½") diameter clips.

.11 **Banding: 15 mm (1/2") wide, 0.5 mm (26 gauge) thick stainless steel.**

Part 3 Execution

3.1 PRE-INSTALLATION REQUIREMENTS

.1 Pressure testing of ductwork systems to be complete, witnessed, and certified.

.2 Surfaces to be clean, dry, free from foreign material.

3.2 INSTALLATION

.1 Install in accordance with North American Commercial and Industrial Insulation Standards.

.2 Apply materials in accordance with manufacturers instructions and this specification.

.3 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Hangers, supports to be outside vapour retarder jacket.

.4 Supports, Hangers in accordance with general requirements.

.1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.

.5 Fasteners: At 300 mm (12") oc. in horizontal and vertical directions, minimum two rows each side.

.6 Provide rigid insulation for exposed ductwork.

.7 **Use two layers with staggered joints when required nominal thickness exceeds 75 mm (3").**

3.3 DUCTWORK INSULATION SCHEDULE

.1 Insulation types and thicknesses conform to following table:

Application	Type	Thickness
Rectangular supply air ducts	C-1	25 mm (1")
Supply, return, and fan exhaust ducts exposed (visible) in space being served	None	
Last 1.5m of exhaust duct	C-1	25 mm (1")

.2 Exposed round ducts 600 mm (24") and larger, smaller sizes where subject to abuse:

.1 Use TIAC code C-1 insulation, scored to suit diameter of duct.

.2 C-6 insulation is also acceptable. Same thickness, schedule, and facing to be used as C-1 material.

.3 Finishes: Conform to following table:

Application	Rectangular	Round
Indoor, concealed	None	None
Indoor, exposed	Canvas	Canvas

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ANSI/ASME B16.5, Pipe Flanges and Flanged Fittings: NPS ½ through NPS 24 Metric/Inch.

.3 ANSI B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.

.4 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.

.5 ANSI B18.2.1, Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series).

.6 ASTM A47/A47M, Specification for Ferritic Malleable Iron Castings.

.7 ASTM A53/A53M, and A106, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded ERW and Seamless.

.8 ASTM B32, Specification for Solder Metal.

.9 ASTM B75M, Specification for Seamless Copper Tube [Metric].

.10 CSA B149.1, Natural Gas and Propane Installation Code.

.11 CSA W47.1, Certification of Companies for Fusion Welding of Steel.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings product data in accordance with general requirements.

.2 Indicate on manufacturers catalogue literature.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 PIPE

.1 Steel pipe: to ASTM A106, Schedule 40, seamless as follows:

.1 NPS 15 mm to 50 mm (1/2" to 2"), screwed.

.2 NPS 65 mm (2 1/2") and over, plain end.

.2 Copper tube: to ASTM B75M.

2.2 JOINTING MATERIAL

.1 Screwed fittings: pulverized lead paste.

.2 Welded fittings: to CSA W47.1.

.3 Flange gaskets: nonmetallic flat.

.4 Soldered: to ASTM B32, tin antimony 95/5.

.5 Screwed brass fittings: Teflon Tape.

2.3 FITTINGS

.1 Steel pipe fittings, screwed, flanged or welded:

.1 Malleable iron: screwed, banded, Class 150.

.2 Steel pipe flanges and flanged fittings: to ANSI/ASME B16.5.

.3 Welding: butt-welding fittings.

.4 Unions: malleable iron, brass to iron, ground seat, to ASTM A47/A47M.

.5 Bolts and nuts: to ANSI B18.2.1.

.6 Nipples: schedule 40, to ASTM A53/A53M/A106.

.2 Copper pipe fittings, screwed, flanged or soldered:

.1 Cast copper fittings: to ANSI B16.18.

.3 Brass fittings: To ASTM B16.

2.4 BALL VALVES

.1 NPS 50 mm (2") and under:

.1 Body and cap: cast high tensile bronze to ASTM B62.

.2 Pressure rating: Class 125, 860 kPa (125 psi) steam, WP = 1.4 MPa (203 psi) WOG.

.3 Connections: Screwed ends to ANSI B1.20.1 and with hex. shoulders.

.4 Stem: tamperproof ball drive.

.5 Stem packing nut: external to body.

.6 Ball and seat: replaceable stainless steel solid ball and teflon seats.

.7 Stem seal: TFE with external packing nut.

.8 Operator: removable lever handle.

2.5 LUBRICATED PLUG VALVES

.1 All sizes

.1 Provincial Code approved, lubricated plug type.

.2 Body: cast iron to ASTM A 126 Class B semi-steel.

.1 Rating: Class 125 psig.

.3 Plug: tapered, with regular pattern port – 90 from full open to fully closed.

.4 Ends: 50 mm (2") and smaller with hexagon shoulders, ends screwed to ANSI B1.20.1. Flanged to ANSI B16.1.

.5 Lubrication system, nickel-plated.

.6 Lubricant: to suit type, temperature and pressure of contained fluid.

.7 Feeding system: lubricant forced into lubrication grooves between seating surfaces of plug and body to form positive seal, leakproof operation, and corrosion preventing film.

.8 Lubricant screw for lubrication.

.9 O-rings between body and plug.

.10 Operator: removable manual lever handle.

.11 Acceptable Manufacturers:

.1 Newman Hattersley

.2 Crane

.3 Jenkins

.4 Milwaukee

.5 Toya

2.6 GAS REGULATOR

.1 Reduce pressure from 34.5 kPa (5 psi) to 1.74 kPa (7" WC) capacity as indicated. Contractor to confirm supply pressure from meter.

.1 Acceptable Manufacturers:

.1 Singer

.2 Schlumberger

.2 Vent interior relief valve to outdoors with gooseneck and stainless steel insect screen. Vent piping shall be sized as per manufacturers' requirements and recommendations.

.3 Isolate with lubricated plug valve and union connection.

2.7 TREATED WOOD ROOF SUPPORTS

.1 Wolmanized wood with blocking and styrofoam SM insulation, constructed as detailed on drawings.

2.8 MANUFACTURED ROOF SUPPORTS

.1 Single piece injection moulded polypropylene support.

.2 Type 3-20 psi extruded polystyrene UV protected base glued to the support.

.3 Minimum base dimension of 300 x 225 (12" x 9") and be 140 mm (5.5") high.

.4 Pull test of 1.4 KN (315 lbs) using two #14-10 screws on pipe strap.

.5 Acceptable Manufacturers:

.1 Quick Block

.2 Erico

2.9 ALUMINUM ROOF SUPPORTS

.1 450 mm high aluminum pipe support.

.2 Adjustable leg assembly, base plate, roller assembly.

.3 Acceptable Manufacturers:

.1 Thaler Mers-600A Series.

2.10 PIPING THROUGH ROOF

.1 Provide Thaler MEF-9 or equal gas piping flashing where pipe and/or relief vent penetrates roof.

Part 3 Execution

3.1 PIPING

.1 Install in accordance with applicable Provincial/Territorial Codes.

.2 Install in accordance with CAN/CSA B149.

.3 Assemble piping using fittings manufactured to ANSI standards.

.4 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

.5 Slope piping down in direction of flow to low points.

.6 Install drip points:

.1 At low points in piping system.

.2 At each connection to equipment.

.7 Use eccentric reducers at pipe size change installed to provide positive drainage.

.8 Provide clearance for access and for maintenance.

.9 Ream pipes, clean scale and dirt, inside and out.

.10 Install piping to minimize pipe dismantling for equipment removal.

.11 Install regulator vents to code. Terminate in open air with Gooseneck fitting complete with stainless steel screen.

.12 Paint gas piping with two (2) coats yellow paint. Banding of gas will not be accepted.

3.2 PIPING ON ROOF

.1 Support piping as follows or as per seismic requirements (1.8 M (6' - 0") O.C.) whichever is more stringent:
≤ 40 mm (1½") 2.4 M (8' – 0") O.C.
≥ 50 mm (2") 3.0 M (10' - 0") O.C.

.2 Provide support at each elbow and fitting.

.3 Provide support at each regular and/or isolating valve.

.4 Provide support within 600 mm (24") of each piece of equipment.

3.3 VALVES

.1 Install valves with stems upright or horizontal unless otherwise approved by Consultant.

.2 Install valves at branch take-offs to isolate each piece of equipment, and as indicated.

.3 Provide lubricated plug type when gas line is exterior of building or 65 mm (2½") and larger.

.4 Provide ball valve when gas line is interior of building and 50 mm (2") or smaller.

3.4 FIELD QUALITY CONTROL

.1 Test system in accordance with CAN/CSA B149. Requirements of authorities having jurisdiction.

.2 Provide copy of TSSA tag to the consultant.

3.5 PURGING

.1 Purge after pressure test in accordance with CAN/CSA B149.

3.6 GAS FIRED EQUIPMENT START-UP

.1 Start-up of all new and existing gas fired equipment shall be by this contractor to the requirements of the equipment manufacturer.

END OF SECTION

Part 1 GENERAL

1.1 INTRODUCTION

.1 The owner is required to inspect and test building gas piping every 10 years and have documentation supporting this work. This school is due for the inspection and documentation.

.2 The inspection and documentation is to be done by the mechanical contractor and included in the tender price.

.3 For gas piping installations, appliance installation and venting requirements refer to most current edition of CSA B149.1. This will be the basis for inspections on gas piping.

.4 These provisions are not intended to be all-inclusive. **When in doubt as to the proper procedure, consult your TSSA Representative or Consultant before proceeding with the work.**

.5 Any imperfect material or defective or faulty workmanship in the installation will be treated as extra work for gas piping, appliances, appliance connections or appliance venting.

Part 2 MATERIALS

Not applicable.

Part 3 EXECUTION

3.1 GENERAL

.1 The materials, installation and location of the gas piping, appliance, appliance connections or appliance venting shall be subject to requirements of CSA B149.1.

.2 Gas piping shall be of such size as to provide a supply of gas sufficient to meet the maximum demand with a recommended pressure drop not in excess of 0.3 inch water column between the outlet of the meter set assembly and appliances with 0.6 specific gravity gas.

.3 CSA B149.1 list the recommended minimum sizes of gas piping to the drop line or connection for heating and/or air conditioning equipment and other types of appliances and should be used unless the complete house line system is sized in accordance to demand.

3.2 VISUAL INSPECTION

.1 The first inspection of any job shall be the visual inspection. In the event the lines will not pass such inspection, or if other unsatisfactory conditions result in the disapproval by the contractor, the necessary correction shall be made and the line involved shall again be inspected by owner and consultant.

.2 The visual inspection shall include but not limited to the following:

.1 Proper sleeving.

.2 Condition of gas piping.

.3 Proper supports and hangers.

.4 Proper venting of PRV's.

.5 Identify any concealed location.

.6 Proper valving.

.7 Pipe size.

.8 Proper installation.

.9 Proper identification

.10 Etc.

.3 At the time the gas piping are re-inspected by the customer and/or customer's representative, the results of such inspection will be recorded by the contractor on an appropriate form.

.4 At the time of visual inspection, the entire gas piping system shall be recorded on a drawing indicating all devices, valves, etc. including pipe sizes and device loads.

.5 A paper drawing or CAD file will be handed to the contractor for mark-ups and identification of the gas piping systems. The contractor will be responsible for providing an AutoCAD drawing of the gas piping system upon completion. The drawing shall indicate:

.1 Piping system.

.2 Date of testing.

.3 Corrective measures taken.

.4 Any concealed piping locations.

.5 Contractor test name, personal licenses number, contractor's TSSA numbers.

.6 Any other pertinent information that should be included on documentation.

.6 The visual inspection, documentation and corrective measures (i.e. add identification) are all to be included in the tender price.

3.3 TESTING GAS PIPING

.1 Decommission the gas pipe system.

.2 Disconnect all appliances from the gas piping system and cap lines.

.3 Purge gas lines to the outside for testing.

.4 Provide an air pressure test at 60 psig for 24 hours without a loss of pressure.

.5 If pressure test has failed, then investigate and report locations of loss.

.6 If pressure loss is in a screwed fitting or value, then correct valve, lubricate valve, or replace and submit extra if value below $1,000.00, over $1,000.00 MUST BE REPORTED AND APPROVED by owner before proceeding.

.7 If pressure loss is in the piping system, report to the owner.

.8 Do not provide pressure test thru any PRV valves or appliances.

.9 After system tested and accepted, then reconnect and return the system to operation.

.10 Air or an inert gas such as nitrogen shall be used to pressurize the piping. In no case shall oxygen, acetylene or other such gases be used.

.11 To locate leaks, piping joints should be covered with soapsuds, or a leak-finder liquid. In no case shall ether as an odorant, Freon, or any gas that will produce a toxic atmosphere when burned, be injected into the piping to locate leaks.

.12 Test pressure must be measured with a manometer or with a pressure-measuring device designed and calibrated to read, record, or indicate a pressure loss caused by leakage during the pressure test period (i.e. a Kuhlman Instrument indicates a pressure loss via fluid rising up the back tube). A standard dial type mechanical pressure gauge indicates pressure, it does not however read, record, or indicate a pressure *loss* in and of itself.

3.4 ABANDONED PIPING

.1 Gas piping previously abandoned shall be removed from site.

.2 Review abandoned service lines with the owner and consultant as it may be advantageous to have piping remain.

3.5 VENTING

.1 The contractor shall visually inspect the venting from all appliances and provide in writing any deficiencies to the owner and consultant.

3.6 EQUIPMENT RESTARTS

.1 All equipment shall be restarted and confirmed operating properly at the gas fired burners.

.2 Where boilers are not familiar to the contractor, notify the owner and ask for assistance from a qualified technician.

3.7 COMPLETION

.1 Upon completion, the contractor shall provide the TSSA test certificate on the gas piping system and submit copy to the owner and consultant.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.

.3 SMACNA HVAC Duct Leakage Test Manual.

.4 ASTM A480/A480M, Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.

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

.6 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.

.7 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.

.8 ANSI/NFPA 96, Ventilation Control and Fire Protection of Commercial Cooking Operations.

.9 CSA B228.1, Pipe Ducts and Fittings for Residential Type Air Conditioning Systems.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section general requirements.

.2 Indicate following:

- .1 Sealants
- .2 Tape
- .3 Proprietary Joints
- .4 Fittings

1.3 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 DUCTWORK

.1 Galvanized Steel:

- .1 Galvanized steel with Z90 designation zinc coating lock forming quality: to ASTM A653/A653M.

.2 Thickness:

Size Type	Class A Gauge	Class B Gauge	Class C Gauge
Square and Rectangular			
Up to 600 mm (24")	22	24	24
625 mm to 1000 mm (25" to 40")	20	22	24
1025 mm to 1800 mm (41" to 72")	18	20	22
1825 mm to 2400 mm (73" to 96")	16	18	20
2450 mm and over (97")	16	16	16
Round and Oval			
Up to 300 mm (12")	24	24	24
325 mm to 600 mm (13" to 24")	22	24	24
625 mm to 900 mm (25" to 36")	20	22	24
925 mm to 1200 mm (37" to 48")	18	20	22
1225 mm (49") and over	18	18	20
Residential Suite Ductwork:			
Square and Rectangular			
Up to 300 mm (12") *	26	26	26
Round and Oval Snap Lock *			
Up to 200mm (8") *	30	30	30

***Following SMACNA for low pressure ductwork.

.3 All ductwork between HVAC unit connections and 3.0 m (10'-0") downstream or to silencers shall be 1.4 mm (18 gauge).

2.2 DUCT CONSTRUCTION

.1 Round and oval:

.1 Ducts: factory fabricated, spiral wound, with matching fittings and specials to SMACNA.

.2 Transverse joints up to 900 mm (36"): slip type with tape and sealants.

.3 Transverse joints over 900 mm (36"): Ductmate or Exanno Nexas Duct System.

.2 Square and rectangular:

.1 Ducts: to SMACNA.

.2 Transverse joints, longest side:

up to and including 750 mm (30"): SMACNA proprietary duct joints.

.3 Ducts with sides over 750 mm (30") to 1200 mm (48"), transverse duct joint system by Ductmate/25, Nexus, or WDCI (Lite) (SMACNA ”E” or “G” Type connection). Weld all corners.

.1 Acceptable Manufacturers:

.1 Ductmate Canada Ltd.

.2 Nexus, Exanno Corp.

.3 WDCI

.4 Ducts 1200 mm (48") and larger, Ductmate/35, Nexus, or WDCI (heavy) (SMACNA “J” Type connection). Weld all corners.

.1 Acceptable Manufacturers:

.1 Ductmate Canada Ltd.

.2 Nexus, Exanno Corp.

.3 WDCII.

2.3 FITTINGS

.1 Fabrication: to SMACNA.

.2 Radiused elbows:

.1 Rectangular: standard radius and or short radius with single thickness turning vanes Centreline radius: 1.5 times width of duct.

.2 Round:

.1 In exposed areas one-piece smooth radius, 1.5 times diameter.

.2 In concealed areas 3-piece adjustable, 1.5 times diameter.

.3 Mitred elbows, rectangular:

.1 To 400 mm (16"): with double thickness turning vanes.

.2 Over 400 mm (16"): with double thickness turning vanes.

.4 Branches:

.1 Rectangular main and branch: with 45º entry on branch.

.2 Round main and branch: enter main duct at 45º with conical connection.

.3 Provide volume control damper in branch duct near connection to main duct.

.4 Main duct branches: with splitter damper.

.5 Diffuser connection to main:

.1 90º round spin in collars with balancing damper and locking quadrant.

.6 Transitions:

.1 Diverging: 20º maximum included angle.

.2 Converging: 30º maximum included angle.

.7 Offsets:

.1 Full short radiused elbows.

.8 Obstruction deflectors: maintain full cross-sectional area.

2.4 SEAL CLASSIFICATION

.1 Classification as follows:

Maximum Pressure Pa (" w.c.)	SMACNA Seal Class	Acceptable Leakage Classification (Rectangular)	Acceptable Leakage Classification (Round)
2500 (10")	A	4	2
1500 (6")	A	4	2
1000 (4")	A	4	2
750 (3")	A	8	4
500 (2")	B	16	8
250 (1")	B	16	8
125 (0.5")	C	16	8

.2 Seal classification:

.1 Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.

.2 Class B: longitudinal seams, transverse joints and connections made airtight with sealant.

.3 Class C: transverse joints and connections made air tight with gaskets, or sealant or combination thereof. Longitudinal seams sealed with foil tape or sealant.

2.5 SEALANT

.1 Sealant: oil resistant, polymer type flame resistant duct sealant. Temperature range of -30°C (-22°F) to plus 93°C (199°F).

.2 Flame-spread rating not more than 25.

.3 Smoke developed classification not more than 50.

.4 Acceptable Manufacturers:

.1 Duro Dyne S-2

.2 Foster

2.6 TAPE

.1 Tape: polyvinyl treated, open weave fiberglass tape, 50 mm (2") wide.

.1 Acceptable Manufacturers:

.1 Duro Dyne FT-2

2.7 DUCT LEAKAGE

.1 In accordance with SMACNA HVAC Duct Leakage Test Manual.

2.8 FIRESTOPPING

.1 40 mm x 40 mm x 3 mm (1½" x 1½" x 16ga) retaining angles all around duct, on both sides of fire separation.

.2 Firestopping material and installation must not distort duct.

.3 All ductwork passing through partition walls shall be firestopped.

2.9 HANGERS AND SUPPORTS

.1 Band hangers: use on round and oval ducts only up to 500 mm (20") diameter, of same material as duct but next sheet metal thickness heavier than duct.

.2 DUCTMATE “Clutcher” cable hanging system may be utilized on round ductwork up to 450mm (18 inch) diameter in areas of exposed ceilings where lateral movement/loads on ductwork is not present (such as those caused by attached linear diffusers).

.3 Trapeze hangers: ducts over 500 mm (20") diameter or longest side, to ASHRAE and SMACNA.

.4 Hangers: galvanized steel angle with black steel rods to ASHRAE and SMACNA following table:

Duct Size mm (")	Angle Size mm (")	Rod Size mm (")
up to 750 (30)	25 x 25 x 3 (1 x 1 x 1/8)	6 (1/4)
>750 to 1050 (>30 to 42)	40 x 40 x 3 (1½ x 1½ x 1/8)	6 (1/4)
>1050 to 1500 (>42 to 60)	40 x 40 x 3 (1½ x 1½ x 1/8)	10 (3/8)
>1500 to 2100 (>60 x 84)	50 x 50 x 3 (2 x 2 x 1/8)	10 (3/8
>2100 to 2400 (>84 x 96)	50 x 50 x 5 (2 x 2 x 1/8)	10 (3/8)
>2400 (96) and over	50 x 50 x 6 (2 x 2 x ¼)	10 (3/8)

.5 Upper hanger attachments:

.1 For concrete: manufactured concrete inserts.

.1 Acceptable Manufacturers:

.1 Myatt fig. 485

.2 For steel joist: manufactured joist clamp or steel plate washer.

.1 Acceptable Manufacturers:

.1 Grinnell fig. 61 or 60

.3 For steel beams: manufactured beam clamps:

.1 Acceptable Manufacturers:

.1 Grinnell Fig. 60

Part 3 Execution

3.1 GENERAL

.1 The following systems shall conform to these requirements:

System	Pressure	Class	Material
HVAC Supply and Return	+/-	B	Galvanized steel
General Exhaust	-	B	Galvanized steel

.2 Do work in accordance with ASHRAE and SMACNA.

.3 Do not break continuity of insulation vapour barrier with hangers or rods.

.4 Support risers in accordance with ASHRAE and SMACNA.

.5 Install breakaway joints in ductwork on each side of fire separation.

.6 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.

.7 Manufacture duct in lengths to accommodate installation of acoustic duct lining.

3.2 HANGERS

.1 Strap hangers: install in accordance with SMACNA.

.2 Angle hangers: complete with locking nuts and washers.

.3 Hanger spacing: in accordance with ASHRAE, SMACNA and as follows:

Duct Size mm (")	Spacing mm (")
to 1500 (60")	3000 (120")
over 1500 (60")	2500 (100")

.4 Do not support ductwork over 250 mm x 250 mm (10" x 10") from roof deck.

3.3 CLUTCHER CABLE HANGER

.1 Do not install in corrosive environments such as pools, aquariums or spas.

.2 Utilize the standard loop hanging style. (limited to 450mm (18") diameter)

.3 Contractor is responsible to calculate required clutcher and cable weight rating based on manufacturer selection guidelines. Minimum weight rating of system components shall be 250 lbs.

.4 Maximum Hanger Spacing: 3000 mm (120")

.5 Provide additional rigid supports as required if lateral movement in the ductwork occurs.

3.4 SEALING

.1 Apply sealant to outside of joint to manufacturer's recommendations.

.2 Bed tape in sealant and recoat with minimum of 1 coat of sealant to manufacturers recommendations.

3.5 LEAKAGE TESTS

.1 Co-ordinate leakage testing with TAB contractor **and commissioning agent**. TAB contractor will be responsible for all duct testing.

.2 Duct to be tested in accordance with SMACNA HVAC Duct Leakage Test Manual.

.3 Leakage tests to be done in sections.

.4 Trial leakage tests to be performed as instructed to demonstrate workmanship.

.5 Install no additional ductwork until trial test has been passed.

.6 Test section to be minimum of 15 m (50'-0") long with not less then 3 branch takeoffs and two 90º elbows. Maximum test length and area to be determined by BAS testing equipment. Allow for twelve (12) tests.

.7 Complete test before insulation or concealment.

.8 Provide all necessary end caps and fittings as required for the TAB contractor. Remove same after successful completion of duct test.

.9 Pressure test ductwork to 1½ times operating pressure (minimum pressure 500 Pa (2" wc) all systems).

3.6 CLEANING

.1 Keep ducts clear from dust and debris

.2 Keep duct liner clean from dust, debris, and moisture.

.3 At completion of project vacuum ducts if dirt or dust is present.

.4 Where new systems connect into existing systems the existing systems shall be cleaned and vacuumed prior to reconnection. **The extent of the cleaning shall be limited to the area immediately surrounding the new connection point.**

.5 Ensure all systems are clean prior to start up.

3.7 INSTALLATION REQUIREMENTS

.1 All ductwork is to be protected from the weather and precipitation. The top and sides of all ductwork are to be completely covered with 6mil poly to the satisfaction of the consultant. Maintain protection of the ductwork until the building is made watertight and hollow cores drained. Tape all joints.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.

.3 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.

.4 ANSI/NFPA 96, Ventilation Control and Fire Protection of Commercial Cooking Operations.

.5 CSA B228.1, Pipes, Ducts and Fittings for Residential Type Air Conditioning.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

.1 Flexible connections.

.2 Duct access doors.

.3 Turning vanes.

.4 Instrument test ports.

1.3 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 GENERAL

.1 Manufacture in accordance with CSA B228.1.

2.2 FLEXIBLE CONNECTIONS

.1 Frame: galvanized sheet metal frame with fabric clenched by means of double locked seams.

.2 Material:

.1 Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at -40°C (-40°F) to plus 90°C (194°F), density of 1.3 kg/m.

2.3 ACCESS DOORS IN DUCTS

.1 Non-insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm (25 gauge) thick complete with sheet metal angle frame.

.2 Insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm (24 gauge) thick complete with sheet metal angle frame and 25 mm (1") thick rigid glass fibre insulation.

.3 Gaskets: neoprene

.4 Hardware:

.1 Up to 300 mm (12"): 2 sash locks

.2 301 mm to 450 mm (13" to 18"): 4 sash locks Complete with safety chain.

.3 451 mm to 1000 mm (19" to 40"): piano hinge and minimum 2 sash locks.

.4 Doors over 1000 mm (40"): piano hinge and 2 handles operable from both sides.

.5 Hold open devices.

.6 300 mm x 300 mm (12" x 12") glass viewing panels.

.5 Acceptable Manufacturers:

.1 Nailor

.2 E. H. Price

.3 Titus

.6 Provide access doors in kitchen exhaust duct with bolted cover to the requirements of NFPA and authority having jurisdiction.

2.4 TURNING VANES

.1 Factory or shop fabricated double thickness, to recommendations of SMACNA and as indicated.

.2 Acceptable Manufacturers:

.1 Duro Dyne

.2 Ductmate

2.5 INSTRUMENT TEST PORTS

.1 1.6 mm (16 gauge) thick steel zinc plated after manufacture.

.2 Cam lock handles with neoprene expansion plug and handle chain.

.3 28 mm (1 1/8") minimum inside diameter. Length to suit insulation thickness.

.4 Neoprene mounting gasket.

.5 Acceptable Manufacturers:

.1 Duro Dyne IP1 or IP2

.2 Duct mate

2.6 PREFABRICATED ROOF CURB

.1 Construction: welded with exposed joints ground flush and smooth.

.2 Material: 1.3 mm (18 gauge) galvanized steel with raised cant and wood nailer.

.3 25 mm (1") insulation 3 lb density.

.4 Acceptable Manufacturers:

.1 Greenheck GPR – 600 mm (24") high

.2 Penn

2.7 SPIN-IN COLLAR

.1 Construction: galvanized straight or conical spin-in collar complete with spin-in bead and crimped collar connection.

.2 Provide balancing damper where indicated.

.3 Acceptable Manufacturers:

.1 Ecco Manufacturing

.2 Flex Master

Part 3 Execution

3.1 INSTALLATION

.1 Flexible connections:

.1 Install in following locations:

.1 Inlets and outlets to supply air units and fans. (Unless internally isolated)

.2 Inlets and outlets of exhaust and return air fans.

.3 As indicated.

.2 Length of connection: 100 mm (4").

.3 Minimum distance between metal parts when system in operation: 75 mm (3").

.4 Install in accordance with recommendations of SMACNA.

.5 When fan is running:

.1 Ducting on each side of flexible connection to be in alignment.

.2 Ensure slack material in flexible connection.

.2 Access doors and viewing panels:

.1 Size:

.1 600 mm x 600 mm (24" x 24") for person size entry.

.2 600 mm x 1000 mm (24" x 40") for servicing entry.

.3 300 mm x 300 mm (12" x 12") for viewing.

.4 As indicated.

.2 Location:

.1 At fire and smoke dampers.

.2 At control dampers.

.3 At devices requiring maintenance.

.4 At locations required by code.

.5 At inlet and outlet of reheat coils.

.6 Elsewhere as indicated.

.7 Inlet and outlet of duct mounted coils.

.3 Instrument test ports.

.1 General:

.1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.2 Locate to permit easy manipulation of instruments

.3 Install insulation port extensions as required.

.4 Locations.

.1 For traverse readings:

.1 At ducted inlets to roof and wall exhausters.

.2 At inlets and outlets of other fan systems.

.3 At main and sub-main ducts.

.4 And as indicated.

.2 For temperature readings:

.1 At outside air intakes.

.2 In mixed air applications in locations as approved by Consultant.

.3 At inlet and outlet of coils.

.4 Downstream of junctions of two converging air streams of different temperatures.

.5 And as indicated.

.4 Turning vanes:

.1 Install in accordance with recommendations of SMACNA and as indicated.

.2 Install on supply ducts only.

3.2 WARRANTY

.1 Warranty Start Date:

.1 Warranty period starts as of the date of Ready for Takeover.

.2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.

.2 Warranty Duration:

.1 Two year warranty period applies.

.3 Warranty Coverage:

.1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements

.2 Indicate the following: performance data.

Part 2 Products

2.1 GENERAL

.1 Manufacture to SMACNA standards.

2.2 SINGLE BLADE DAMPERS

.1 Of same material as duct, but one sheet metal thickness heavier. V-groove stiffened, minimum 1.6 mm (16 gauge).

.2 Size and configuration to recommendations of SMACNA, except maximum height 100 mm (4").

.3 Shaft extension to accommodate insulation thickness and locking quadrant.

.4 Inside and outside nylon end bearings.

.5 Channel frame of same material as adjacent duct, complete with angle stop.

2.3 MULTI-BLADED DAMPERS

.1 Factory manufactured of material compatible with duct.

.2 Opposed blade: configuration, metal thickness and construction to recommendations of SMACNA.

.3 Maximum blade height:

.1 50 mm (2") up to 375 mm (15") high duct.

.2 100 mm (4") max 400 mm (16") high duct and over.

.4 Bearings: self-lubricating nylon.

.5 Linkage: shaft extension with locking quadrant.

.6 Channel frame of same material as adjacent duct, complete with angle stop.

.7 Shaft extension to accommodate insulation thickness and locking quadrants.

.8 Acceptable Manufacturers:

.1 Duro Dyne

.2 E.H. Price

.3 Nailor

.4 T.A. Morrison

.5 Tamco

.6 Ruskin

.7 Ventex/Alumavent

.8 United Enertech

2.4 LOCKING QUADRANTS

.1 6 mm (1/4") dial regulator with square bearing shaft.

.1 18 gauge oval frame, cadmium plated, clearly shows damper position.

.2 18 gauge formed handle for easy adjustment.

.3 Bolt and wing nut lock damper securely.

.4 Offset mounting holes avoid interference with damper movement and mechanical fastening to duct.

.2 9 mm (3/8") and larger: clamp quadrant with square bearing shaft.

.1 Accommodates and securely locks square rod, bearing fitting and adaptor pins.

.2 Heavily ribbed 16 gauge steel frame, 3 mm (1/8") thick formed steel handle, cadmium-plated.

.3 By tightening nut, bearing is securely locked in handle, preventing slippage and rattle.

.4 Neoprene and steel washer assembly seals bearing opening to eliminate air-leakage.

.5 Screw holes for mechanically fastening to ductwork.

.3 High pressure system locking quadrant:

.1 Airtight, rattle-proof regulator, designed for ZERO leakage at high pressure. Use for applications up to 500°F constant temperature.

.2 Handle design for easy recognition of damper position.

.3 Heavy-gauge, zinc-plated steel, 2 high temperature rubber seals and washers, end bearing support, and 2 end bearings. Pressure loss and damper rattle in ductwork has been a constant annoyance for as long as HVAC ductwork has been installed. Now, a truly air-tight, rattle-proof regulator is available. The SPEC-SEAL regulator utilizes a special high-temperature rubber seal to eliminate leakage and rattle even at many times the pressure found in high pressure.

.4 Soft, comfortable grip handle with a highly-visible, plastic cover which indicates the damper position.

.5 Handle to accommodate 9 mm (3/8") or 12 mm (1/2") to match damper shaft size, square and round bearing shafts.

.4 Acceptable Manufacturers:

.1 Duro Dyne

.2 Ductmate

.3 Pottorff

2.5 VOLUME EXTRACTORS

.1 Fully adjustable gang operated blade volume extractor.

.2 Cold rolled steel construction, 25 mm (1") blade spacing with matte black finish.

.3 Provide Type 1 manual adjusting operating lever.

.4 Acceptable Manufacturers:

.1 EH Price AE-1

.2 Krueger EX8/EX88

.3 Or equal approved by consultant

Part 3 Execution

3.1 INSTALLATION

.1 Install where indicated.

.2 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.3 For supply, return and exhaust systems, locate balancing dampers in each branch duct.

.1 Single blade dampers up to 200 mm (8").

.2 Multi-blade dampers over 200 mm (8").

.4 Runouts to registers and diffusers: install single blade damper located as close as possible to main ducts.

.5 All dampers to be vibration free.

.6 Leave all dampers in open position for T.A.B.

.7 Fasten locking quadrants to ductwork and shaft.

.8 Place locking quadrants on standoffs where ductwork insulated.

.9 Lock down quadrant arm in the open position.

3.2 VOLUME EXTRACTOR

.1 Install at branch take off connections where indicated.

.2 Secure lever adjustment rod to inside duct collar after final adjustments.

3.3 WARRANTY

.1 Warranty Start Date:

.1 Warranty period starts as of the date of Ready for Takeover.

.2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.

.2 Warranty Duration:

.1 Two year warranty period applies.

.3 Warranty Coverage:

.1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.

.3 CAN/ULC-S112, Standard Method of Fire Test of Fire Damper Assemblies.

.4 CAN/ULC-S112.1, Standard Method of Fire Test of Ceiling Firestop Flap Assemblies.

.5 ULC-S505, Fusible Links for Fire Protection Service.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

.1 Fire dampers.

.2 Operators.

.3 Firestop flaps.

.4 Fusible links.

1.3 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

1.4 MAINTENANCE MATERIALS

.1 Provide the following:

.1 Six (6) fusible links of each type.

1.5 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 FIRE DAMPERS (DYNAMIC)

.1 Multi blade or roll type, fire damper suitable for HVAC system velocities up to 2000 fpm (610 m/mm), dual direction air flow, max 4" wg pressure.

.2 Mild steel, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.

.3 Top hinged: offset single damper, round or square; multi-blade hinged or interlocking type; guillotine type; sized to maintain full duct cross section.

.4 Stainless closure spring to positively close damper upon fusible link release, for horizontal or vertical orientations.

.5 Linkage concealed in frame.

.6 40 mm x 40 mm x 3 mm (1½" x 1½" x 16ga) retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.

.7 Fire damper assemblies and type to meet requirements of provincial fire authority and authority having jurisdiction.

.8 Acceptable Manufacturers:

.1 Ruskin

.2 Nailor

.3 E.H. Price

.4 T.A. Morrison

.5 Tamco

.6 Greenheck

.7 Ventex/Alumavent

.8 Pottorff

Part 3 Execution

3.1 INSTALLATION

.1 Provide where indicated and at all fire rated partitions indicated, on architectural drawing.

.2 Install in accordance with ANSI/NFPA 90A and in accordance with conditions of ULC listing.

.3 Maintain integrity of fire separation.

.4 After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.

.5 Install access door adjacent to each damper.

.6 Coordinate with installer of firestopping.

.7 Static fire dampers: Only on transfer air ducts where ductwork is not connected to a fan/blower.

.8 Dynamic fire dampers: In all duct work where air is moved by a fan/blower.

3.2 WARRANTY

.1 Warranty Start Date:

.1 Warranty period starts as of the date of Ready for Takeover.

.2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.

.2 Warranty Duration:

.1 Two year warranty period applies.

.3 Warranty Coverage:

.1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 CAN/ULC-S110, Standard Methods of Test for Air Ducts.

.3 UL 181, Factory Made Air Ducts and Air Connectors.

.4 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.

.5 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.

.6 SMACNA HVAC Duct Construction Standards - Metal and Flexible.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

.1 Thermal properties.

.2 Friction loss.

.3 Acoustical loss.

.4 Leakage.

.5 Fire rating.

1.3 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 GENERAL

.1 Factory fabricated to CAN/ULC S110.

.2 Pressure drop coefficients listed below are based on relative sheet metal duct pressure drop coefficient of 1.00.

.3 Flame spread rating not to exceed 25. Smoke developed rating not to exceed 50.

2.2 METALLIC – UNINSULATED

.1 Spiral wound flexible aluminum, Class 1 duct material.

.2 Performance:

.1 Factory tested to 2.5 kPa (10" w.c.) without leakage.

.2 Maximum relative pressure drop coefficient: 3.

.3 Operating pressure: 300 mm (12").

.3 Acceptable Manufacturers:

.1 Flexmaster T/L

.2 Ductmate

2.3 METALLIC –INSULATED

.1 Spiral wound flexible aluminum with factory applied, 25 mm (1") thick flexible glass fibre thermal insulation with vapour barrier and vinyl jacket, Class 1 duct material.

.2 Performance:

.1 Factory tested to 2.5 kPa (10" w.c.) without leakage.

.2 Maximum relative pressure drop coefficient: 3.

.3 Operating pressure: 300 mm (12").

.3 Acceptable Manufacturers:

.1 Flexmaster T/L – VT

.2 Ductmate

Part 3 Execution

3.1 DUCT INSTALLATION

.1 Install in accordance with: SMACNA.

.2 Maximum length of flexible duct: 1.8 m (6' 0").

.3 Minimum length of acoustical ductwork; 1.5 m (5' 0") with minimum of 1 bend.

.4 Provide support at centre of flexible duct with 25 mm (1") wide galvanized hanger.

.5 Insulated flexible ductwork in areas where ceilings are not utilized as return air plenums.

.6 Uninsulated flexible ductwork in areas where ceilings are utilized as return air plenums.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 AMCA 99, Standards Handbook.

.3 ANSI/AMCA 210, Laboratory Methods of Testing Fans for Certified Aerodynamics Performance Rating.

.4 AMCA 300, Revised 1987, Reverberant Room Method for Sound Testing of Fans.

.5 AMCA 301, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

.6 ANSI/ASHRAE 51, Laboratory Methods of Testing Fans for Certified Aerodynamics Performance Rating.

.7 ANSI/NFPA 96 – Ventilation Control and Fire Protection of Commercial Cooking Operations.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements.

.2 Product data to include fan curves and sound rating data.

1.3 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into manual specified in general requirements.

1.4 CERTIFICATION OF RATINGS

.1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered from independent testing agency signifying adherence to codes and standards in force.

.2 Provide confirmation of testing.

Part 2 Products

2.1 FANS GENERAL

.1 Capacity: Flow rate, total static pressure Pa, r/min, W (" w.c., r/min, bhp) model and size and sound ratings as indicated on schedule.

.2 Statically and dynamically balanced. Constructed in conformity with AMCA 99.

.3 Sound ratings: Comply with AMCA 301, tested to AMCA 300.

.4 Performance ratings: Based on tests performed in accordance with ANSI/AMCA 210, and ANSI/ASHRAE 51.

.5 Bearings: Sealed lifetime of self aligning type with oil retaining, dust excluding seals and a certified minimum rated life of 80,000 100,000 h in accordance with AFBMA L10 life standard. Bearings to be rated and selected in accordance with AFBMA 9 and AFBMA 11.

.6 Provide vibration isolation hangers/pads for all fans.

.7 Electrical components and motors within the airstream shall be classified for use in a Class I, Zone 2 system (as defined by the Electrical Safety Code) when connected to ductwork systems served by refrigerant containing air handling systems.

.8 Provide factory mounted speed control for all direct drive motors.

.9 Acceptable Manufacturers:

.1 Greenheck

.2 Penn-Barry

.3 Cook

2.2 ROOF EXHAUSTERS

.1 Centrifugal V belt or direct driven as indicated.

.1 Housing: Spun aluminum complete with resilient mounted motor and fan.

.2 Impeller: Aluminum non-overloading.

.3 Adjustable motor sheave.

.4 15 mm (1/2") mesh 2.0 mm (79 mil) diameter aluminum birdscreen.

.5 Automatic gasketted aluminum backdraft dampers.

.6 Disconnect switch within fan housing.

.7 Continuous curb gaskets, cadium plated securing bolts and screw, and sound insulating.

.2 Roof curbs: of same manufacturer as fan and built to suit model specified. Roof curbs to be minimum 600 mm (24") high except where indicated otherwise. Roof curbs for NFPA 96 fans are to be vented.

.3 Size, type, and capacity: As indicated.

.4 Power feed shall be through roof curb.

.5 To NFPA 96 requirements where indicated.

.6 Provide vibration isolators and flexible connections.

2.3 EXISTING EXHAUST AIR FANS

.1 Refurbish existing exhaust air fans as follows:

.1 Vacuum entire unit interior.

.2 Lubricate all bearings.

.3 Replace fan belt(s).

.4 Rebalance to capacity indicated.

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

.2 Provide flexible duct connection for all fans.

.3 Provide backdraft damper at building exterior penetration.

.4 Provide and install vibration isolation.

.5 Provide and install roof curb for all roof mounted fans.

.6 Provide and install sleepers for utility set style roof mounted fans; provide roof curb for duct penetration.

3.2 WARRANTY

.1 Warranty Start Date:

.1 Warranty period starts as of the date of Ready for Takeover.

.2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.

.2 Warranty Duration:

.1 Two year warranty period applies.

.3 Warranty Coverage:

.1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ANSI/NFPA-90A, Installation of Air Conditioning and Ventilating Systems.

.3 AMCA 99 – Standard Handbook.

.4 AMCA 210 – Laboratory Methods of Testing Fans for Rating Purposes.

.5 ARI 270, Standard for Sound Rating of Outdoor Unitary Equipment.

.6 ANSI/AHRI 340/360 – Performance Rating of Commercial and Industrial Unitary Air Conditioning and Heat Pump Equipment.

.7 AMCA 500 – Test Methods for Louvers, Dampers, and Shutters.

.8 AHRI 260 – Sound Rating of Ducted Air Moving and Conditioning Equipment.

.9 NFPA 90A – Installation of Air Conditioning and Ventilation Systems.

.10 UL-1995 – Standard for Safety for Heating and Cooling Equipment.

.11 C.1 CSA B52-2023, Mechanical Refrigeration Code

.12 C.2 CAN/CSA-C22.2 No 60335 Safety of Household and similar electrical appliances – Heat Pumps, Air-conditioners and dehumidifiers

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section general requirements.

1.3 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

1.4 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with general requirements.

1.5 UNIT ASSEMBLY

.1 Unless stated otherwise, air handling units are to be shipped to the job in one piece, factory assembled. All equipment shall be factory tested prior to shipment.

1.6 MANUFACTURED ITEMS

.1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards in force.

.2 The air handling units and major components shall be products of manufacturers regularly engaged in the production of such equipment and with a minimum of fifteen continuous years of proven production experience.

.3 Manufacturer shall have a fully implemented and auditable quality assurance program, equal to the ISO-9002 Quality Standard.

1.7 PERFORMANCE RATINGS

.1 Unit certification: Units shall conform to CSA-C746-2006 and ARI 340/360-2007 and shall be listed by NRCan as approved for sale in Canada and be compliant with the SB-10 Supplement of the Ontario Building Code. Testing shall be completed by a third party, certified lab.

Part 2 Products

2.1 GENERAL

.1 Field Factory assembled components to form units supplying air at design conditions as indicated and specified.

.1 Acceptable Manufacturers:

.1 Engineered Air – FWE/DJS Series

.2 Daikin McQuay

.2 Air Handling Units shall be built to the level of quality as herein specified and to the description indicated on the mechanical drawings.

.3 Substitution of any product other than that specified, must ensure no deviation below the stated capacities, air flow rate, heat transfer rate, filtration efficiency and air mixing quality. Power requirements must not be exceeded, and where specifically defined, sound power levels must not be exceeded. Applications for "equal" or "alternate" must address these factors.

.4 Unless stated otherwise, air-handling units are to be shipped to the job in one piece, factory assembled. Modular units assembled to achieve a close proximation to the intent of this specification will not be considered equal. All equipment shall where specified and applicable, be pre-wired, and factory certified by an approved testing agency such as CETL, ETLUS, UL, CSA prior to shipment.

.5 Pre-wired air handling units shall bear an approved label with all the necessary identification marks, electrical data, and any necessary cautions as required by the Canadian Electrical Code.

.6 All electrical circuits shall undergo a dielectric strength test and shall be factory tested and checked as to proper function.

.7 The air handling units and major components shall be products of manufacturers regularly engaged in the production of such equipment and with a minimum of fifteen continuous years of proven production experience.

2.2 UNIT CONSTRUCTION

.1 Unit casing shall be of minimum 18 gauge satin coat galvanized sheet metal. Surfaces shall be cleaned with a degreasing solvent to remove oil and metal oxides and primed with a two-part acid based etching primer. Finish coat shall be electrostatically applied enamel, to all exposed surfaces. All unprotected metal and welds shall be factory coated.

.2 All high pressure [5" w.c.(1250Pa) to 9" w.c.(2250Pa)] fan sections shall be constructed of 14 gauge (2.0mm) metal. Continuous high pressure sealant shall be provided between all panels.

.3 All walls, roofs and floors shall be of formed construction, with at least two breaks at each joint. Joints shall be secured by sheet metal screws or pop rivets. Wall and floor joints shall be broken in and on all outdoor unit's roof joints broken out (exposed) for rigidity. All joints shall be caulked with a water-resistant sealant.

.4 Entire unit airstream to include solid 22 Ga satin coat liner.

.5 Units shall be provided with gasketed access doors to the following components: fans and motors, filters, dampers and operators, access plenums and humidifiers/wet cells, electrical control panels, burner compressor compartments. Access doors shall be large enough for easy access. Removal of screwed wall panels will not be acceptable.

.6 Units shall be provided with hinged access doors, with extruded neoprene gasket, fully lined, and a minimum of two Lever handles, operable from both sides for all units. Hinged access doors shall open outwards on all sections for outdoors units. Doors located on sections with positive pressure shall have a clear warning label and a safety device must be affixed.

.7 All units shall be internally insulated with 25 mm (1") thick 24 kg/m³ (1.5 lb./ft³) density, neoprene coated fibre glass thermal insulation. 24 kg/m³ (1.5 lb/ft³) insulation shall be secured to metal panels with a fire-retardant adhesive and welded steel pins at 400 mm (16") o/c. All longitudinal insulation joints and butt ends shall be covered by a sheet metal break to prevent erosion of exposed edges. Drain pans and all floor areas shall be insulated on the underside.

.8 Drain pans and all floor areas shall be insulated on the underside.

.9 Use standard 18 ga. Satin coat flooring in all access sections. Provide structural reinforcing channels under floor to minimize deflection.

.10 Air handling units shall be weatherproofed and equipped for installation outdoors. This shall include generally for the prevention of infiltration of rain and snow into the unit, louvers or hoods on air intakes and exhaust openings with 1"(25mm) galvanized inlet screens; rain gutters or diverters over all access doors; all joints caulked with a water resistant sealant; roof joints turned up 2" (51mm) with three break interlocking design; outer wall panels extend a minimum of ¼"(6mm) below the floor panel; drain trap(s) connections for field supply and installation of drain traps.

.11 Units mounted on roof curbs incorporate welded floor to base construction. Floors are of three break upstanding design with welded corners and free of penetrations. Unit underside joints are caulked.

.12 Provide full perimeter roof mounting curb of heavy gauge sheet metal, minimum of 12" (305mm) high, and complete with wood nailer, neoprene sealing strip, and fully welded "Z" bar with 1" (25mm) upturn on inner perimeter, to provide a complete seal against the elements. External insulation of the roof-mounting curb shall be provided by the Roofing Subcontractor.

.1 Panels shall comply with the following performance tests and properties:

.1 Design load/deflection criteria and fastening pattern with limitation of 1/200th under positive and negative pressures. This shall be based on test design loading of 20 PSF (0.96 kPa).

.2 Panels shall withstand at least 2 million alternate cycles of 1/180 deflection without evidence of delamination, core cracking or permanent deformation.

.3 Air leakage shall not exceed .0015 CFM/sq. ft. of wall area at a pressure differential of 20 PSF (0.96 kPa).

.4 No uncontrolled water penetration through panel joints when tested at 20 PSF (0.96 kPa).

.5 Panels shall provide nominal thermal resistance of R=7.8/inch thickness.

.6 Panels shall meet the following standards of compliance for fire test and be so labeled by:

.1 (FM) Factory Mutual Corp

.2 (WH) Warnock-Hersey

.3 (UL) Underwriters Laboratory Inc.

.4 (ULC) Underwriters Laboratory Canada

Note: As an option to the above, no through metal construction may be achieved by using two standard built, off-set walls.

2.3 KAIC RATING

.1 Kilo Ampere Interrupting Capacity (kAIC) Rating

.1 Equipment shall be rated a interrupting capacity rating of 25 kAIC.

.2 All products supplied to the site shall meet or exceed this kAIC rating.

.3 The kAIC rating may be lowered to match or exceed the available fault current indicated on the Short Circuit Co-ordination Study completed by the electrical trade.

2.4 FANS

.1 Centrifugal fans shall be rated in accordance with AMCA Standard Test Code, Bulletin 210. Fan manufacturer shall be a member of AMCA. All fans and fan assemblies shall be dynamically balanced during factory test run. Fan shafts shall be selected for stable operation at least 20% below the first critical RPM. Fan shafts shall be provided with a rust inhibiting coating.

.2 Single/Double low pressure forward curved fans shall be equipped with greaseable pillow block bearings, supported on a rigid structural steel frame.

.3 Drives shall be adjustable on fans with motors 7 1/2 HP (5.6 kW) or smaller. On fans with larger motors, fixed drives shall be provided. All drives shall be provided with a rust inhibiting coating. The air balancer shall provide for drive changes (if required) during the air balance procedure.

.4 Units shall include a separate Nema 1 rated heated and vented cabinet capable of housing a controller to be installed by controls contractor.

.5 Motor, fan bearings and drive assembly shall be located inside the fan plenum to minimize bearing wear and to allow for internal vibration isolation of the fan-motor assembly, where required. Motor mounting shall be adjustable to allow for variations in belt tension.

.6 Provide belt guards on all supply and return blowers.

.7 Fan-motor assemblies shall be provided with vibration isolators. Isolators shall be bolted to steel channel welded to unit floor, which is welded to the structural frame of the unit. The isolators shall be neoprene-in-shear type for single 9" (230mm) to 15" (380mm) diameters forward curve fans. All other fans shall incorporate vertical spring type isolators with leveling bolts, bridge bearing waffled pads with minimum 1" (25mm) static deflection designed to achieve high isolation efficiency. Fans shall be attached to the discharge panel by a polyvinyl chloride coated polyester woven fabric, with a sealed double locking fabric to metal connection.

.8 All single-phase belt drive motor applications shall include rubber isolation for motors ¼ H.P. (.19kw) through 1 ½ H.P. (1.1kw). Provide internal spring isolation for single phase motors over 1 ½ H.P. (1.1kw).

.9 Provide single extended grease line from far side to access side bearing.

.10 Fan motors shall be inverter rated ODP super high efficiency.

2.5 GAS HEAT SECTION (DJS)

.1 General

.1 Heating units shall be indirect natural gas fired approved for both sea level and high altitude areas. The entire package, including damper controls, fan controls, and all other miscellaneous controls and accessories shall be approved by an independent testing authority and carry the approval label of that authority as a complete operating package.

.2 All units must exceed the ASHRAE 90.1 requirement of steady state efficiency at low fire.

.3 Operating natural gas pressure at unit(s) manifold shall be 7"w.c.(1750 Pa) .

.4 Gas fired units shall be approved for operation in -40°F(-40°C) locations.

.2 Heat Exchanger/Burner Assembly

.1 Heat exchanger shall be a primary drum and multi-tube secondary assembly constructed of titanium stainless steel with multi-plane metal turbulators and shall be of a floating stress relieved design. Heat exchanger shall be provided with condensate drain connection. The heat exchanger casing shall have 1"(25mm) of insulation between the outer cabinet and inner heat reflective galvanized steel liner. Blower location shall be engineered to improve the required air flow pattern around the heat exchanger. Using duct type furnaces and closed coupled blowers are not acceptable.

.2 High efficiency gas fired heat exchanger / burner assemblies (DJS) shall be tested and certified to ANSI/CSA standards to provide a minimum of 80% efficiency throughout the entire operating range as required by ASHRAE 90.1. The manufacturer shall be routinely engaged in the manufacture of this type of high efficiency equipment.

.3 The heat exchanger/burner assembly shall be a blow through positive pressure type. Units incorporate an interrupted pilot ignition system to provide increased safety. Units using continuous or intermittent pilots are not acceptable.

.4 Flame surveillance shall be from the main flame after ignition not the pilot flame. The burner and gas train shall be in a cabinet enclosure. Atmospheric burners or burners requiring power assisted venting are not acceptable.

.5 The heat exchanger/burner assembly shall include 15:1 turndown for all input ranges from 100MBH to 1400MBH (29.3 kW to 410 kW). The high turn down heat exchanger/burner assembly minimum input shall be capable of controlling 6.7% of its rated input, excluding the pilot assembly, without on/off cycling and include built in electronic linearization of fuel and combustion air. Efficiency during turndown shall increase 1-5% from high to low fire.

.3 Factory testing of indirect fired gas heating section.

.1 The minimum test requirements on all cabinet / fan size / fan type / fan orientation / heat exchanger / outlet configuration combinations previously built are listed below.

.1 Tests shall be performed after complete final unit assembly, just prior to shipping to job site. The tests shall be performed in accordance with the equipment standard that the gas heating section is certified.

.1 Heat exchanger shall be clocked with a dedicated calibrated gas meter to insure proper set up of the gas manifold.

.2 High and Low input flue gas combustion analysis using a calibrated combustion analyzer including O2 and CO to provide proper air fuel ratio throughout the entire operating range.

.3 A copy of the combustion test report shall be provided.

.2 Any single component or size or type or orientation change requires these tests. The tests shall be performed with standard factory temperature air, not design temperature air, through the unit as an additional heat exchanger safety factor.

.1 Heat Exchanger airflow pattern shall be tested to ensure uniform airflow across all parts of the heat exchanger.

.2 Once the equilibrium operating temperatures have been reached, the heat exchanger temperatures shall be checked to insure that all surfaces are below 1075°F (579.4°C). Temperatures above this can lead to premature heat exchanger failure.

.3 Flue gas temperature and combustion analysis shall be performed. The heat exchanger efficiency shall be analyzed and must meet current requirements.

.4 High limit operational check shall be performed to ensure proper function at all normal airflows including loaded filters.

.5 If the unit is capable of or intended to operate at varying air flows, all of the above tests must be performed at high flow and low flow.

.6 A copy of the test report shall be provided.

.4 Venting

.1 Installation and venting provisions must be in accordance with CAN/CSA Standard B149.1, ANSI Z223.1-NFPA 54, and local authorities having jurisdiction. Type A, L, and/or PS venting is required on indoor units.

.2 Unit(s) requiring sidewall venting shall be CETL, ETLUS approved for use with a sidewall ventor. The sidewall ventor shall be supplied by the unit manufacturer. The unit manufacturer must also supply the air proving switch, wall cap, double acting barometric damper, and all necessary control interlocks.

.5 Outdoor venting when installed close to a parapet or wall.

.1 Venting is to be provided by the installing contractor using materials approved for outdoors. Installation and venting provisions must be in accordance with CAN/CSA Standard B149.1, ANSI Z223.1-NFPA54 and local authorities having jurisdiction. Where flue requirements exceed 6” (150 mm) above the unit casing height, it is the installing contractor’s responsibility to provide and install venting including all structural-supporting requirements. Support is to be independent of the unit.

.6 Controls

.1 Electronic DJM module (Modulating Fuel w/ Modulating Combustion Air) complete with proportional and integral control with discharge air sensor to maintain set point temperature and provide rapid response to incremental changes in discharge air temperature. Combustion air motor speed varies proportionally in response to the modulation of gas flow to provide optimum fuel/air mixture and efficiency at all conditions. Combustion blower RPM shall be proved using a hall effect speed sensor. Two speed or step speed combustion blowers are not acceptable.

.2 Combustion efficiency of high efficiency heat exchangers shall increase by up to 1-5% from high fire to low fire while turning down on units incorporating 15:1 turndown (HT Burner). Heat exchangers shall provide a minimum of 80% efficiency throughout the entire operating range.

.3 Alternate manufacturers units that do not incorporate a variable speed combustion air blower shall have a modulating gas valve and a combustion air damper with a linear linkage connected to an actuator which has a minimum of 100 steps of control.

.4 Controllers shall include the following standard features:

.1 Service analyzer with diagnostic lights for ease of set-up and service

.2 linear gas and combustion air flow obtained via a built in solid-state linear algorithm

.3 -40°F(-40°C) minimum operating ambient temperature

.4 four air change pre-purge on units with over 400MBH(117kW) input

.5 maintained purge to decrease temperature cycles

.6 post purge

.7 interrupted pilot

.8 self check on start-up to make sure air proving and discharge air sensors are operating within design tolerances

.9 low fire start

.10 controlled burner start-up and shut down

.11 blower contactor that starts fan after burner prepurge

.12 economizer enable control

.13 damper contact that allows fan to start after damper opens, damper to close after fan stops, and damper to close on flame failure

.14 non-recycling auto by-pass low limit with alarm contacts and built-in sensor checking

.15 built-in alternate blower and damper functions and set back temperatures for unoccupied mode operation using a single room thermostat

.16 separate gas and air actuators independently controlled to give the correct air to fuel ratio though out the entire firing range.

.17 Acceptable controllers for heating units shall be Engineered Air DJM-3, Honeywell ControLinks R7999, or Nexus NX3100.

.5 Heating control function shall be modulating discharge air controlled by the unit CTRAC controller and reset by the building management system.

2.6 FILTERS

.1 Filter sections shall be provided with adequately sized access doors to allow easy removal of filters. Filter removal shall be from one side as noted on the drawings.

.2 For units with filter banks up to 72" (1825mm) high, the filter modules shall be designed to slide out of the unit. Side removal 1" (25mm) or 2" (50mm) filters shall slide into a formed metal track, sealing against metal spacers at each end of the track.

.3 2"(50mm) Merv 8 Pleated Panel Disposable Filters: An optimum blend of natural and synthetic fiber media with a rust resistant support grid and high-wet strength beverage board enclosing frame with diagonal support members bonded to the air entering and air exiting side of each pleat. Outside air intake filters to include a permanent re-usable metal enclosing frame. The filter media shall have a minimum efficiency of 30% on ASHRAE Standard 52.1-92, and a minimum of MERV 8 per ASHRAE 52.2. Rated U.L. Class 2.

.4 Filter media shall meet UL Class 2 standards.

.5 Provide each filter bank with Penn P32 pressure differential switch with a range of 0-2" w.c.. The pressure switch to be monitored by the building management system (BMS).

2.7 DAMPERS

.1 Dampers shall be certified low leak dampers tested to AMCA Standard 500-89 by an accredited test laboratory. These dampers include: extruded aluminum frame with corner reinforcing brackets, heavy duty extruded aluminum airfoil damper blades secured with bolts to continuous ½"(13 mm) aluminum drive rods, all weather PVC double seal blade gasket, tempered aluminum alloy blade end seal, epoxy enamel coated, oil impregnated bronze bushings, and non-corrosive smooth acting linkage.

.2 All dampers to be low leak airfoil Ruskin CD60. .

.3 Mixing dampers shall be parallel blade type.

.4 Two position inlet dampers shall be parallel blade type.

.5 Face and bypass dampers shall be opposed blade type.

.6 Motorized relief dampers shall be parallel blade type.

.7 Gravity relief dampers shall be single blade gasketted design.

.8 All dampers include Belimo 0-10 vdc modulating operator. Damper control is by the building management system.

2.8 FACTORY SUPPLIED CONTROLS/WIRING

.1 Provide a system of motor control, including all necessary terminal blocks, motor contactors, motor overload protection, grounding lugs, control transformers, auxiliary contactors and terminals for the connection of external control devices or relays.

.2 Gas fired units shall also include high limit and combustion airflow switch.

.3 Fire alarm circuits (where required) shall be powered from a relay in unit circuitry.

.4 Factory installed and wired non-fused disconnect switch in CEMA/NEMA 1 configuration.

.5 Automatic controls shall be housed in a control panel mounted in or on the air handling unit, which will meet that standard of the specific installation.

.6 Provide a discharge air low limit equipped with an automatic by-pass time delay to allow for cold weather start-up. On a heating system failure, this device will shut down the fan and close the outdoor air damper.

.7 BAS terminal strip.

2.9 COMPONENTS

.1 Filter section

.2 Supply air blower

.3 Gas fired heat exchanger

.4 Discharge air sensor.

2.10 ACCESSORIES

.1 Internal wiring to terminal strip in Nema 1 enclosure with space for DDC controller.

.2 Dead front disconnect.

.3 24" roof curb.

2.11 CAPACITY

.1 Provide unit capacity indicated.

2.12 ACCEPTABLE SOUND CRITERIA

Octave Band Round Power Levels (dB)								
63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**800**	**Total (dBA)**
88	**85**	**86**	**91**	**86**	**82**	**78**	**74**	**91**

Part 3 Execution

3.1 INSTALLATION

.1 Fabricate to provide smooth air flow through all components. Limit air leakage to 1% of rated air flow at 2.5 kPa (10" w.c.) suction pressure.

.2 Apply sealer into all seams prior to assembly. Secure toe angles continuous along entire length of assembly.

.3 Install to manufacturers requirements.

3.2 FANS

.1 Install flexible connections at fan outlets. Ensure metal bands of connectors are parallel and not touching when fan is running and when fan is stopped. Ensure that fan outlet and duct are aligned when fan is running.

3.3 START-UP/COMMISSIONING

.1 Unit manufacture shall perform start-up and commissioning.

3.4 TRAINING

.1 Provide 2 hours training to owner's staff on the care, maintenance, and operation of the equipment. Dedicated visit to site is required as it will not be paired with equipment startup.

3.5 SPARE PARTS

.1 Two (2) complete sets of filters.

.2 One (1) set of spare belts.

3.6 WARRANTY

.1 Warranty Start Date:

.1 Warranty period starts as of the date of Ready for Takeover.

.2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.

.2 Warranty Duration:

.1 Two (2) year warranty period applies.

.2 Two (2) years on parts and labour on all components.

.3 Ten (10) years on heat exchanger.

.3 Warranty Coverage:

.1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 CSA 22.2 No. 152 Combustible Gas Detection Instruments.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

.1 Electrical power supply.

.2 Installation instructions.

.3 Control function.

Part 2 Products

2.1 CO AND NO2 MONITOR

.1 Dual or single channel gas monitoring system with remote solid state carbon monoxide sensor and remote electrochemical nitrogen dioxide sensor/transmitter. Each set of sensors shall control exhaust fan and RTU.

.2 Unit shall include:

.1 Monitoring panel

.1 Monitor shall be enclosed in NEMA 12 cabinet.

.2 Dual alarm trip points (CO trip points will be at 25 and 100 ppm, NO2 trip points will be at 1 ppm and 3 ppm).

.3 Dual DPDT 10A relays for alarm actuation and control of ventilation equipment and/or auxiliary alarms. Connect alarm to respective exhaust fan.

.4 LEDs indicating power on, low and high alarms, and fail, plus a user selectable audio indicator capable of being silenced for high alarm.

.5 Test sequence activated by single push button.

.6 Alarms shall be equipped with user selectable time delays whereby, when chosen, low and high alarm conditions must prevail for five and ten minutes respectively before activation occurs.

.7 Alarms shall be equipped with dead band which requires gas levels to decline slightly below the original trip point before alarms will automatically reset.

.2 Carbon monoxide sensor

.1 Range of 0 – 100 ppm CO.

.2 Solid state type sensor.

.3 Three wire hook-up.

.4 Capable of covering up to 697 m2 (7500 ft2).

.5 To be mounted 1.2 m to 1.8 m (4' to 6') above floor level (breathing zone) to OBC requirements.

.3 Nitrogen dioxide sensor/transmitter

.1 4 m to 20 m (13' 4" to 6' 8") A linear signal output corresponding to 0 – 10 ppm NO2.

.2 Electrochemical type sensor.

.3 Remote calibration feature with non-interactive zero and span.

.4 Two wire hook-up.

.5 Capable of covering up to 697 m^2 (7500 ft^2).

.6 To be mounted 1.2 m to 1.8 m (4' to 6') above floor level (breathing zone) to OBC requirements.

.3 Type and placement: as indicated.

.4 Acceptable Manufacturers:

.1 Armstrong Monitoring Corporation Model #1022-D monitor with #AMC-1220 carbon monoxide sensor and #AMC-1220 nitrogen dioxide sensor/transmitter.

.2 Mine Safety Appliances Model TGM combo panel and 215068 CO sensors with 212569 NO2 sensors.

.3 Vulcain

.4 FCS Gas detection system by Critical Environment Technologies

.5 Belimo

Part 3 Execution

3.1 GENERAL

.1 Install in accordance with manufacturer's recommendations.

.2 Install in accordance with CSA standards and local authorities' requirements.

.3 Field test system to verify operation in presence of manufacturer.

.4 Install in accordance to local hydro requirements and the Electrical Safety Code.

.5 Install wiring in EMT conduit to the standards of the Electrical Division.

.6 Mount devices at height required to properly detect gas.

3.2 COMMISSIONING

.1 Prove operation at each sensor for all relevant gasses.

.2 Prove Stage 1 Detection in each zones. System shall demonstrate the following:

.1 Zone intake motorized dampers are interlocked, engaged, and fully operable.

.2 Zone exhaust fans are interlocked, engaged, and fully operable.

.3 Prove Stage 2 Detection in each zone.

.1 Local detectors provide audible and visual alarm.

.2 Dampers remain open and exhaust fans remain operable.

.4 Prove Stage 3 Detection in each zone

.1 When local detectors sense Stage 3 concentrations of toxic gases, all sensors in building will provide audible and visual alarm.

.2 Dampers remain open and exhaust fans remain operable.

.5 Prove gas detectors enter a local alarm when in a fault condition.

.6 Prove that all detectors audible alarm can be silenced by main gas detector control panel.

.7 Submit supporting documents to local authority and consultants, signed by testing agency.

3.3 WARRANTY

.1 Warranty Start Date:

.1 Warranty period starts as of the date of Ready for Takeover.

.2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.

.2 Warranty Duration:

.1 All components shall be CSA certified and carry a full two (2) year warranty against defects in labour and workmanship. Electrochemical sensors (NO2) carry a two year warranty.

.3 Warranty Coverage:

.1 Applies to parts and labour.

END OF SECTION

PART 1 General

1.1 GENERAL REQUIREMENTS

.1 Conform to General Conditions for Mechanical Trades.

.2 Related Work Specified Elsewhere.
- .1 General Conditions for Mechanical Trades
- .2 Plumbing & Drainage
- .3 Heating, Ventilation & Air Conditioning
- .4 Heating, Ventilation & Air Conditioning Equipment
- .5 Electrical

1.2 DESCRIPTION OF SYSTEM

.1 Furnish and install all components, devices and control wiring for a fully integrated Energy Management and Environmental Control System incorporating Direct Digital Control (DDC), and equipment monitoring. The system shall control/monitor HVAC and plumbing equipment and systems as specified in this section. The work shall include but is not limited to the following:
- .1 All necessary hardware, software, control panels, control wiring, field devices, installation, documentation, and owner training as specified.
- .2 The installed system shall incorporate electronic and digital control devices to perform the control sequences and monitoring outlined herein. Specific control sequence requirements are as detailed elsewhere in this Section of the specification.
- .3 Control and monitoring of the equipment and systems shown on the drawings (refer also to 'Sequence of Operation' for additional details).
- .4 Testing, debugging, calibrating, adjustment, programming, and confirmation of total system operation.

1.3 MANUFACTURER AND INSTALLING CONTRACTOR

.1 The control/programmable device manufacturer shall be Distech, integrated to the WRDSB TAC Vista server/BAS system automation. Existing BAS server upgrade to Niagara c/w new LAN front end device (Distech ECBOS / Vycon JACE / JCL "Niagara") and integration of all existing Mechanical/Electrical and new controls c/w updated front end graphics and updated control sequences for all equipment.

.2 Energy Controls, the local Distech integrator is available at phone 519-893-2638.

.3 Any new building must be a seamless extension of the current Energy Management and Building Control System.
- .1 The existing TAC Vista software is, and shall continue to be, the only head-end BAS server for the entire School Board.

.2 The head-end server contains the secure Energy Management Settings (i.e. Master Setpoints and Schedules) that are sent to all schools in real-time. The control system must be an extension of the head-end server and be able to be managed exclusively through the Vista head-end server.

.3 Monitoring of all school board control systems are done in real-time and must be presented at the exclusive Vista head-end server as first-priority data.

.4 The Vista head-end server has all the required controller databases and software to be able to centrally maintain and modify network configuration and controller software for the entire School Board. The Vista head-end server is the only system that can access the LacNet programming variables inside the controllers for real-time configuration of setpoint and time scheduling parameters.

.5 The graphics and controller database must be presented inside the Vista head-end server in its native format in order to preserve the real-time speed, integrity and multi-site administration of the entire system.

1.4 SCOPE OF WORK

.1 Refer to drawings and specification for complete scope.

.2 New RTU units complete with remote exhaust fans.

.3 Removal/upgrading of of existing BAS system with new Niagara based programmable controllers in renovation spaces.

.4 Upgrade existing controls in the areas of construction.

.5 RTU economizer control.

.6 Ventilation lockout.

.7 Minimum outside air schedule.

.8 CO_2 controls.

.9 Trending.

.10 Summary page in graphics (fan status, MAT, SAT, CO_2, Schedule).

.11 Revision summary control drawings.

.12 Controller locations shown on graphics.

.13 Standby schedule for all systems.

QUALITY ASSURANCE

.1 The system components shall be listed by Underwriters Laboratories Inc. and Canadian Standards Association.

.2 The system control products shall be stored and handled according to manufacturer' recommendations.

.3 The work shall be performed by skilled technicians all of whom shall be properly trained and qualified for this work.

1.6 SUBMITTALS

.1 Prior to the installation of any equipment, the Contractor shall provide the Consultant with shop drawings and specifications for all devices and equipment used for the complete system installation. Shop drawings shall include the following:

- .1 Identified schematic control diagrams for all systems, each diagram indicating or referencing input / output connection points, control components, component catalogue numbers, operation sequence, interlocking and RPU's to which they are connected.
- .2 Complete network schematic indicating all programmable controllers and data connections.
- .3 Detailed listing of inputs and outputs of each programmable controller.
- .4 Control damper schedule indicating damper size, required torque and blade type.
- .5 Technical data sheets / manufacturer application manuals of each system component.

.2 Upon completion of the installation and prior to acceptance and Owner training, the Contractor shall furnish the Consultant with three copies of installation and operation manuals for the system. Each manual shall include:

- .1 Record drawings, including plan layout indicating major device locations and wiring diagrams as finally installed.
- .2 All shop drawings, incorporating all required revisions to reflect as-built conditions.
- .3 The Contractor shall also keep one copy of backup programs for the system archived in a software storage vault at their business location.

Part 2 Products

2.1 GENERAL

.1 The control system shall be a Tour Andover (TAC) Xenta/Distech building automation system (BAS).

.2 The system shall integrate the operation of intelligent building management controllers distributed into the network.

.3 The DDC System shall be generally comprised of the following devices to achieve the control functions described in this section:
- .1 Xenta/Distech programmable controllers
- .2 Distech input/ output programmable I/O modules.
- .3 Control relays.
- .4 Control dampers and valves.
- .5 Sensors, actuators and other input/output devices.

.4 Controllers shall execute the application programs, calculations, and commands to provide the control function specified for that unit. Each controller shall include its own micro-computer controller, power supply, input/output modules, termination modules and real time clock.

.5 Controllers shall be capable of full control functionality and alarm reporting independently or as a part of the DDC network.

.6 The system shall be stored in flash ram so no batteries are required.

.7 Each control device shall be modular and expandable to provide additional inputs and outputs and control functionality for that device.

.8 Each controller shall be able to transfer and receive data via the network for performance of control functions.

.9 The system shall be modular, permitting expansion by adding hardware and software without changes in communication or processing equipment.

.10 The complete system shall be capable of communication over a LonWorks network.

.11 The controllers shall monitor the status of all overrides and include this information in logs and summaries to inform the operator that automatic control has been inhibited.

.12 Controllers shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all subsidiary equipment and provide both local and remote annunciation of any component failures.

.13 Controllers shall activate an orderly shutdown of their operation in the event of loss of normal electrical power. Non-volatile memory shall be incorporated for all controller configuration data. The controllers shall automatically resume full operation without manual intervention.

.14 The controllers shall have sufficient memory to support their own operating system and data bases including:
- .1 control processes
- .2 energy management applications
- .3 alarm management
- .4 trend data
- .5 operator input/output
- .6 remote communications
- .7 manual override monitoring

.15 Controllers shall incorporate the following software features:
- .1 Energy management:
  - .1 Time of Day Scheduling
  - .2 Calendar Based Scheduling
  - .3 Holiday Scheduling
  - .4 Optimal Start and Stop
  - .5 Demand Limiting
  - .6 Heating/Cooling Interlock
- .2 Alarm Management:
  - .1 Alarm Management shall be provided to monitor, buffer and direct alarm reports to operator devices and memory files. The controllers shall perform alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic and prevent alarms from being lost.
  - .2 All alarm or point change report shall include the points English language description and the time and date of occurrence.
  - .3 The user shall be able to define the specific reaction for each point, the priority level (3 in total) and ability to inhibit alarm reporting for each point.
  - .4 The user shall be able to define conditions under which point changes need to be acknowledged by an operator and logged for analysis at a later date.
  - .5 The user shall be able to print, display or store a unique 60 character alarm message to more fully describe the alarm condition or direct operator response. The message shall be customizable to describe each individual alarm.
  - .6 In web access applications only critical alarms shall initiate a call to a remote operator device, otherwise call activity shall be minimized by time stamping and saving reports until a manual request is received or until the buffer space (minimum 50 alarms) is full.
- .3 Trend Logs:
  - .1 Controllers shall provide an automatic roll-over trend log, which stores records up to an operator-selected number at an operator-selected sampling rate and then overwrites the oldest record with each new record.
  - .2 Sample intervals shall be from 1 minute to 24 hours.

.3 Provide graphical and tabular displays.

.4 Runtime Totalization:

.1 The controllers shall automatically accumulate and store runtime hours for binary points with a sampling resolution of 1 minute. The user shall have the ability to define a warning limit to trigger maintenance or user-defined messages.

.5 Custom Programming:

.1 The controllers shall permit user defined custom control processes based on:

.1 any system measured data or status

.2 any calculated data

.3 any results from other processes

.4 Boolean logic

.2 The custom processes may be triggered by:

.1 Time-of-day

.2 calendar date

.3 events (point alarm etc.)

.16 The control strategy for each control loop shall be performed by software within the controller. The sequence of events required for each control loop is described for each system in the control sequence.

.17 Outdoor air temperature indication shall be available at each controller as an integral part of the control strategies for that controller. Should the network transmission of the common outdoor air temperature (or any other common value) fail, then each controller shall use the last good value received.

2.2 NETWORK ARCHITECTURE

.1 The controllers on the local network shall communicate via a two wire LonTalk TP/FT-10 network.

2.3 CONTROL PANELS

.1 Control panels shall be fully enclosed cabinets with all steel construction. Cabinets shall have a hinged door with locking latch or bolt-on cover plate. All cabinet locks shall be common keyed. Cabinets shall be finished with two coats of paint.

2.4 TEMPERATURE SENSORS

.1 Provide thermistor temperature sensors, not requiring transmitters, to measure temperature.

.2 Accuracy shall be +/-0.2°C from 0 to 70°C.

.3 Temperature sensors shall be Greystone EC200 series.

.4 Space sensors in occupied areas shall be type AE or equal having an integral push button for unoccupied override and an integral slider to adjust set point (LED display not required).

.5 In corridors and where noted on the drawings, provide stainless steel plate type sensors (push button override and LED display not required), type AS.

.6 Duct temperature sensors shall be type B having a stainless steel probe length to suit application and ABS enclosure. Duct averaging temperature sensors shall be type FD having an element length to suit application, copper probe and ABS enclosure.

.7 Immersion temperature sensors shall be type C having a ¼" OD stainless steel probe, 4" long and ABS enclosure. Immersion sensors shall be complete with thermowells. Thermal conductive compound shall be added inside the thermowell to provide optimum thermal transfer from the fluid to sensor. Stainless steel thermowells shall be used for steel pipe and brass thermowells shall be used in copper pipe.

2.5 CARBON DIOXIDE SENSORS

.1 Sensors shall Greystone CDD series or equal having the following features:
- .1 0-2000 ppm factory default detection range, field adjustable.
- .2 Non-dispersive infrared sensing element with self-calibration algorithm.
- .3 Guaranteed five (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 two (2) minutes for 90% step change.

.2 Duct mounted sensors shall be complete with ABS enclosure complete with sampling tube.

.3 Space mounted sensors shall be executive space type without LCD display.

2.6 MOTORIZED CONTROL DAMPERS (PROVIDED BY BAS, INSTALLED BY MECH.)

.1 Control dampers shall be the parallel or opposed blade type as below or as scheduled on drawings.
- .1 Outdoor and/or return air mixing dampers and face and bypass (F & BP) dampers shall be parallel blade, arranged to direct airstreams toward each other.
- .2 Other modulating dampers shall be the opposed blade type.
- .3 Two-position shut off dampers may be parallel or opposed blade type with blade and side seals.

.2 Damper frames shall be 13 gauge galvanized steel channel or 1/8 in. extruded aluminum with reinforced corner bracing.

.3 Damper blades shall not exceed 20 cm (8 in.) in width or 125 cm (48 in.) in length. Blades are to be suitable for medium velocity performance (10 m/s [2000 fpm]). Blades shall be not less than 16 gauge.

.4 Damper shaft bearings shall be as recommended by manufacturer for application, oil impregnated sintered bronze or better.

.5 All blade edges and top and bottom of the frame shall be provided with replaceable butyl rubber or neoprene seals. Side seals shall be spring-loaded stainless steel. The blade seals shall provide for a maximum leakage rate of 50 L/s m^2 (10 cfm per ft^2) at 1000 Pa (4 in. w.g.) differential pressure. Provide air foil blades suitable for a wide-open face velocity of 7.5 m/s (1500 fpm).

.6 Individual damper sections shall not be larger than 125 cm x 150 cm (48 in. x 60 in.). Provide a minimum of one damper actuator per section.

.7 Modulating dampers shall provide a linear flow characteristic where possible.

.8 Dampers shall have exposed linkages.

2.7 WATER CONTROL VALVES

.1 Heating and cooling control valves shall be Belimo CCV series characterized ball valves, complete with chrome plated brass trim and NPT female pipe connections. Radiation valves shall be complete with non-spring return modulating actuators. Control valves for coils heating a portion of outdoor air shall have spring return modulating actuators.

.2 Control valves shall be sized to provide approximately one half the circuit branch pressure drop to obtain good modulation control but they shall be no smaller than two (2) pipe sizes less than the pipe they are installed in.

Part 3 Execution

3.1 INSTALLATION

.1 Installation

.1 All controllers and components in the system and on the network shall be installed according to manufacturer recommendations, general installation standards for digital controls and in accordance with the approved shop drawings.

.2 Locate room sensors in the locations shown on the mechanical drawings. All sensors shall be mounted at barrier free height (3'-11" (1175 mm) above finished floor).

.3 All control components for off site system access shall be located where noted on the drawings. The Electrical Contractor shall provide all required connections / cabling for off site access to the web access components.

.4 All programmable controllers, web access components, relays and other control components shall be located within control panels. Control Panels shall be wall mounted and shall be located within suspended ceiling spaces or other locations approved by the Consultant.

.5 The Electrical Contractor will provide hand-off-auto switches in all starters controlled by the BAS.

.2 Generally duct mount carbon dioxide sensors shall be used where specified for air handling units; but, for gyms and single zone libraries, a wall mount carbon dioxide sensor shall be mounted next to the room temperature sensor.

.3 All carbon dioxide levels which are measured by the carbon dioxide sensors shall be made available to the Owner in the form of trend logs. Record readings at 10 minute intervals and keep them for at least 30 days.

.4 Freeze-stats shall be installed so that their sensing element runs horizontally across the coil face (not diagonally) with no more than 12" vertical drops at the outside coil frame. The full face of the coil shall be covered with no horizontal runs being more than 12" apart. The top and bottom horizontal run shall be within 6" of the coil frame. If more than one freezestat is required they shall be wired in series in order to detect a low temperature in portion of the coil. The sensing elements shall be firmly secured in place to avoid vibration without added air restriction.

3.2 SYSTEM START-UP AND ACCEPTANCE

.1 Upon completion of installation, test, adjust and calibrate controls provided under this Section.

.2 On system completion, a demonstration of complete system operation shall be made to the Owner’s authorized representative and Consultant.

.3 The Consultant shall verify through the Owners representatives that the entire system is complete and operating to the satisfaction of the Owner before final acceptance is approved.

3.3 TRAINING

.1 The Contractor shall provide competent instructors to give full instruction to designated personnel in the adjustment, operation and maintenance of the system installed rather than a general training course. Instructors shall be thoroughly familiar with all aspects of the subject matter they are to teach. All training shall be held during normal work hours of 8:00 a.m. to 4:30 p.m. weekdays as follows:

.2 Provide four (4) hours of training for Owner’s operating personnel. Training shall include:

.1 Explanation of drawings, operations, and maintenance manuals

.2 Explanation of web access program

.3 Explanation of adjustment procedures
.4 Trend Analysis

3.4 WARRANTY

.1 Warranty Start Date:
.1 Warranty period starts as of the date of Ready for Takeover.
.2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.

.2 Warranty Duration:
.1 Warranty in writing, all provided equipment, accessories, installations, software and firmware against defects in workmanship and materials for a period of two year commencing from the date of Ready for Takeover.
.2 Maintain the affected parts operational during repair of defective equipment covered by the warranty.
.3 Provide warranty service at no cost to the owner for the guarantee period, this shall include, but not limited to the following:
.1 Emergency repair service on regular working hour basis during warranty.
.2 Replacing defective parts and components as required.
.3 Servicing by factory trained and employed service representatives of system manufacture.
.4 System software support.
.4 Supplier shall have an in-place support facility within 32 km (20 miles) of the site with technical staff, spare parts inventory and all necessary test and diagnostic equipment.

.3 Warranty Coverage:
Applies to parts and labour.

3.5 IDENTIFICATION

.1 Provide system identification and provide nameplates identifying the following (nameplates shall be keyed to the wiring diagrams):
.1 Duct mounted sensors.
.2 Control panels (identify as to equipment / systems controlled). Each panel shall include an as-built drawing showing all the connected control points.

3.6 TESTING AND BALANCING

.1 During the system testing and balancing by the Testing and Balancing Agency, demonstrate the operation of all controls. During balancing procedures, set controls to a fixed mode (bypass damper locked fully closed and all zone dampers locked fully open) to prevent any changes during the balancing procedure.

3.7 ELECTRICAL WIRING

.1 All wiring shall be installed to the standards specified in the Electrical Division.

.2 Use Echelon recommended jacket cable for all network wiring, colour-coded to WRDSB standards.

.3 Run all wiring in EMT conduit where exposed, where running within new concrete block walls and where required by the Ontario Electrical Code. Plenum rated cable shall be used in return air ceiling plenums.

.4 Control relays necessary for BAS operation shall be provided by the Temperature Control Contractor but all contactors and their power supplies handling power wiring to the equipment shall be by the Electrical Contractor.

Part 4 Sequence of Operation

4.1 GENERAL

.1 All setpoints shall be adjustable.

.2 Outdoor air temperature shall be broadcasted to all controllers.

.3 Heating mode: Heating is enabled between October 15 and April 15 or if the outdoor air temperature is below 10°C. This heating mode is used in all controllers for the building.

.4 Cooling Mode (if applicable to unit): Mechanical cooling is enabled if the outdoor air temperature is above 18°C.

.5 Occupancy mode shall be determined by a weekly schedule with an annual holiday schedule. Each system shall have this schedule but there shall be provision for operating under a general (to the building) schedule as well. An adjustable parameter shall be available to select the local or general schedule for each system.

.6 Lead/lag: Devices designed for lead lag operation shall operate in automatic lead/lag mode to equalize run time. If the lead unit fails the lag shall automatically start and an alarm shall be generated. The lead unit shall be advanced through the series of devices in sequence every Tuesday at noon.

4.2 RTU INTERLOCKED WITH EXHAUST FAN

.1 The general exhaust fan is to be interlocked and to operate in sequence with the unit in ventilation mode. All exhaust to be through remote exhaust fan. Return air damper & outside air damper (mixing dampers) and exhaust fan to modulate in unison.

Provide status and alarm on failure.

On sensing that an exhaust fan is operational, the mixing dampers open to a revised minimum position; (set by air balancer based upon minimum outdoor air requirement), the heating modulates to maintain set point.

Based on CO2 reading, the mixing dampers and exhaust fan to modulate to maintain setpoint of 1000ppm (adj).

Monitor the process of new and existing exhaust fans and open fresh air damper to maintain room make-up air. Some rooms have multiple exhaust systems requiring a staged event. Rooms to have a pressure sensor and operate in slightly negative pressure (10% (adj)) compared to adjacent corridor. General exhaust fan and RTU to modulate to maintain pressure setpoint (adjustable).

.2 Unoccupied (Normal Off)
The supply fan is off, gas heat is off, mixing dampers are in 100% recirculation position (closed to outdoor air).

.3 Night or Unoccupied Mode Heating
If the space temperature drops below the night setback set point, the unit will start and run until the room temperature rises by 3°C (100% recirculation). Maintain minimum space temperature of 18°C (65°F).

.4 Emergency Purge Button
If emergency purge button is energized, return damper to close and outside air damper to open 100%. General exhaust to operate at maximum speed.

.5 Limits & Safeties
A low temperature detector in the discharge of the heat exchanger will shut down the supply fan and close the outside air damper if the temperature leaving the heat exchanger falls below a low limit set point. An alarm is generated at the BAS. The low temperature detectors shall be wired to the fan starters.

.6 RTU-2 & EF-2 serving Auto Mechanics/Truck Coach (Rm 124) shop shall to also be interlocked with a gas detection system. Upon detection of CO/NOx at alarm concentrations, RTU-2 and EF-2 shall operate until the gas levels in the space decline below the trip point. Refer to section 250 05 21 for details.

END OF SECTION

Division 26 Common Requirements for Electrical

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26 05 20 Splitters, Junction, and Pull Boxes
26 05 21 Outlet Boxes, Conduit Boxes, and Fittings
26 05 27 Seismic Restraint for Electrical Systems
26 05 33 Conduits, Conduit Fastenings, and Conduit Fittings
26 05 75 Auxiliary Systems

Low-Voltage Distribution Equipment

26 27 26 Wiring Devices

Low-Voltage Circuit Protective Devices

26 28 16 Disconnect Switches

Lighting

26 51 13 Lighting Equipment
26 51 16 Digital Occupancy & Daylight Control Systems

Division 28 Electronic Safety and Security

Fire Detection and Alarm

28 31 26 Fire Alarm System (Renovation)

END OF SECTION

Part 1 General

1.1 GENERAL

.1 This Section covers items common to Electrical Division 26, as well as Division 27 and Division 28.

.2 This section supplements requirements of Division 1.

.3 Furnish labour, materials, and equipment necessary for completion of work as described in contract documents.

1.2 INTENT

.1 Mention herein or indication on Drawings of articles, materials, operations, or methods requires: supply of each item mentioned or indicated, of quality, or subject to qualifications noted; installation according to conditions stated: and, performance of each operation prescribed with furnishing of necessary labour, equipment, and incidentals for electrical work.

.2 Where used, words “Section” and “Division” shall also include other Subcontractors engaged on site to perform work to make building and site complete in all respects.

.3 Where used, word “supply” shall mean furnishing to site in location required or directed complete with accessory parts.

.4 Where used, word “install” shall mean secured in place and connected up for operation as noted or directed.

.5 Where used, word “provide” shall mean supply and install as each is described above.

1.3 TENDERS

.1 Submit tender based on specified described equipment or Alternates listed.

.2 State in Tender, names of all Subcontractors proposed for work under this Division.

1.4 LIABILITY INSURANCE

.1 This contractor must maintain and produce at the request of the consultant proof of proper insurance to fully protect the owner, the consultant and the contractor from any and all claims due to accidents, misfortunes, acts of God, etc.

1.5 ELECTRICAL SAFETY AUTHORITY

.1 The contractor is to determine general inspection fees with Electrical Safety Authority and include as part of tender.

1.6 DRAWINGS

.1 Electrical Drawings do not show structural and related details. Take information involving accurate measurement of building from building drawings, or at building. Make, without additional charge, any necessary changes or additions to runs of conduits and ducts to accommodate structural conditions. Location of conduits and other equipment may be altered by the consultant without extra charge provided change is made before installation and does not necessitate major additional material.

.2 As work progresses and before installing fixtures and other fittings and equipment which may interfere with interior treatment and use of building, provide detail drawings or obtain directions for exact location of such equipment and fitments.

.3 Electrical drawings are diagrammatic. Where required work is not shown or only shown diagrammatically, install same at maximum height in space to conserve head room (minimum 2200 mm (88") clear) and interfere as little as possible with free use of space through which they can pass. Conceal wiring, conduits and ducts in furred spaces, ceilings and walls unless specifically shown otherwise. Install work close to structure so furring will be small as practical.

.4 Before commencing work, check and verify all sizes, locations, grades, elevations, levels and dimensions to ensure proper and correct installation. Verify existing/municipal services.

.5 Locate all electrical equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.

.6 In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install services so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose.

.7 Relocate equipment and/or material installed but not co-ordinated with work of other Sections as directed, without extra charge.

.8 Where drawings are done in metric and product not available in metric, the corresponding imperial trade size shall be utilized.

1.7 INTERFERENCE AND CO-ORDINATION DRAWINGS

.1 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the constructed spaces provided.

.2 Prepare drawings to indicate co-ordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are co-ordinated.

.3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.

.4 Upon consultant’s request submit copies of interference drawings to the consultant.

.5 Due to the nature of the building and the complexity of the building systems provide the following:

.1 Interference drawings, showing coordination of architectural, structural, mechanical, and electrical systems for the consultant's review prior to fabrication.

.2 Detailed equipment room drawings clearly showing all distribution equipment.

.3 Detailed layout drawings clearly showing conduit/feeder runs 78mm diameter or larger, including hangers or tray.

.6 Provide CAD drawings (minimum file version AutoCAD 2013) in addition to hard copies.

1.8 QUALITY ASSURANCE

.1 The installations of the division must conform to the latest edition of the Electrical Safety Code as well as its supplemental bulletins and instructions. Provide materials and labour necessary to comply with rules, regulations, and ordinances.

.2 Abbreviations for electrical terms: to CSA Z85-1983.

.3 In case of differences between building codes, provincial laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify consultant in writing of such differences.

1.9 ALTERNATES AND SUBSTITUTIONS

.1 Throughout these sections are lists of "Alternate Equipment" manufacturers acceptable to consultant if their product meets characteristics of specified described equipment.

.2 Each bidder may elect to use "Alternate Equipment" from lists of Alternates where listed. Include for any additional costs to suit Alternated used. Prices are not required in Tender for Alternates listed except where specifically noted as "Separate Price".

.3 When two or more suppliers/manufacturers are named in the Bid Documents, only one supplier/manufacturer of the products named will be acceptable; however, it is the responsibility of this Division to ensure "Alternate Equipment" fits space allocated and gives performance specified. If an "Alternate Equipment" unit is proposed and does not fit space allotted nor equal specified product in consultant's opinion, supply of specified described equipment will be required without change in Contract amount. Only manufacturers listed will be accepted for their product listing. All other manufacturers shall be quoted as substitution stating conditions and credit amount.

.4 If item of material specified is unobtainable, state in Tender proposed substitute and amount added or deducted for its use. Extra monies will not be paid for substitutions after Contract has been awarded.

1.10 EXAMINATION

.1 Site Reviews

.1 Examine premises to understand conditions, which may affect performance of work of this Division before submitting proposals for this work.

.2 No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

.2 Drawings

.1 Electrical Drawings show general arrangement of fixtures, power devices, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.

.2 Consider Architectural, Mechanical, and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Electrical Drawings.

.3 Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories, which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings and accessories required to meet conditions.

.3 Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

1.11 SEQUENCING AND SCHEDULING

.1 It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for installation of systems according to the true intent and meaning of Contract Documents. Anything not clear or in conflict will be explained by making application to consultant. Should conditions arise where certain changes would be advisable, secure consultant's approval of these changes before proceeding with work.

.2 Coordinate work of various trades in installing interrelated work. Before installation of electrical items, make proper provision to avoid interferences in a manner approved by consultant. Changes required in work specified in these sections caused by neglect to do so shall be made at no cost to owner.

.3 Arrange fixtures, conduit, ducts, and equipment to permit ready access to junction boxes, starters, motors, control components, and to clear openings of doors and access panels.

.4 Furnish and install inserts and supports required by these sections unless otherwise noted. Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions of the Work to Sections involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne by the electrical trade.

.5 Adjust locations of ducts, conduits, equipment, fixtures, etc., to accommodate work from interferences anticipated and encountered. Determine exact route and location of each conduit and duct prior to installation.

.1 Make offsets, transitions, and changes in direction of ducts, and electrical raceways as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.

.2 Supply and install pull boxes, etc., as required to affect these offsets, transitions, and changes in direction.

1.12 REQUEST FOR INFORMATION (RFI) PROCEDURES

.1 RFIs shall be submitted to the consultant minimum two (2) weeks prior to answer being required. Failure to submit and RFI in a timely manner will forfeit delay claims and schedule extension requests by the contractor.

.2 All RFIs will be submitted with the following information:

.1 RFI number

.2 Name of project

.3 Date of initiation

.4 Date response required by (minimum two (2) weeks)

.5 Subject

.6 Submitter's name

.7 Drawing/specification reference

.8 Photograph of the issue (if applicable)

.9 Description of the issue

.10 Contractor's proposed resolution

1.13 DRAW BREAKDOWN

.1 This contractor MUST submit a breakdown of the tender price into classifications to the satisfaction of the consultant, with the aggregate of the breakdown totaling the total contract amount. **Each item must be broken out into material and labour costs.** Progress claims, when submitted are to be itemized against each item of the draw breakdown. This shall be done in table form showing contract amount, amount this draw, total to date, % complete and balance.

.2 Breakdown shall be as follows:

.1 Permits and fees

.2 Mobilization (maximum 1%)

.3 Demolition

.4 Branch conduits

.5 Branch wiring

.6 Lighting fixtures (interior)

.7 Emergency lighting

.8 Fire alarm system devices and rework

.9 Auxiliary system rough-ins

.10 Integrated Life Safety System Testing

.11 Commissioning (minimum 3%)

.12 Electrical contractor closeout requirements (minimum of 3% but not less than $3,500.00)

.3 The breakdown must be approved by the consultant prior to submission of the first draw.

.4 Breakdowns not complying to the above will not be approved.

.5 Breakdown must indicate total contract amount.

.6 Mobilization amount may only be drawn when all required shop drawings have been reviewed by the consultant.

1.14 SHOP DRAWINGS AND PRODUCT DATA

.1 General

.1 Furnish complete catalog data for manufactured items of equipment to be used in the work to consultant for review within 14 days after award of Contract.

.2 Upon receipt of reviewed shop drawing, product is to be ordered immediately.

.3 Provide a complete list of shop drawings to be submitted prior to first submission.

.4 Before submitting to the consultant, review all shop drawings to verify that the products illustrated therein conform to the Contract Documents. By this review, the contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers, and similar data and that it has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The contractor's review of each shop drawings shall be indicated by stamp, date and signature of a qualified and responsible person possessing by the appropriate authorization.

.5 If material or equipment is not as specified or submittal is not complete, it will be rejected by consultant.

.6 Additional shop drawings required by the contractor for maintenance manuals, site copies etc., shall be photocopies of the "reviewed" shop drawings. All costs to provide additional copies of shop drawings shall be borne by the contractor.

.7 **Submit all shop drawings for the project as a package. Partial submittals will not be accepted**.

.8 Catalog data or shop drawings for equipment, which are noted as being reviewed by consultant or his engineer shall not supersede Contract Documents.

.9 Review comments of consultant shall not relieve this Division from responsibility for deviations from Contract Documents unless consultant's attention has been called to such deviations in writing at time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.

.10 Check work described by catalog data with Contract Documents for deviations and errors.

.11 Shop drawings and product data shall show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances. e.g. access door swing spaces.

.12 Shop drawings and product data shall be accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Manufacturer test data where requested.

.3 Manufacturer to certify as to current model production.

.4 Certification of compliance to applicable codes.

.13 State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information. List on catalog covers page numbers of submitted items. Underline applicable data.

.14 If a shop drawing is returned "reviewed as noted" this contractor must provide written indication that the comments have been complied with.

.15 A partial list of shop drawings includes:

.1 Luminaires and drivers

.2 Lighting Controls

.3 Emergency battery units, exit signs, and fixtures

.4 Firestopping materials

.5 Surface raceways

.6 Wiring devices

.7 Lighting controls

.8 Disconnect switches and fuses

.9 Integrated Life Safety System Testing Plan (ITP)

.2 Submissions shall be submitted electronically as per the following directions:

.1 Electronic Submissions:

.1 Electronically submitted shop drawings shall be prepared as follows:

.1 Use latest software to generate PDF files of submission sheets.

.2 Scanned legible PDF sheets are acceptable. Image files are not acceptable.

.3 PDF format shall be of sufficient resolution to clearly show the finest detail.

.4 PDF page size shall be standardized for printing to letter size (8.5" x 11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11" x 17".

.5 Submissions shall contain multiple files according to section names as they appear in Specification.

.6 File names shall include consultant project number and description of shop drawing section submitted.

.7 Each submission shall contain an index sheet listing the products submitted, indexed in the same order as they appear in the Specification. Include associated PDF file name for each section.

.8 On the shop drawing use an “electronic mark” to indicate what is being provided.

.9 **Each file shall bear an electronic representation of the “company stamp” of the contractor. If not stamped the file submission will not be reviewed.**

.2 Email submissions shall include subject line to clearly identify the consultants’ project number and the description of the shop drawings submitted.

.3 Electronic attachments via email shall not exceed 10MB. For submissions larger than 10MB, multiple email messages shall be used. Denote related email messages by indicating “1 of 2” and “2 of 2” in email subject line for the case of two messages.

.4 Electronic attachments via web links (URL) shall directly reference PDF files. Provide necessary access credentials within link or as username/password clearly identified within body of email message.

.5 On site, provide one (1) copy of the “reviewed” shop drawings in a binder as noted above.

.6 Contractor to print copies of “reviewed” shop drawings and compile into maintenance manuals in accordance with requirements detailed in this section.

1.15 CARE, OPERATION AND START-UP

.1 Instruct consultant and operating personnel in the operation, care and maintenance of equipment.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation and ensure that operating personnel are conversant with all aspects of its care and operation.

1.16 VOLTAGE RATINGS

.1 Operating voltages: to CAN3-C235-83.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.17 PERMITS, FEES, AND INSPECTION

.1 A submission has been made (if required by this scope of project) by the consultant to the Electrical Safety Authority for review of this project. The payment of the required review costs will be co-ordinated by the consultant. A copy of the Electrical Safety Authority review report will be forwarded to the successful contractor for information and action.

.2 The contractor is required to include in his tender all required inspection costs by the Electrical Safety Authority. Permit application is the responsibility of the contractor.

.3 Reproduce drawings and specifications required by Electrical Safety Authority at no cost.

.4 Notify consultant of changes required by Electrical Safety Authority prior to making changes.

.5 Furnish Certificates of Acceptance to consultant from Electrical Safety Authority and other authorities having jurisdiction upon completion of work.

.6 This contractor must furnish any certificates required to indicate that the work completed conforms with laws and regulations of authorities having jurisdiction.

1.18 ADDITIONAL INSTALLED EQUIPMENT

.1 The electrical contractor is to review all specification sections forming part of the electrical bid documents and include additional equipment or components, as well as all associated installation costs and testing costs as noted, in the electrical bid price.

1.19 MATERIALS AND EQUIPMENT

.1 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Safety Authority.

.2 Factory assemble control panels and component assemblies.

1.20 ELECTRIC MOTORS, EQUIPMENT, AND CONTROLS

.1 Supplier and installer responsibility is indicated in the Equipment Wiring Schedule on electrical drawings.

.2 Control wiring and conduit is specified in the Electrical specifications except for conduit, wiring and connections below 50 V, which are related to control systems specified in the Mechanical specifications.

1.21 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint outdoor electrical equipment "equipment green" finish.

.2 Paint indoor switchgear and distribution enclosures light grey.

.2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.3 Clean and prime exposed non-galvanized hangers, racks, fastenings, and conduits etc. to prevent rusting.

1.22 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

.2 Nameplates:

.1 Lamicoid 3 mm (1/8") thick plastic engraving sheet, black face, white core, mechanically attached with self tapping screws.

NAMEPLATE SIZES

Size 1	9 mm x 50 mm (3/8" x 2")	1 line	3 mm (1/8") high letters
Size 2	12 mm x 70 mm (1/2" x 2 1/2")	1 line	5 mm (3/16") high letters
Size 3	12 mm x 70 mm (1/2" x 2 1/2")	2 lines	3 mm (1/8") high letters
Size 4	20 mm x 90 mm (3/4" x 3 1/2")	1 line	9 mm (3/8") high letters
Size 5	20 mm x 90 mm (3/4" x 3 1/2")	2 lines	5 mm (3/16") high letters
Size 6	25 mm x 100 mm (1" x 4")	1 line	12 mm (1/2") high letters
Size 7	25 mm x 100 mm (1" x 4")	2 lines	6 mm (1/4") high letters

.3 Wording on nameplates labels to be approved by consultant prior to manufacture.

.4 Allow for average of twenty-five (25) letters per nameplate.

.5 Identification to be English.

.6 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.7 Nameplates for disconnects, starters and contactors must indicate equipment being controlled and voltage.

.8 Nameplates for transformers must indicate transformer label as indicated and capacity, primary, and secondary voltages.

1.23 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour code: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

1.24 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m (45') intervals.

.3 Colour bands must be 25 mm (1") wide.

	Prime
up to 208 V	yellow
209 to 600 V	white
Voice system	green
Data system	orange
Security	brown
Public address	black
Cable TV	blue
Fire alarm	red

.4 This contractor must paint all system junction boxes and covers in conformance with the above schedule.

1.25 PROTECTION OF OPENINGS

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.26 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.27 MANUFACTURERS AND CSA LABELS

.1 All labels must be visible and legible after equipment is installed.

1.28 WARNING SIGNS

.1 To meet requirements of Electrical Safety Authority and consultant.

.2 Provide porcelain enamel signs, with a minimum size of 175 mm x 250 mm (7" x 10").

1.29 LOCATION OF OUTLETS

.1 Do not install outlets back-to-back in wall; allow minimum 150 mm (6") horizontal clearance between boxes.

.2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3 m (10'), and information is given before installation.

.3 Locate light switches on latch side of doors. Locate disconnect devices in mechanical and elevator machine rooms on latch side of door.

1.30 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise. Coordinate with block coursing (if applicable).

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.

- .1 Local switches: 1100 mm (43.3").
- .2 Wall receptacles:
  - .1 General: 400 mm (16").
  - .2 Above top of continuous baseboard heater: 200 mm (8").
  - .3 Above top of counters or counter splash backs: 100 mm (4").
  - .4 In mechanical rooms: 1200 mm (48").
- .3 Panelboards: as required by Code or 1400 mm (56").
- .4 Voice/Data outlets: At height of adjacent outlet or at 400 mm (16").
- .5 Fire alarm stations: 1200 mm (3'-11").
- .6 Fire alarm visual and signal devices: 2250 mm (88 ½").
- .7 Television outlets: 400 mm (16").
- .8 Thermostat: 1200 mm (3'-11").
- .9 Clocks: 2100 mm (84").
- .10 Heaters: 200 mm (8" AFF) to bottom of heater.
- .11 Emergency call switches and/or pushbuttons: 900 mm (36").

1.31 LOAD BALANCE

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Submit, at completion of work, report listing phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

1.32 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete shall be schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm (2") beyond either side.

.2 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

1.33 FIELD QUALITY CONTROL

.1 Conduct and pay for following tests:

.1 Power distribution system including phasing, voltage, grounding, and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

.5 Systems: fire alarm system, communications, security.

.2 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.

.3 Insulation resistance testing.

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

.4 Carry out tests in presence of consultant.

.5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.6 Submit test results for consultant's review.

1.34 EQUIPMENT NAMEPLATE DATA

.1 Refer to the Equipment Wiring Schedule, Distribution Diagram(s) and Panel Schedules for information regarding the designed electrical connections for all equipment to be connected to the electrical distribution system.

.2 Refer to the shop drawing submissions of all project divisions and coordinate with all trades and equipment manufacturers throughout the construction period for equipment connection requirements.

.3 This electrical trade shall be responsible to coordinate any discrepancies on equipment minimum circuit ampacity, maximum overcurrent protection, voltage and phase, between the equipment manufacturer published literature, the equipment shop drawing submission, the project design drawings equipment wiring schedule, and the nameplate data on the equipment. The contractors installing and connecting all equipment shall be responsible for the coordination of this data through the construction period.

.4 Equipment shall not be connected where the specified maximum overcurrent protection and minimum circuit ampacity values do not meet the requirements of the equipment nameplate data on site.

.5 Electrical distribution equipment shop drawings shall not be submitted prior to approval of equipment to be connected including, but not limited to, mechanical units, pumps, elevators, etc. Electrical distribution equipment shall not be released into production until all connected equipment requirements are confirmed and included in approved shop drawings.

.6 Where nameplate data of equipment on site varies from that data listed in the approved equipment shop drawings, the consultant shall be notified in writing, and the equipment shall not be connected until the equipment connection details are confirmed. The final installation must meet the nameplate data of the equipment on site.

.7 No subsequent allowance for time or money for changes to breakers, wiring and conduit, or equipment sizes will be considered for any consequence related to failure by the electrical trade to coordinate final equipment connection requirements with nameplate data and electrical distribution equipment shop drawings.

1.35 GUARANTEE AND WARRANTY

.1 At ready for takeover of this project this Contractor must provide a written guarantee indicating that any defects, not due to ordinary wear and tear or improper use which occur within the first **TWO YEARS** from the date of ready for takeover will be corrected at the contractor's expense.

.2 If the electrical sub-contractor's office is 50 kilometers (30 miles) or more from the project site, the sub-contractor is to provide a service/warranty work agreement for warranty period with a local electrical sub-contractor approved by consultant. Include copy of service/warranty agreement in warranty section of operation and maintenance manual.

.3 Warranty period shall start from date of ready for takeover completion.

.4 Refer to individual specification sections for information on any special manufacturer's equipment warranties.

1.36 SYSTEM START UP

.1 Provide consultant with written notice verifying all equipment operation and installation is complete prior to scheduled start-up period.

.2 Start up shall be in presence of the following: owner or representative, contractor, and manufacturer's representative. Each person shall witness and sign off each piece of equipment. Consultant's attendance will be determined by consultant.

.3 Arrange with all parties and provide 72 hours notice for start up procedure.

.4 Simulate system start up and shut down and verify operation of each piece of equipment.

.5 These tests are to demonstrate that the systems and equipment installed are operational as specified.

.6 The contractor must describe during the start up session the required maintenance for each piece of equipment according to the manufacturer.

.7 The contractor must provide all necessary tools (including a digital multimeter) to successfully complete the start up procedure.

1.37 OPERATION AND MAINTENANCE MANUAL

.1 Provide operation and maintenance data for incorporation into manual as specified in other Sections of this Division.

.2 Operation and maintenance manual to be approved by, and final copies deposited with, consultant before final inspection.

.1 Submit one (1) copy of Operation and Maintenance Manual to consultant for review and approval. Submission of individual data will not be accepted unless so directed by consultant. Submission can be done electronically in PDF format or as a hard copy.

.1 Electronic submission/PDF file is required to be bookmarked. Any submission received without bookmarking will be immediately returned as unacceptable.

.2 Hard copy submission shall be in a three-ring binder (minimum 50 mm (2") ring) and labelled as 'Operation and Maintenance Manual' with project name and location. Dividers are to be used for binder organization.

.2 Make changes as required and re-submit as directed by consultant.

.3 Each manual must include (in "tabbed" sections) the following:

.1 Index

.2 List of General, Mechanical, Electrical Contractors and all associated sub-contractor names, addresses and contact numbers.

.3 List of suppliers and equipment wholesalers local to the project.

.4 Letter of contractor's warranty and guarantee for all parts, equipment and workmanship.

.5 WRDSB Project Asset and Warranty Card for all assets replaced, newly installed, and removed.

.6 List of manufacturers, spare parts list and source.

.7 Copy of typewritten schedules for all new and renovated panels.

.8 Copy of all substantial performance final certificates.

.9 Copy of electrical shop drawings which have been stamped and reviewed by consultant.

.10 Electrical As-built drawings including contractor company's as built stamp.

.11 Any special warranties on equipment required (i.e. LED lighting, digital lighting control).

.12 Certificate of completion from all associated sub-contractors.

.13 System commissioning certificate and report.

.4 Final Submittals:

.1 Upon acceptance of Operation and Maintenance Manual by the consultant, provide the following:

.1 Provide two (2) copies of final Operation and Maintenance Manuals, as well as a PDF file of the entire approved manual on a USB stick. Only one (1) USB stick is to be provided containing both the approved manual and as-built drawings.

1.38 AS-BUILT DRAWINGS

.1 Site records:

.1 Contractor shall provide two (2) sets of reproducible electrical drawings. Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include field and contract changes to electrical systems.

.2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection at all times.

.2 As-built drawings submittal for review:

.1 Identify **each drawing** in lower right-hand corner in letters at least 3 mm (1/8") high as follows: - "AS-BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW ELECTRICAL SYSTEMS AS INSTALLED" (Company Name) (Signature of Contractor) (date).

.2 Submit copy to consultant for approval. When returned, make corrections (if any) as directed.

.3 As-built drawings final submittal:

.1 Once approved, submit completed, reproducible paper as-built drawings as well as a scanned PDF file copy on USB stick with Operation and Maintenance Manuals.

1.39 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTIONS

.1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.2 Manufacturers or their representatives are to provide demonstrations and instructions.

.3 Use operation and maintenance manual, As-built drawings, audio visual aids, etc. as part of instruction materials.

.4 Instruction duration time requirements as specified in appropriate sections.

.5 Where deemed necessary, consultants may record these demonstrations on video tape for future reference.

1.40 READY FOR TAKEOVER

.1 Complete the following to the satisfaction of the consultant prior to request for ready for takeover.

.1 As-built Drawings

.2 Maintenance Manuals

.3 System Start up

.4 Instructions to Owners

.5 Lighting Control System

.6 Outlet cover circuit labels

1.41 TRIAL USAGE

.1 Consultant or owner may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

1.42 REVISION TO CONTRACT

.1 Provide the following for each item in a given change notice:

.1 Itemized list of material with associated costs.

.2 Labour rate and itemized list of labour for each item.

.3 Copy of manufacturers/suppliers invoice if requested.

1.43 EQUIPMENT SUPPORTS

.1 Equipment supports supplied by equipment manufacturer: shall be installed by the electrical contractor.

.2 Equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel meeting requirements of - Structural Steel Section. Submit structural calculations with shop drawings if necessary.

.3 Mount base mounted equipment on chamfered edge housekeeping pads, minimum of 100 mm (4") high and 150 mm (6") larger than equipment dimensions all around. This installation of this pad shall be the responsibility of the electrical contractor.

.4 This contractor shall be responsible for providing all anchor bolts and associated formed concrete bases for lighting standards as detailed.

1.44 SLEEVES

.1 Pipe sleeves: at points where pipes pass through masonry, concrete, or fire rated assemblies and as indicated.

.2 Schedule 40 steel pipe.

.3 Sleeves with annular fin continuously welded at midpoint:

.1 Through foundation walls.

.2 Where sleeve extends above finished floor.

.4 Sizes: minimum 6 mm (1/4") clearance all around, between sleeve and conduit.

.5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm (1") above other floors.

.6 Through foundation walls PVC sleeves are acceptable.

.7 Fill voids around pipes:

.1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.

.2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.

.3 Fill future-use sleeves with easily removable filler.

1.45 FIRESTOPPING

.1 Firestopping material and installation within annular space between conduits, ducts, and adjacent fire separation.

.2 Provide materials and systems capable of maintaining effective barrier against flame, smoke, and gases.

.3 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.

.4 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation.

.5 Provide “firewrap” blanket around services penetrating firewalls. Extent of blanket must correspond to ULC recommendations. In general wrap individual conduits with approved firewrap materials on each side of firewall. Refer to architectural drawings for FT ratings. Provide 1 and/or 2 layers of firewrap with transverse and longitudinal seams overlapped and/or butted (second layer offset from first layer). Cut edges are to be sealed with aluminum foil tape. Provide 50 mm stainless steel banding at 200 mm intervals. Install firewrap to manufacturers’ recommendations for proper FT rating. Acceptable manufacturers are 3M Firemaster ductwrap or approved equal.

.6 The firestopping materials are not to shrink, slump or sag and be free of asbestos, halogens and volatile solvents.

.7 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

.8 Firestop materials are to be capable of receiving finish materials in those areas, which are exposed and scheduled to receive finishes.

.9 Firestopping shall be inspected and approved by local authority prior to concealment or enclosure.

.10 Install material and components in accordance with ULC certification, manufacturers instructions and local authority.

.11 Submit product literature and installation material on firestopping in shop drawing and product data manual.

.12 Acceptable manufacturers:

.1 Rectorseal Corporation (Metacaulk)

.2 Proset Systems

.3 3M

.4 Hilti

.5 STI Firestop

Note: Fire stop material must conform to requirements of local authorities having jurisdiction. Contractor to confirm prior to application and ensure material used is compatible with that used by other trades on site.

1.46 PAINTING

.1 Refer to Section Interior Painting and specified elsewhere.

.2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

.3 Prime and touch up marred finished paintwork to match original.

.4 Restore to new condition, or replace equipment at discretion of consultant, finishes which have been damaged too extensively to be merely primed and touched up.

1.47 ACCESS DOORS

.1 Supply access doors to concealed electrical equipment for operating, inspecting, adjusting and servicing.

.2 Flush mounted 600 mm x 600 mm (24" x 24") for body entry and 300 mm x 300 mm (12" x 12") for hand entry unless otherwise noted. Doors to open 180º, have rounded safety corners, concealed hinges, screwdriver latches, and anchor straps.

.3 Material:

.1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by consultant.

.2 Remaining areas: use prime coated steel.

.3 Fire rated areas: provide ULC listed access doors

.4 Installation:

.1 Locate so that concealed items are accessible.

.2 Locate so that hand or body entry (as applicable) is achieved.

.3 Installation is specified in applicable sections.

.5 Acceptable materials:

.1 Le Hage

.2 Zurn

.3 Acudor

.4 Nailor Industries Inc.

1.48 DELIVERY STORAGE & HANDLING

.1 Follow Manufacturer's directions in delivery, storage, and protection, of equipment and materials. Contractor to include all costs associated with delivery storage and handling in tender price.

.2 Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or mechanical injury, but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in dry, heated space.

1.49 REPAIR, CUTTING, CORING AND RESTORATION

.1 Be responsible for required digging, cutting, and patching incident to work of this Division and make required repairs afterwards to satisfaction of consultant. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.

.2 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

.3 Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

.4 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

.5 Slots, cores and openings through floors, walls, ceilings, and roofs shall be provided by this contractor but performed by a trade specializing in this type of work. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

1.50 EXISTING SYSTEMS

.1 Connections into existing systems to be made at time approved by consultant. Request written approval of time when connections can be made.

.2 Be responsible for damage to existing plant by this work.

1.51 CLEANING

.1 Clean interior and exterior of all electrical equipment provided including light fixture lenses.

.2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition.

1.52 ASBESTOS

.1 If asbestos is suspected or identified cease all work in the immediate area in accordance with OHSA and notify consultant.

.2 Each contractor and on site employee of the contractor shall have “asbestos awareness training”.

.3 The contractor shall ensure that employees who may come into contact with asbestos due to the nature of the work that they perform, have received training that enables them to recognize asbestos and that enables them to react in accordance with the Occupational Health and Safety Act and regulations thereto should contact with asbestos occur during the course of their work.

.4 It is the responsibility of the contractor to review the asbestos book in the building prior to starting any work.

.5 Existing occupied buildings (depending upon their age) may contain asbestos in thermal insulating materials and some manufactured products, such as vinyl asbestos floor tile. Any insulating materials, on pipes, fittings, boilers, tanks, ductwork, etc. may contain asbestos and shall not be disturbed.

.6 **A survey of each building documenting the location and condition of asbestos-containing materials is available for your mandatory review prior to commencing any work on premises.**

1.53 DISCONNECTION AND REMOVAL

.1 Disconnect and/or remove equipment as indicated.

.2 Cap and conceal all redundant and obsolete connections.

.3 Provide a list of equipment to be removed to the owner, for his acceptance of same. Remove all equipment from site, which the owner does not retain.

.4 Store equipment to be retained by owner on site where directed by consultant.

1.54 OWNER SUPPLIED EQUIPMENT

.1 Connect to equipment supplied by the owner and make operable.

.2 Design drawings are diagrammatic and do not necessarily indicate all specific final connection requirements. For the purposes of bidding, electrical trade shall include but not be limited to provision of a junction box to connect equipment wiring tail, provision of suitable disconnecting means, and flexible connection directly to equipment.

1.55 ENCLOSURES

.1 This contractor must ensure that all electrical equipment mounted in sprinklered areas is provided with an enclosure in conformance with the Electrical Safety Code.

1.56 INTEGRATED LIFE SAFETY SYSTEM TESTING

.1 The Integrated Life Safety System Testing Coordinator (ITC) shall be hired by the electrical trade as indicated in specification section 26 01 20.

.2 This electrical contractor shall work with the project Integrated Life Safety System Testing Coordinator (ITC) and participate in all phases of the Integrated Life Safety Systems testing process as specified within CAN/ULC S1001-11 (2024 Rev2 updates) as well as the electrical and architectural specifications.

.3 During the ***Planning Phase*** of the Integrated Life Safety Systems Testing process this electrical contractor shall review the Integrated Testing Plan (ITP) and give written confirmation of this review and acknowledgement of affected systems under his responsibility as required by the electrical specifications per the shop drawing submittal process.

.4 Prior to the building Integrated Life Safety Systems Testing this electrical contractor shall startup/commission/verify the operation of all systems under the responsibility of this electrical trade. This electrical trade shall give written indication of completed systems and provide copies of all inspection reports, start-up reports, commissioning reports, verification reports, etc. when requested by the ITC during the ***Implementation Phase***.

.5 Upon completion of the building Integrated Life Safety Systems Testing this electrical contractor shall rectify all deficiencies related to all systems under his responsibility during the ***Testing Phase*** in due time for the ITC to verify and document for the project team.

1.57 PHASING OF WORK

This work for this project shall be constructed in phases. Refer to the architectural drawings for phasing information and details. Misinterpretation of the drawings with respect to the extent of the phasing of the work shall not relieve the contractor of the work required to complete the entire contract.

Part 2 Not Used

Part 3 Not Used

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

.1 Conform to the General Provisions of Division 1 and Electrical General Requirements Section.

.2 This project is one of a retrofit nature in part, and which will require extensive demolition.

.3 Allow for all remedial work in areas indicated on the drawings and as generally defined in the relevant sections of the specifications.

1.2 SCOPE OF WORK

.1 The scope of work is essentially the selected disconnection and/or removal of services and/or equipment, devices etc. as indicated or required to complete the work.

.2 The reference drawings indicate some of the services which shall remain, and some may have to be retained through construction and a phased changeover to help construction i.e. electrical service, phone service, winter heat, and temporary construction services i.e. washroom facility. This co-ordination remains the responsibility of the contractors.

Part 2 Products

2.1 GENERAL

.1 This Division is to liaise with the Owners or Consultant for equipment being removed that may be suitable for reuse to that specified or handed over to the owner.

.2 This Division to take full responsibility for any special tools or equipment required to disassemble or remove material from building.

Part 3 Execution

3.1 GENERAL

.1 The general requirements are indicated on the drawings and on the outline specification in Division 1.

.2 The general execution of the demolition is to be carried out in a clean and efficient manner.

.3 Demolition of existing ceiling, walls etc., to facilitate removal of existing services or equipment or installation of new to be kept to a minimum and then restored to match existing.

.4 All openings or holes created by removal of existing electrical systems which are not being reused are to be patched with the same material surrounding surfaces.

.5 All new holes and openings to facilitate electrical systems are to be patched to match surrounding surfaces.

.6 Protect all existing furnishings materials and equipment. Any damage occurring as a result of the work of this Division shall be repaired or replaced at the expense of this Division.

.7 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Owners in an expedient manner with minimum disruption to the facility and systems downtime.

.8 Where unknown services are encountered immediately advise Consultant and confirm findings in writing.

.9 Where the location of any services has been shown on the plans, such information is not guaranteed. It is this Division's responsibility to verify locations, etc., immediately after moving on site. Should for any reason the information obtained necessitates changes in procedure or design, advise the Consultant at once. If verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Division's.

.10 Disconnect and/or remove equipment, devices, cabling, services, etc. as indicated.

.11 Remove all redundant and obsolete systems, connections, and wiring.

.12 Provide a list of equipment to be removed to the owner, for their acceptance of same. Remove all equipment from site that the owner does not retain.

.13 Maintain equipment to be retained by owner on site where directed by consultant.

.14 Demolition of all parts of the work must be completed within the confines of the work area and in such a way as the dust produced and risk to injury of will not adversely affect the building users.

.15 Demolished areas of the existing building will remain in their current use in some cases. Demolition in these areas must be kept to the minimum required to complete the work.

.16 Demolition shall take place within areas isolated from all other areas with appropriate hoarding, scaffolding, netting, fencing or other means of security between building users and the work.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

.1 Section 21 02 51 – FIRE PROTECTION GENERAL REQUIREMENTS and DIVISION 1

.2 Section 21 12 13 – FIRE SUPPRESSION STANDPIPE SYSTEM

.3 Section 21 13 13 – WET PIPE FIRE SUPPRESSION

.4 Section 21 22 11 – CLEAN AGENT FIRE SUPPRESSION SYSTEM and DIVISION 1

.5 Section 21 13 16 – DRY-PIPE SPRINKLER SYSTEMS

.6 Section 23 02 52 – HVAC GENERAL REQUIREMENTS and DIVISION 1

.7 Section 23 33 17 – SMOKE CONTROL DAMPERS

.8 Section 26 01 16 – ELECTRICAL GENERAL REQUIREMENTS and DIVISION 1

.9 Section 26 32 15 – POWER GENERATION DIESEL

.10 Section 26 32 16 – POWER GENERATION NATURAL GAS

.11 Section 26 36 23 – AUTOMATIC TRANSFER SWITCH (ATS)

.12 Section 26 51 13 – LIGHTING EQUIPMENT

.13 Section 26 51 16 – DIGITAL OCCUPANCY & DAYLIGHT CONTROL SYSTEMS

.14 Section 28 31 25 – FIRE ALARM SYSTEM (ADDRESSABLE)

.15 Applicable building systems in item 1.3.10 and as included in all project DIVISIONS.

1.2 REFERENCES

.1 OBC-2024, Ontario Building Code Compendium.

.2 CAN/ULC-1001, Integrated System Testing of Fire Protection and Life Safety Systems.

.3 CAN/ULC-S524, Installation of Fire Alarm Systems.

.4 CAN/ULC-S537, Verification of Fire Alarm Systems.

.5 CAN/ULC-S573, Installation of Ancillary Devices Connected to Fire Alarm Systems

.6 CAN/ULC-S561, Installation and Service for Fire Signal Receiving Centres and Systems

.7 CAN/ULC-S112, Standard Method of Fire Test of Fire Damper Assemblies

.8 NFPA 13, Fire Sprinkler Systems

.9 NFPA 17A, Standard for Wet Chemical Extinguishing Systems

.10 NFPA 92, Standard for Smoke Control Systems

.11 NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

1.3 OVERVIEW

.1 All work shall be performed in accordance with CAN/ULC-1001 Integrated System Testing of Life Safety and Fire Protection Systems, latest edition.

.2 The Building Code has adopted CAN/ULC-1001 as the standard to comply with Integrated System Testing of Life Safety and Fire Protection Systems. The scope of this project shall follow the strict guidelines laid out in CAN/ULC-1001 for Integrated Testing Planning, review, and implementation.

.3 The Integrated Testing Plan (ITP) will provide a full overview of all integration points of life safety and fire protection systems. The ITP will be submitted for review to the design professionals and Authority Having Jurisdiction (AHJ). Upon the successful completion of the ITP and all the respective systems, the Integrated Testing Coordinator (ITC) will provide a schedule to the design professionals, the AHJ, and all required participating members for the ITP to be conducted.

.4 The ITC will review all drawings, specifications, sequence of operations, and methodology prepared by the design professionals, complete with the contractor's shop drawings and manufacture requirements.

.5 The ITP shall be coordinated with all sub-contractors and suppliers as outlined in item 1.1.

.6 The ITC will conduct the ITP and will sign each integrated test form, complete with signatures from each participating member of the integrated systems.

.7 The ITC shall witness all integrations and not rely on the CAN/ULC-S537 Verification Inspection Report for fire protection system integration testing; however, the ITC may attend the verification to validate the testing.

.8 The ITC will provide all work and ITP including functional documentation, prescribed in CAN/ULC-1001. Such testing and documentation have been deemed to satisfy OBC 2024 Sentence 3.2.9.

.9 The ITC will provide PDF and digital media copy of the buildings ITP and Integrated System Report (ITR) for the building owner's use, re-testing, and reproduction purpose.

.10 The systems applicable to the function testing include but not limited to:

- .1 Fire Alarm System (including sequence of operations) and Monitoring
- .2 Elevators
- .3 Sprinkler Systems (wet, dry, window, garbage chute, standpipe)
- .4 Fire Pumps
- .5 Water Supplies (fire cistern)
- .6 Life Safety Generator and Automatic Transfer Switches
- .7 Kitchen Fire Suppression Systems
- .8 Fixed Fire Suppression Systems
- .9 Magnetic Door Holds
- .10 Electromagnetic Locks

.11 Fire Curtain or Fire Shutter Release
.12 Smoke and CO Alarms
.13 Smoke Damper Assemblies
.14 Nurse Call Systems
.15 Emergency Lighting
.16 HVAC Shutdown and ON/OFF/Auto Controls
.17 Pressurization Fans and ON/OFF/Auto Controls
.18 Smoke Exhaust System and ON/OFF/Auto Controls
.19 CO System
.20 A/V System Mute/Shutdown
.21 Mass Notification System
.22 Hazardous Protection Monitoring
.23 HVLS Fan Shutdown
.24 Freeze Protection (heat trace monitoring)
.25 Dust Collector (spark arrest system)

Part 2 Products

2.1 TESTING AND PLANNING

.1 The Integrated Testing Process must include following:

.1 Planning phase by the testing coordinator.
.2 Integrated testing plan review by the design professionals.
.3 Integrated testing plan review by the AHJ.
.4 Review of sequence of operations.
.5 System documentation.
.6 Integrated System Testing Plan consisting of:

.1 Project description.
.2 Project contacts including applicable project responsibilities.
.3 Overview and description of each integrated system.
.4 System integrations and functional objective of each integrated system.
.5 Integration matrix of all integrated system complete with integration type, normal mode and off-normal mode.
.6 Test protocols and procedures of each integrated system,
.7 Notifications.
.8 Personnel safety.
.9 Phased occupancies.
.10 Pre-testing documentation checklist.

.11 Pre-testing documentation acknowledgement forms.

.12 Testing forms.

.13 Ongoing integrated system testing forms.

.14 Integrated system testing completion form.

.15 Integrated testing notes.

2.2 RESPONSIBILITIES

.1 General Contractor:

.1 Coordinate with the ITC for schedule and witness testing.

.2 Coordinate all responsible sub-contractors.

.3 Confirm all respective systems listed in item 1.3.10 are complete and fully operational, prior to the ITC commencing the functional testing.

.4 Provide reports for respective systems such as, but not limited to; TSSA elevator inspection reports, start-up reports, commissioning reports, verification reports.

.5 Participate in the ITP and provide function testing of equipment within the mechanical, electrical, and fire protection contract packages.

.6 Allow for any cost associated to re-testing of the ITP due to failures or insufficient work.

.7 Allow for any cost associated with phased occupancy and phased Integrated Testing work.

.2 HVAC Contractor:

.1 The HVAC Contractor shall confirm all mechanical systems listed in item 1.3.10 are complete and fully operational, prior to the ITC commencing the functional testing.

.2 Provide system reports such as, but not limited to; air balancing reports, TSSA inspection reports, start-up reports, commissioning reports, verification reports. The Mechanical Contractor shall further provide written confirmation that all mechanical systems are installed and operating as intended by the contract documents and sequence of operations.

.3 Participate in the ITP and provide function testing of equipment within the mechanical contract package.

.4 Allow for any cost associated to re-testing of the ITP due to failures or insufficient work.

.5 Allow for any cost associated with phased occupancy and phased Integrated Testing work.

.3 Fire Protection Contractor:

.1 The Fire Protection Contractor shall confirm all fire protection systems listed in item 1.3.10 are complete and fully operational, prior to the ITC commencing the functional testing.

.2 Provide system reports such as, but not limited to; NFPA 13 letter, NFPA 20, letter, above ground sprinkler piping letter, below ground sprinkler letter, system designer letter, start-up reports, commissioning reports, verification reports. The Fire Protection Contractor shall further provide written confirmation that all fire protection systems are installed and operating as intended by the contract documents and sequence of operations.

.3 Participate in the ITP and provide function testing of equipment within the fire protection contract package.

.4 Allow for any cost associated to re-testing of the ITP due to failures or insufficient work.

.5 Allow for any cost associated with phased occupancy and phased Integrated Testing work.

.4 Electrical Contractor:

.1 Electrical Contractor to employ the services of the ITC firm as a sub-contractor and include in bid price. Refer to item 2.6.

.2 The electrical contractor shall confirm all electrical systems listed in item 1.3.10 are complete and fully operational, prior to the ITC commencing the functional testing.

.3 Provide system reports such as, but not limited to; ESA Inspection Certificate, Fire Alarm Verification, TSSA Inspection, Generator Start-up report, commissioning reports, and verification reports. The Electrical Contractor shall further provide written confirmation that all electrical systems are installed and operating as intended by the contract documents and sequence of operations.

.4 Participate in the ITP and provide function testing of equipment within the electrical contract package.

.5 Allow for any cost associated to re-testing of the ITP due to failures or insufficient work.

.6 Allow for any cost associated with phased occupancy and phased Integrated Testing work.

.5 Equipment Manufacturers:

.1 Where required, shall confirm all respective systems listed in item 1.3.10 are complete and fully operational, prior to the ITC commencing the functional testing.

.2 Participate in the ITP and provide function testing of equipment within the respective contract package.

.6 Design Professionals:

.1 The design professional shall include, but not be limited to, the project Architect, Electrical and Mechanical Consultants, Fire Protection Engineer, Elevator Consultant, etc.

.2 Shall review the ITP, and upon review, accept the ITP as the agreed ITP for implementation.

.3 The design professionals are responsible for design. Upon an unsuccessful test, the failure will be documented and provided to the respective design professionals for review and action.

2.3 NOTIFICATION OF TESTING PLANNING PROCESS

.1 The ITC shall work with the General Contractor, Owner, sub-contractors, design professionals, and the AHJ to provide a schedule for the implementation of the ITP.

.2 The ITC shall obtain contact names, contact details, and system responsibilities for all project design professionals.

.3 The ITC shall provide notification to the integrated testing participants seven (7) days prior to the date and time for the implementing of the ITP.

.4 Prior to testing, the ITC shall obtain written acknowledgement for acceptance and understanding of the ITP by all project design professionals and contractors per 1001 Section 5 and Appendix B. Include ITP Review & Acceptance acknowledgement sheet in the ITR. **Refer to Figure 1.**

.5 Prior to testing, the ITC shall obtain written acknowledgement for acceptance testing of site readiness from all project design professionals and contractors per 1001 Section 5 and Appendix B. Failure to obtain acknowledgement prior to implementation of integrated testing may invalidate the results and could result in delays by the design professionals issuing conformance. Include ITP Acceptance Testing acknowledgement sheet in the ITR. **Refer to Figure 2 and Figure 3.**

.6 In the event of building occupants, the ITC shall provide at a minimum, forty-eight (48) hour notice of the implementation of the integrated testing. Notification shall be provided via written notices posted at each building entrance.

.7 Partial occupancies shall employ this process for each individual occupancy and shall clearly identify the extent of to which the partial occupancy applies when obtaining written confirmations.

.8 Figures 1 through 3 of this specification section are indicated as informative and are for information only regarding the intent for required written acknowledgement gathering by the ITC. All designers and trades listed may not apply to all projects. The ITC shall be responsible for determining all required designers and contractors for the project based on the contact information from the ITP.

2.4 TESTING IMPLEMENTATION PROCESS

.1 Implementation of the integrated test shall follow all job site and personnel safety requirements set out in the contract and General Contractors requirements.

.2 The ITC shall define:

.1 Personnel safety protocols

.2 Special hazards

.3 Team communications

.4 Occupant notification of emergencies

.3 The integrated system test shall follow the methodology and process outlined in CAN/ULC-1001 as the requirement for this project.

.1 Provide the final ITP to the Consultant fourteen (14) days prior to scheduled implementation and test.

.4 The respective contractors and manufactures are responsible to start-up and function test their respective systems, for observation and witnessing by the ITC. The ITC will record the results, and the respective contractor and manufacture will restore the system to a normal condition. Upon successful testing the contractor and manufacture will initial the respective integrated testing from adjacent to their respective test.

.5 Upon a failure of a test, the ITC will document the failure and continue with the testing of other integrations. The respective contractor and manufacture will document the failure, notify they design professional, and correct the failure under the direction of the design professional.

.1 The ITC will re-test the unsuccessful integration after the correction has been documented and verified.

.6 Upon a failure of a device (such as a smoke detector), the contractor may immediately replace the device, and the ITC may continue to test the integration. The device failure maybe documented but shall not result in a failed integrated test.

.7 The ITC shall include in quote costs associated with site testing of all integrated devices. ITPs and testing procedures which include only for a sampling of devices will not be accepted. ITPs and testing procedures which rely solely on inspection reports, start-up reports, commissioning reports, or verification reports, etc. will not be accepted.

.8 Partial occupancies shall employ this process for each individual occupancy and shall clearly identify the extent to which the partial occupancy applies when obtaining written confirmations.

.9 Upon successfully completing the ITP, the ITC shall provide the ITR to the design professionals and building owner.

2.5 QUALITY CONTROL

.1 The ITC must meet the following criteria to be considered acceptable for this project:

.1 Firms regular engaged with contractors in function testing, fire alarm verification, sprinkler system testing, annual inspections and maintenance of fire and life safety systems.

.2 Firms knowledgeable and experience of the respective Codes and Standards of the particular project, including but not limited to; Building Codes, Fire Codes, ULC Standards, CSA Standards, and NFPA Standards.

.3 Firms must be a member in good standing of the Canadian Fire Alarm Association (CFAA).

.4 Vendors must be a 3rd party and independent from the fire protection and life safety system installation company present on the project in accordance with ULC Certification Bulletin 2020-08.

.5 Firms must maintain operations in the province of Ontario for at least five years.

.6 Vendors must be a ULC Listed Integrated Systems Testing Service Provider and posses a ULC Integrated Fire Protection and Life Safety Certification. The ULC Certificate must be valid from the date of project award until the completed Integrated Testing Report. The ULC certification level shall be that which is applicable to the building life safety systems level of complexity for the project.

.1 Submit the ULC Certificate upon project award to the Consultant's office complete with Applicant ID Number.

2.6 QUALIFIED INTEGRATED TESTING COORDINATOR

.1 Bidders may choose from the experienced ITC Firms listed below or local branches of these companies noted in the vicinity of this project and are acceptable as a sub-contractor to the Electrical Contractor:

.1 Lonergan Engineering
Aurora, Ontario L4G 3V5

.2 Great Lakes Fire Consulting & Engineering Group
Windsor, Ontario

.2 Other experienced ITC Firms must submit in writing, to the Consultant's office, confirmation of the items listed in the Quality Control criteria above, prior to tender close to be considered as an acceptable bidder.

END OF SECTION

Figure 1 – Example Pre-Test ITP Acknowledgement (Typical Design Professionals): Informative

INTEGRATED SYSTEMS WRITTEN ACKNOWLEDGEMENT REVIEW AND ACCEPTANCE OF INTEGRATED TEST PLAN (EXAMPLE)			
Per Item 5.2.8 and Section B9.1 of CAN/ULC S1001 (latest version), the respective design professionals shall indicate written confirmation to the Testing Coordinator acceptance of the Integrated systems Test Plan according to the intent of the project design documents.			
List of Design Professionals		Company/Representative	Design Responsibility
Architect	Company Name:		
	Designer Name:		
	Signature		
Electrical Engineer	Company Name:		
	Designer Name:		
	Signature		
Mechanical Engineer	Company Name:		
	Designer Name:		
	Signature		
Fire Protection Engineer (sprinkler)	Company Name:		
	Designer Name:		
	Signature		
(typical responsible consultant on project)	Company Name:		
	Designer Name:		
	Signature		

Figure 2 – Example Pre-Test Trade Site Ready Acknowledgement (Typical Project Trades): Informative

PRE-TESTING INTEGRATED SYSTEMS WRITTEN ACKNOWLEDGEMENT (EXAMPLE)			
Per Item 5.3.1.(B) and Section B8.1 of CAN/ULC S1001 (latest version), the respective installing contractors shall indicate written confirmation to the Testing Coordinator that their respective life safety systems have been installed in accordance with the design are ready for integrated testing as outlined within the Integrated Systems Testing Plan.			
List of Installing Trades		Company/Representative	System Responsibilities
General Contractor	Company Name:		
	Name:		
	Signature		
Electrical Contractor	Company Name:		
	Name:		
	Signature		
Mechanical Contractor	Company Name:		
	Name:		
	Signature		
Sprinkler Contractor	Company Name:		
	Name:		
	Signature		
Elevator Contractor	Company Name:		
	Name:		
	Signature		
(typical responsible trade on project)	Company Name:		
	Name:		
	Signature		

Figure 3 – Example Pre-Test Designer Site Ready Acknowledgement (Typical Design Professionals): Informative

PRE-TESTING INTEGRATED SYSTEMS WRITTEN ACKNOWLEDGEMENT (EXAMPLE)			
Per Item 5.3.1.(A) and Section B8.1 of CAN/ULC S1001 (latest version), the respective design professionals shall indicate written confirmation to the Testing Coordinator that the site is ready for integrated systems testing per the descriptions and integrations outlined within the Integrated Systems Testing Plan.			
List of Design Professionals		Company/Representative	Design Responsibility
Architect	Company Name:		
	Designer Name:		
	Signature		
Electrical Engineer	Company Name:		
	Designer Name:		
	Signature		
Mechanical Engineer	Company Name:		
	Designer Name:		
	Signature		
Fire Protection Engineer (sprinkler)	Company Name:		
	Designer Name:		
	Signature		
(typical responsible consultant on project)	Company Name:		
	Designer Name:		
	Signature		

Part 1 General

1.1 GENERAL

.1 This Section covers items common to Electrical Division 26, as well as Division 27 and Division 28.

.2 This section supplements requirements of Division 1.

1.2 OCCUPANCY REQUIREMENTS

.1 The contractor shall provide the following documentation to the consultant's satisfaction prior to receiving occupancy. Failure to provide the proper documentation will result in the occupancy not being granted. List of required documentation:

.1 Final Certificates (required prior to consultant's release of conformance letter).

.1 Electrical Safety Authority.

.2 Emergency Lighting.

.3 Fire Alarm Verification Certificate.

.4 Integrated Life Safety Testing

Part 2 Not Used

Part 3 Not Used

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA C22.2 No.0.3-92, Test Methods for Electrical Wires and Cables.

.2 CAN/CSA-C22.2 No.131-M89(R1994), Type TECK 90 Cable.

.3 CAN/ULC S319 (latest edition), Standard for Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control, and Data Cables.

.4 CSA C22.2 No. 123 (latest edition), Metal Sheathed Cables.

1.2 PRODUCT DATA

.1 Submit product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger.

.2 Minimum size: 12 AWG.

.3 Copper conductors: size as indicated, with 600 V insulation of chemically cross-linked thermosetting polyethylene material 90°C (194ºF) rated T90 for indoor above grade installations and RW90 for below grade installations.

2.2 TECK CABLE

.1 Cable: to CAN/CSA-C22.2 No.131.

.2 Conductors:

.1 Grounding conductor: Copper.

.2 Circuit conductors: Copper, size as indicated.

.3 Inner jacket: Polyvinyl chloride material.

.4 Armour: Aluminum.

.5 Overall covering: Polyvinyl chloride material.

.6 Fastenings:

.1 One hole steel zinc straps to secure surface cables 50 mm (2") and smaller. Two-hole steel straps for cables larger than 50 mm (2").

.2 Channel type supports for two or more cables at 1500 mm (60") centres.

.3 Threaded rods: 6 mm (1/4") diameter to support suspended channels.

.7 Connectors must be suitable for:

.1 Installed environment and approved for use with TECK cable.

2.3 ARMOURED CABLES

.1 Conductors: insulated, copper minimum size as indicated above.

.2 Type: AC90 (minimum size 12 AWG).

.3 Armour: interlocking type fabricated from aluminum strip.

.4 Connectors must be suitable for installed environment and approved for use with armoured cable.

2.4 FIRE RATED CABLES

.1 Cable: to CAN/ULC S319 and CSA C22.2 No. 123.

.2 Conductors: insulated, copper minimum size as indicated above.

.3 Type: Fire-resistive 2-hour certified cable MC/RC90 or Mineral Insulted type MI (minimum size 12 AWG unless otherwise noted).

.4 Armour MC/RC90: Seamless, smooth metal sheath, or seamless, corrugated metal sheath applied over one or more insulated conductors.

.5 Armour MI: Magnesium oxide powder copper sheath applied over one or more insulated conductors, corrosion resistant.

.6 Connectors must be suitable for installed environment and approved for use with fire rated cable type.

Part 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Install wiring from source to load through raceways as specified.

.2 Provide separate neutral conductors for all lighting circuits and circuits originating from surge protected panels. Size raceways accordingly.

3.2 INSTALLATION OF TECK CABLE 0 - 1000 V

.1 Group cables wherever possible on channels.

.2 Terminate cables in accordance with Wire and Box Connectors - 0 - 1000 V Section.

3.3 INSTALLATION OF FIRE RATED CABLES

.1 Group cables wherever possible.

.2 Terminate cables in accordance with manufacturer’s recommended installation instructions.

.3 Cables are to be installed as a single continuous run to maintain fire rating integrity.

.4 Support cables horizontally or vertically every 1219 mm (48") intervals and on each side of a bend.

.5 Provide thermoplastic barrier at all mounting locations as per manufacturer's installation instructions.

3.4 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible.

.2 Terminate cables in accordance with Wire and Box Connectors - 0 - 1000 V Section.

.3 These cables are to be installed in concealed locations only. These concealed locations are considered to be stud walls and "drops" to stud walls, lighting fixtures, and ceiling mounted devices.

.4 These "drops" shall not be permitted to exceed 2.4 m (8'-0"). To limit these "drops" to lengths noted above provide additional branch wiring in conduit.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data for cabinets in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 MATERIALS

.1 Splitters must conform to CSA C22.2 No. 76 (latest edition).

.2 Junction and pull boxes must conform to CSA C22.2 No. 40 (latest edition)

2.2 SPLITTERS

.1 Sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.

.2 Main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.

.3 At least three spare terminals on each set of lugs in splitters less than 400 A.

.4 Splitter length must match arrangement of equipment unless indicated otherwise.

2.3 JUNCTION AND PULL BOXES

.1 Welded steel construction with screw-on flat covers for surface mounting.

.2 Covers with 25 mm (1") minimum extension all around, for flush-mounted pull and junction boxes.

Part 3 Execution

3.1 SPLITTER INSTALLATION

.1 Install splitters and mount plumb, true and square to the building lines on 21 mm (3/4") painted plywood backboards.

3.2 JUNCTION AND PULL BOXES INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Install junction and pull boxes so as not to exceed 30 m (100') of conduit run between pull boxes and in conformance with the Electrical Safety Code.

3.3 IDENTIFICATION

.1 Provide equipment identification in accordance with General Electrical Requirements Section.

.2 Install size 2 identification labels indicating system name, voltage and phase.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Outlet boxes, conduit boxes, and fittings must conform to CSA C22.2 No. 18 (latest edition).

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm (4") square or larger outlet boxes as required for special devices.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 347 V outlet boxes for 347 V switching devices.

.6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 SHEET STEEL OUTLET BOXES

.1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 mm x 50 mm x 64 mm (3" x 2" x 2½") or as indicated. 102 mm (4") square outlet boxes when more than one conduit enters one side with extension and plaster rings as required. Iberville 1104 Series.

.2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit **in utility rooms**, minimum size 102 mm x 57 mm x 38 mm (4" x 2¼" x 1½"). Iberville 1110 Series.

.3 102 mm (4") square or octagonal outlet boxes for lighting fixture outlets.

.4 102 mm (4") square outlet boxes with extension and plaster rings for flush mounting devices in finished tile walls.

2.3 MASONRY BOXES

.1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4 CONCRETE BOXES

.1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5 CONDUIT BOXES

.1 Cast FS or FD feraloy boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacle **in areas (other than utility rooms) where surface conduit is used.**

2.6 FITTINGS- GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 32 mm (1- 1/4") and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm (1/4") of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.

.5 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.

END OF SECTION

Part 1 DGeneral

1.1 APPLICATION

.1 Seismic restraint is becoming more prominent with improved soil testing equipment. Seismic requirement is not site specific by geographical area but determined by site soil conditions.

.2 Where the structural engineer or architect documents have Ie*Sa(0.2)*Fa<3.5 seismic is not required on the electrical systems.

.3 Where the structural engineer or architect documents have Ie*Sa(0.2)*Fa≥3.5 seismic is required on the electrical systems.

.4 Seismic will always be required on fire protection systems when required by NFPA codes.

.5 Seismic will always be required on any “Disaster Relief Building.” For example, hospitals, police stations, ambulance building, etc.

.6 When it is unclear in the tender documents request information from the structural engineer or architect for clarification.

1.2 SECTION INCLUDES

.1 Seismic Requirements for free standing equipment and other similar systems.

.2 Seismic Requirements for single rod hanger supports for conduit, and other similar systems.

.3 Seismic Requirements for trapeze type supports for bus tray, conduit, and other similar systems.

1.3 REFERENCES

.1 Building Officials and Code Administrators National Building Code (BOCA) (latest edition).

.2 Ontario Building Code (OBC), (latest edition).

1.4 QUALITY ASSURANCE

.1 The contractor shall provide pre-engineered seismic restraint systems to meet total design lateral force requirements for support and restraint of free standing electrical equipment, conduit, cable trays and other similar suspended systems and equipment as determined by seismic restraint designer.

.2 System Supports/Restraints: Firms regularly engaged in the manufacture of products of the types specified in this section, whose products have been in satisfactory use in similar service for not less than 5 years.

.3 Bolted framing channels and fittings shall have the manufacturers name, part number, and material heat code identification number stamped in the part itself for identification. Material certification sheets and test reports must be made available by the manufacturer upon request.

.4 Only companies experienced in performing the work of this section shall do the installation.

.5 All seismic restraint installations shall be independently reviewed by the Owner's representatives for compliance with project specifications.

1.5 SUBMITTALS

.1 Submit seismic force calculations according to forces chart located on structural engineer of record's drawings. Submit pre-approved restraint selections and installation details from acceptable manufacturer specified in this section or engineer approved equal.

.2 Restraint selection and installation details shall be pre-approved by a professionally licensed engineer with at least 5 years of experience in the design of seismic restraints.

.3 Submit manufacturer's product data on strut channels including, but not limited to, types, materials, finishes, gauge thickness, and hole patterns.

.4 Contractor to retain services of Professional Engineer, designated in local jurisdiction and submit stamped drawings. The same engineer shall provide periodic field review and final certification upon completion of the project.

The following companies are provided for information purposes:

.1 Tecoustics Limited - 1-888-714-9596

.2 Lampkin Structural Services – 613-830-6875

.3 Vibro Acoustics – 1-800-565-8401

.4 Tecoustics Vibration Control & Seismic Restraint – 905-681-6077

.5 Gerrits Engineering 705-737-3303

.5 All fees and associated costs for the engineering shall be the responsibility of this contractor.

1.6 SEISMIC BRACING AND SUPPORT DESIGN REQUIREMENTS

.1 Seismic restraint designer shall co-ordinate all attachments with the structural engineer of record.

.2 Design analysis shall include force calculations according to forces chart listed on the structural engineer of record's drawings and capacity of materials utilized for the connection of the equipment or system to the structure.

.3 Analysis shall detail anchoring methods, bolt diameter, and embedment depth.

.4 All seismic restraint devices shall be designed to accept without failure the calculated forces as pee the applicable Building Code.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Deliver strut systems, pipe hangers and components carefully to avoid breakage, denting, and scoring finishes. Do not install damaged equipment.

.2 Store strut systems, pipe hangers and components in original cartons and in clean dry space; protect from weather and construction traffic.

1.8 WORK FURNISHED BUT NOT INSTALLED

.1 The materials and systems specified in this section shall be purchased by the electrical contractor from a single seismic snubber restraint materials manufacturer to assure sole source responsibility for the performance of the seismic restraints used.

.2 The materials and systems specified in this section can, at the contractor's option, be installed by the subcontractor who installs the electrical equipment.

1.9 COORDINATION

.1 Coordinate size, shape, reinforcement and attachment of all housekeeping pads supporting seismically rated equipment. Concrete shall have a minimum compressive strength of 3,000 psi or as specified by the consultant.

.2 Coordinate with seismic restraint manufacturer to locate and size structural supports underneath seismically restrained equipment (e.g. switchboards, motor control centres, transformers, and other similar equipment).

1.10 DESCRIPTON OF SYSTEM

.1 It shall be understood that the requirements of this seismic restraint section are in addition to other requirements as specified elsewhere for the support and attachment of equipment and electrical services, and for the vibration isolation of same equipment. Nothing on the project drawings or specifications shall be interpreted as justification to waive the requirements of this seismic restraint section.

.2 The work under this section shall include furnishing all labour, materials, tools, appliances, and equipment, and performing all operations necessary for the complete execution of the installation of seismic snubber restraint assemblies as shown, detailed, and/or scheduled on the drawing and/or specified in this section of the specifications.

.3 All seismic snubber restraint assemblies shall meet the following minimum requirements:

.1 The snubber/restrained isolator for isolated equipment shall include a resilient element that will ensure that no un-cushioned shock can occur (this does not include cable restraints).

.2 It shall be possible to visually inspect the resilient material for damage and allow for replacement, if necessary.

.3 All snubbers are to include a maximum air gap of 0.25" (6 mm).

.4 Seismic restraint systems shall be designed to offer seismic restraint in all directions, unless otherwise noted.

.5 Seismic restraint capacities to be verified by an independent test laboratory or certified by a registered Professional Engineer to ensure that the design intent of this specification is realized. Verification shall be by one of the following methods:

.1 An NRTL (National Recognized Testing Laboratory), or laboratory recommended by VISCMA.

.2 Certified by a Professional Engineer with at least 5 years of experience, using industry standard methods of analysis, which employ common engineering practices. Adherence to the ratings standard within ASHRAE SPC171 and VISCMA 102-2007 is required.

.3 By a nationally recognized agency, such as VISCMA, that has reviewed and approved the restraint.

1.11 SYSTEM DESIGN

.1 Seismic restraint manufacturer shall be responsible for the structural design of attachment hardware as required to attach snubbers/restraints to both the equipment and supporting structure on vibration isolated equipment, or to directly attach equipment to the building structure for non-isolated equipment.

.2 The contractor shall furnish, to the seismic restraint manufacturer, a complete set of approved shop drawings of all equipment that is to be restrained, from which the selection and design of seismic restraint devices and/or attachment hardware will be completed. The shop drawings furnished shall include, at a minimum, basic equipment layout, length, and width dimensions, and installed operating weights of the equipment to be restrained.

.3 All conduit etc. is to be restrained to meet code requirements. At a minimum, the seismic restraint manufacturer shall provide documentation on maximum restraint spacing for various restraint sizes and anchors, as well as “worst case” reaction loads for each restraint and/or anchor size.

.4 The contractor shall ensure that all housekeeping pads used are adequately reinforced and are properly dowelled to the building structure, so as to withstand calculated seismic forces. In addition, the size or the housekeeping pad is to be coordinated with the seismic restraint manufacturer to ensure that adequate edge distances exist in order to obtain the desired equipment anchor capacities.

1.12 ALTERNATE SYSTEMS

.1 Provisions of the General Conditions and Supplemental Conditions of the specifications shall govern the use of alternate systems to those specified.

.2 Manufacturers not listed as approved in “Part 2 Materials” of this section must secure approval to bid a minimum of ten (10) days prior to the project bid date.

.3 Uncertified internal equipment seismic restraint systems are disallowed for use on this project.

1.13 INSTALLATION

.1 Installation of all seismic restraint materials specified herein shall be accomplished following the manufacturer's written instructions. Installation instructions shall be submitted to the engineer for approval prior to the beginning of the work.

Part 2 Products

2.1 ACCEPTABLE MANUFACTURERS

.1 Cooper B-Line.

.2 Unistrut Building Systems.

.3 Kinetics Noise Control Inc.

.4 Mason Industries.

.5 Engineer approved equal.

2.2 SEISMIC BRACING COMPONENTS

.1 Steel strut and bracing components shall be utilized in combinations as required to meet designed load capacities.

.2 Fittings and accessories: Products shall be of the same manufacturer as strut and designed for use with that product.

2.3 BUILDING CODE REQUIREMENTS

.1 Seismic Zone Factors and coefficients shall be according to geographical area information table located on structural engineer of record's drawings.

2.4 SEISMIC SNUBBER TYPES

.1 GENERAL

(Isolator/Snubber Types contained herein are per ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.) Handbook, HVAC Applications, Seismic and Wind Restraint Design)

.2 Type J, Cable Restraints for Suspended Conduit and Trapeze

.1 Seismic wire rope cable restraints shall consist of steel wire strand cables, sized to resist project seismic loads, arranged to offer seismic restraint capabilities for conduit, trapeze assemblies, and suspended equipment in all lateral directions.

.2 Building and equipment attachment brackets at each end of the cable shall be designed to permit free cable movement in all directions up to a 45-degree misalignment. Protective thimbles shall be used at sharp connection points as required to eliminate potential for dynamic cable wear and strand breakage.

.3 Restraints shall be sized to the capacity of the cable or to the capacity of the anchorage, whichever is lesser.

.4 Seismic wire rope connections shall be made using overlap wire rope “U” clips or seismically rated tool-less wedge insert lock connectors.

.5 Vertical suspension rods shall be braced as required to avoid potential for buckling due to vertical “up” forces. Braces shall be structural steel angle uniquely selected to be of sufficient strength to prevent support rod bending. Brace shall be attached to the vertical suspension rod by a series of adjustable straps. Clips shall be capable of securely locking brace to suspension rod without the need for hand tools.

.6 Where clevis hanger brackets are used for seismic restraint attachment, they will be fitted with clevis internal braces to prevent buckling of the hanger brackets.

.7 Seismic cable shall be as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed.

.8 Seismic cable building and equipment attachment brackets shall be Model KSCA, KSCU, or KSCC as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed.

.9 Seismic cable concrete anchor bolts shall be Model KCAB Wedge, Model KCCAB Cracked Concrete, or Model KUAB Undercut, as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed.

.10 Seismic wire rope connectors shall be (Model KWRC - 'U’ clamp) / (Model KWGC - Tool-less wedge lock) as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed.

.11 Seismic vertical suspension stiffener rod clips shall be Model KHRC as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed.

.12 Clevis Internal Braces shall be Model KCHB as manufactured by Kinetics Noise Control, or by other manufacturers who can meet the requirements as listed.

Part 3 Execution

3.1 INSTALLATION

.1 All seismic restraint systems shall be installed in strict accordance with the manufacturer’s seismic restraint guidelines manual and all certified submittal data.

.2 Installation of seismic restraints shall not cause any change in position of equipment or piping, resulting in stresses or misalignment.

.3 No rigid connections between equipment and the building structure shall be made that degrade the noise and vibration isolation system specified.

.4 Do not install any equipment, piping, duct, or conduit that makes connections with the building unless isolation is not specified.

.5 Prior to installation, bring to the architect's/engineer's attention any discrepancies between the specifications and the field conditions, or changes required due to specific equipment selection.

.6 Bracing may occur from flanges of structural beams, upper truss cords of bar joists, cast in place inserts, or wedge-type concrete anchors. Consult structural engineer of record.

.7 Overstressing of the building structure shall not occur from overhead support of equipment. Bracing attached to structural members may present additional stresses. The contractor shall submit loads to the structural engineer of record for approval in this event.

.8 Brace support rods when necessary to accept compressive loads. Welding of compressive braces to the vertical support rods is not acceptable.

.9 Provide reinforced clevis bolts where required.

.10 Seismic restraints shall be mechanically attached to the system. Looping restraints around the system is not acceptable.

.11 Do not brace a system to two independent structures such as a ceiling and wall.

.12 Provide appropriately sized openings in walls, floors, and ceilings for anticipated seismic movement. Provide fire seal systems in fire-rated walls.

.13 Torque anchor bolts according to anchor manufacturer's written instructions to resist seismic forces.

.14 Do not install any seismic restraint for equipment, cable trays or conduit that compromises isolation specified.

.15 Hold down clamps must be used to attach conduits and/or cables to all trapeze members before applying restraints.

.16 Conduit crossing building seismic or expansion joints, passing from building to building, or supported from different portions of the building shall be installed to allow differential support displacements without damaging the conduit, equipment connections, or support connections. Conduit offsets, loops, anchors, and guides shall be installed as required to provide specified motion capability and limit motion of adjacent piping.

.17 Coring is not permitted for the installation of concrete anchors. Use ground penetrating radar or equivalent method of embedment item detection to locate all embed items including reinforcing steel and electrical conduits. Concrete reinforcing steel and electrical conduits shall not be cut or damaged under any circumstances.

3.2 EXECUTION

.1 Install vertical braces to stiffen hanger rods and prevent buckling per seismic restraint manufacturer's design. Clamp vertical brace to hanger rods. Requirements apply equally to hanging equipment. Do not weld vertical braces to hanger rods.

.2 If mounting hole diameter exceeds bolt diameter by more than 0.125" (3 mm), reduce clearance in hole with epoxy grout, flanged elastomeric bushings or welded washer.

.3 Housekeeping Pads must be adequately reinforced and adequately sized for proper installation of equipment anchors. Refer to seismic restraint manufacturer's written instructions.

3.3 INSPECTION

.1 The contractor shall notify the local representative of the seismic restraint materials manufacturer prior to installing any seismic restraint devices. The contractor shall seek the representative's guidance in any installation procedures with which he/she is unfamiliar.

.2 Upon completion of the installation of all seismic restraint devices herein specified, the local representative of the seismic restraint manufacturer shall, at the contractor's request, inspect the completed system and report in writing any installation errors, improperly selected snubber devices, or other fault in the system which could affect the performance of the system.

.3 The installing contractor shall submit a report upon request to the building architect and/or engineer, including the manufacturer's representative's final report, indicating that all seismic restraint material has been properly installed, or steps that are to be taken by the contractor to properly complete the seismic restraint work as per the specifications.

3.4 CONDUIT

.1 Seismically restrain all electrical conduit. Use Type J Cable Restraints for all conduit supported by vibration isolation hanger assemblies. Brace all conduit to code requirements (IBC or TI-809-04) or in conformance with SMACNA (Sheet Metal and Air Conditioning Contractors National Association, Inc.) "Seismic Restraint Manual Guidelines for Mechanical Systems", Second Edition (Remaining Codes).

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

- .1 CAN/CSA C22.2 No.18-92, Outlet Boxes, Conduit Boxes, and Fittings.
- .2 CSA C22.2 No.45-M1981(R1992), Rigid Metal Conduit.
- .3 CSA C22.2 No.56-1977(R1977), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .4 CSA C22.2 No.83-M1985(R1992), Electrical Metallic Tubing.
- .5 CSA C22.2 No.211.2-M1984(R1992), Rigid PVC (Unplasticized) Conduit.
- .6 CAN/CSA C22.2 No.227.1, Nema TC-13, Flexible Nonmetallic Tubing.

Part 2 Products

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No.45, aluminum threaded.

.2 Epoxy coated conduit: to CSA C22.2 No.45, with zinc coating and corrosion resistant epoxy finish inside and outside.

.3 Electrical metallic tubing (EMT) with couplings: to CSA C22.2 No.83.

.4 Rigid PVC conduit: to CSA C22.2 No.211.2.

.5 Flexible metal conduit: to CSA C22.2 No.56, aluminum and liquid-tight flexible metal.

.6 Flexible PVC conduit: to CAN/CSA C22.2 No.227.1 and Nema TC-13, Electrical nonmetallic tubing (ENT).

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 53 mm (2") and smaller. Two hole steel straps for conduits larger than 53 mm (2").

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 1.5 m (5'-0") oc.

.4 Threaded rods, 6 mm (1/4") diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

.1 EMT fittings shall be set screw style (zinc alloy).

.2 Flexible metal conduit fittings shall be screw-in type.

.3 Liquid type flexible metal conduit fittings shall be sealtite type.

.4 PVC fittings shall be PVC type complete with PVC adaptors at all boxes.

.5 Rigid conduit and mineral insulated conduit fittings shall be threaded type.

.6 Coating: same as conduit.

.7 Factory "ells" where 90° bends are required for 27 mm (1") and larger conduits.

.8 Where bushings are noted to be provided they must be “screwed” type fastened to a conduit connector. Push-fit or glued in place bushings will NOT be accepted.

2.4 FISH CORD

.1 Nylon twine.

Part 3 Execution

3.1 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical/ electrical service rooms and in unfinished areas.

.3 Where devices are to be installed on existing walls in finished area, which cannot be “fished”, install feeds in a surface metal raceway equal to Wiremold V700 series. Coordinate surface installations with Consultant prior to rough-in, unless otherwise noted.

.4 Use electrical metallic tubing (EMT) for all branch circuits unless specified otherwise.

.5 Electrical nonmetallic tubing (ENT) may be used only for branch circuits in non-combustible buildings, in framed wall construction for residential suites, within block walls, and in precast or cast in place walls and floors. **Use of ENT for direct burial, plenum ceilings, or outdoor environments will not be accepted.**

.6 Use rigid aluminum threaded conduit where specified and up to 2.1 m (7'-0") above finish floor where exposed to mechanical injury.

.7 Use rigid PVC conduit underground and in kitchen areas.

.8 Use flexible metal conduit for connection to motors in dry areas, connection to recessed fixtures without a prewired outlet box, connection to surface or recessed fixtures, work in movable metal partitions.

.9 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations and for connections to kitchen equipment.

.10 Conduits terminating at electrical equipment in sprinklered areas are to be provided rain-tight insulated compression style connectors.

.11 **Minimum conduit size for branch circuits shall be 21 mm (3/4").** Single drops from ceiling mounted junction boxes down to a light switch or duplex receptacle may be reduced to 16 mm (½").

.12 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.13 Mechanically bend steel conduit over 27 mm (1") diameter.

.14 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.15 Install fish cord in empty conduits.

.16 Run 2- 27 mm (1") spare conduits up to accessible ceiling space from each flush panel. Terminate these conduits in 152 mm x 152 mm x 102 mm (6" x 6" x 4") junction boxes in ceiling space.

.17 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.

.18 Dry conduits out before installing wire.

.19 Do not install, store, or handle ENT in cold temperatures below -20°C(-4°F). Do not store ENT outside.

.20 Install conduit sealing fittings in hazardous areas. Fill with compound.

3.2 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m (5') clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended or surface channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm (3") parallel to steam or hot water lines with minimum of 25 mm (1") at crossovers.

.7 Do not fasten surface conduit to roof deck. Provide standoffs or supports as manufactured by Caddy or use Unistrut trapeze fastened to structure.

3.3 CONCEALED CONDUITS

.1 Do not install horizontal runs in masonry walls.

.2 Do not install conduits in terrazzo or concrete toppings.

3.4 CONDUITS IN CAST-IN-PLACE CONCRETE

.1 Locate to suit reinforcing steel. Install in centre one third of slab.

.2 Protect conduits from damage where they stub out of concrete.

.3 Install sleeves where conduits pass through slab or wall.

.4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed. Use cold mastic between sleeve and conduit.

.5 Do not place conduits in slabs in which slab thickness is less than 4 times conduit diameter.

.6 Encase conduits completely in concrete with minimum 27 mm (1") concrete cover.

.7 Organize conduits in slab to minimize cross-overs.

3.5 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE

.1 Run conduits 27 mm (1") and larger 300 mm (12") below slab (measured from top of slab to bottom of conduit) and encased in 78 mm (3") sand envelope.

3.6 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS

.1 Submit shop drawings for each system in Conformance with The Electrical General Requirements Section.

1.2 PRODUCT/MAINTENANCE DATA

.1 Submit product/maintenance data for each system for inclusion in maintenance manual conforming to The General Electrical Requirements Section.

1.3 SCOPE

.1 The scope of this Section will include the following systems.

.1 Surface mounted raceway.

.2 Auxiliary systems rough-in.

.3 Security and access control rough-in.

.4 Telecommunication network system rough-in.

.5 Public address system rough-in.

.6 Line voltage power packs and low voltage occupancy sensors.

Part 2 Products

2.1 SURFACE MOUNTED RACEWAY

.1 The two compartment surface raceway shall be complete with the following features:

.1 Surface non-metallic raceway is to be utilized in dry interior locations only.

.2 The surface non-metallic raceway system specified herein for branch circuit wiring and/or data network, voice, video and other low-voltage wiring shall be the 5400 System as manufactured by the Wiremold Company.

.3 The raceway and all system components must be UL Listed, and exhibit non-flammable self-extinguishing characteristics tested to comparable specifications of UL94V-0. The raceway base and cover shall be manufactured by rigid compound, available in ivory or white colours (Architect Selection).

.4 The raceway shall be a two-piece design with a base and a snap-on cover. Total width shall be 133 mm (5¼") by 44.5 mm (1¾") deep with an approximate thickness of 2.4 mm (1/12"). The base and cover shall be available in 2.4 m (8') lengths. The raceway shall be available with two multiple wiring channels formed by integral barriers in the base.

.5 The cover shall span the entire width of the base concealing all of the wiring channels.

.6 A full complement of fittings must be available including, but not limited to flat, internal and external elbows, tees entrance fittings, cover clips and end caps. They shall be manufactured of a rigid PVC compound. The fittings shall have a matte texture, in ivory or white colours to match the base and cover. They shall overlap the cover and base to hide uneven cuts. All fittings shall be supplied with a base where applicable to eliminate mitring. A transition fitting shall be available to adapt to other Wiremold series raceways.

.7 Device brackets shall be available for mounting standard devices in-line with the raceway. Faceplates shall match and fit flush in the device plate. They shall be manufactured of rigid PVC compound. They shall be ivory or white colours to match raceway base cover (Architect selection). Contractor is to provide devices as noted.

.8 The raceway manufacturer will provide a complete line of connectivity outlets and modular inserts for UTP (including Category 5e and 6), STP (150 ohm) Fibre Optic, Coaxial and other cabling types with face plates and bezels to facilitate mounting. The electrical contractor is to provide adapter plates for faceplates to be provided by the voice/data sub-contractor. The recommended plate is a Deco adapter 3-port plate style, confirm with voice/data sub-contractor.

.2 Acceptable alternate manufacturers include:

.1 Hubbell Base Trak

.2 Panduit Pan-Way

2.2 AUXILIARY SYSTEMS ROUGH-IN

.1 Outlets where noted shall be single gang boxes unless specified otherwise.

.2 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.

.3 Coordinate final outlet locations, quantities, etc. with respective system vendor and owner's representative.

2.3 SECURITY AND ACCESS CONTROL ROUGH-IN

.1 Provide conduit from device and outlet locations to cable management systems as noted on drawings.

.2 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.

.3 Provide grounding of equipment as noted on drawings.

.4 Security and access control systems installation shall be by Owner's approved vendor as part of separate tender.

2.4 TELECOMMUNICATION NETWORK SYSTEM ROUGH-IN

.1 Outlets where noted shall be single gang flush mounted in wall or surface raceways.

.2 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.

.3 Provide a #6 insulated green ground conductor from main service ground to voice equipment backboard located on drawings.

.4 Telecommunication Network installation shall be by Owner's approved vendor as part of separate tender.

2.5 PUBLIC ADDRESS SYSTEM ROUGH-IN

.1 Provide conduit from device and outlet locations to cable management systems as noted on drawings.

.2 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.

.3 Provide grounding of equipment as noted on drawings.

.4 Public address system installation shall be by Owner's approved vendor as part of separate tender.

2.6 LINE VOLTAGE POWER PACKS AND LOW VOLTAGE OCCUPANCY SENSORS

.1 Line voltage power packs and occupancy sensors shall be one manufacturer throughout the project.

.2 Line Voltage Power packs shall be provided to match the room lighting load, control requirements, and lighting voltage. Power packs shall have the following features:

.1 Mount to standard junction box.

.2 Simple replacement. It shall be capable to replace the unit without requiring any configuration or set-up.

.3 Plenum rated

.4 120VAC or 347V, 60HZ operation.

.5 Acceptable materials:

.1 Sensorswitch Cat. #PP20 Series

.2 Legrand Cat. #BZ-250 Series

.3 Greengate Cat. #SP15 Series

.3 Low voltage / analog occupancy sensors shall be complete with the following features:

.1 Coverage pattern to suit room ceiling height.

.2 Suitable to detect minor and medium motion patterns within rooms less than 2000 sq. ft.

.3 Mount to standard junction box.

.4 Simple replacement. It shall be capable to replace the unit without requiring any configuration or set-up.

.5 Relays shall not be integrated within the occupancy sensor. Relays shall be provided within separate power pack.

.6 Acceptable materials

.1 Sensorswitch Cat. #CM-PDT Series

.2 Legrand Cat. #CI-205

.3 Greengate Cat. #OAC-DT-2000

Part 3 Execution

3.1 SURFACE MOUNTED RACEWAY

.1 Raceway is to be supplied and installed complete with all necessary fittings, hardware and device brackets for configuration as noted in the drawings for a complete functional installation.

.2 Install conduit system, wiring and devices as indicated.

.3 Ensure raceway is installed as per manufacturer recommendations.

.4 Where the raceway ends at a wall install end cap.

3.2 AUXILIARY SYSTEMS ROUGH-IN

.1 Provide backboard for each system use as noted complete with ground buss connection as specified.

.2 Outlets are to be installed complete with minimum 21 mm (3/4") conduit to accessible ceiling space or as otherwise detailed.

.3 Conduits terminated into ceiling spaces must be within 3 m (10') of zone conduits when noted.

.4 Provide insulated bushings on all conduits terminated in ceiling space.

.5 Ensure specified zone or riser conduits are installed back to equipment backboard.

3.3 SECURITY AND ACCESS CONTROL ROUGH-IN

.1 Outlets are to be provided for devices with conduit as detailed on drawings.

.2 Conduits terminated into ceiling spaces must be within 1m of cable management of tray.

3.4 TELECOMMUNICATION NETWORK SYSTEM ROUGH-IN

.1 Install incoming service ducts and terminate as noted.

.2 Provide backboard as noted complete with ground connection to main service ground.

.3 Conduits terminated into ceiling spaces must be within 3 m (10') of zone conduits (if applicable).

.4 Ensure specified zone conduits are installed back to service backboard.

.5 Outlets are to be installed complete with 25 mm (1") conduit to corridor ceiling space or nearest zone conduit (if applicable).

.6 Provide insulated bushings on all conduits terminated in ceiling space.

.7 A 25 mm (1") conduit is to be installed from elevator machine room to voice service backboard.

3.5 PUBLIC ADDRESS SYSTEM ROUGH-IN

.1 Conduits terminated into ceiling spaces must be within 1m (10') of cable management tray.

.2 Outlets are to be installed complete with 25 mm (1") conduit to corridor ceiling space or nearest cable management tray.

.3 Provide insulated bushings on all conduits terminated in ceiling space.

.4 Electrical contractor shall obtain speaker back boxes from School Board vender for installation into ceiling tiles, block walls, etc.

3.6 LINE VOLTAGE POWER PACKS AND LOW VOLTAGE OCCUPANCY SENSORS

.1 Install power packs in accessible maintenance areas.

.2 Provide access doors if power packs are installed above drywall ceilings.

.3 Install sensors in gym where noted on plan at mid height of wall.

.4 Sensors installed in areas of high abuse shall be complete with wire guards.

.5 It shall be the contractor's responsibility to locate and aim sensors in the correct location required for complete and proper coverage within the range of coverage as per the manufacturer's recommendations. The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective rooms.

.6 It is the contractor's responsibility to arrange a pre-installation meeting with the manufacturer's factory authorized representative, at the facility, to verify placement to sensors and installation criteria.

.7 The contractor shall also provide the on-site training necessary to familiarize the owner's personnel with the operation, use, adjustment and problem solving diagnosis of the occupancy sensing devices systems.

.8 Upon completion of the installation, the system shall be completely commissioned by the manufacturer's factory authorized technician who will verify all adjustments and sensor placement to ensure a trouble-free occupancy-based lighting control. Submit commissioning report with closeout documents.

.9 **All lighting controls shall be provided with functional testing and documentation conforming to Ashrae 90.1, latest adoption. This cost shall be included in the Tender Price.**

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 SWITCHES

.1 Line Voltage Wall Switches

.1 AC switches must conform to CSA C22.2 No. 111 (latest edition).

.2 AC switches with following features:

.1 Terminal holes approved for No. 10 AWG wire.

.2 Silver alloy contacts.

.3 Urea or melamine molding for parts subject to carbon tracking.

.4 Suitable for back and side wiring.

.5 Toggle style (Rocker style) (architect to select colour).

.3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.

.4 AC Switches of one manufacturer throughout project.

.5 Provide 2 keys per keyed switch.

.6 Occupancy sensor switches shall be dual technology style (PIR and Ultrasonic) where noted on the drawings.

.7 Acceptable Materials:

.1 Single Pole : Hubbell Cat #HBL1201

.2 Three Way: Hubbell Cat. #HBL1203

.3 Four Way: Hubbell Cat. #HBL1204

.4 Illuminated: Hubbell Cat. #HBL1221IL (light on with load off)

.5 Keyed: Hubbell Cat. #HBL1221 Series

.1 Keys: Hubbell Cat. #HBL1209

.6 Motor Rated: Hubbell Cat. #HBL1221PL

.7 Single Pole (Decora): Hubbell Cat #HBL2101

.8 Three Way (Decora): Hubbell Cat #HBL2103

.9 Four Way (Decora): Hubbell Cat. #HBL2124

.10 Single Relay Occupancy Sensor includes:

.1 Legrand Cat. #DW-100

.2 Greengate Cat. #ONW-D-1001

.3 Sensorswitch Cat. #WSXA Series

.11 Dual Relay Occupancy Sensor includes:

.1 Legrand Cat. #DW-200

.2 Greengate Cat. #ONW/VNW-D-1001-DMV-N

.3 Sensorswitch Cat. #WSXA Series

.8 Acceptable toggle switch alternate manufacturers include:

.1 Pass & Seymour

.2 Leviton.

.2 Line Voltage 0-10V Dimming Switches

.1 0-10V Dimmers are to be provided complete with the following features:

.1 Rating of 15A or 20A, 120V or 347V.

.2 0-10V dimming leads

.3 Capable of operation with four switch locations.

.4 DIP switches or local programming through switch buttons to change mode of operation.

.5 Integral on/off switch.

.6 Devices must mount in single gang box or multi-ganged where noted.

.7 Device and faceplate colour must match other wiring devices.

.8 Integral dual technology occupancy sensors (PIR and Ultrasonic).

.2 Acceptable Materials:

.1 0-10V Occupancy Wall Sensor Switch (Decora): Legrand Cat. #DW-311

.2 0-10V Dimming Switch: Leviton Cat. #ZS057 Series

.3 Acceptable alternative manufacturer's include:

.1 Legrand

.2 Leviton

.3 Lutron

.4 Sensor Switch

.5 Greengate

.3 Digital Interval Timer Switches

.1 Where noted supply and install a digital pre-set countdown time switch with the following features:

.1 minimum 1/6 HP rated contacts, mounted in recess single gang outlet box.

.2 Six (6) pre-set time selection buttons with options up to 1 hour.

.3 Unit shall be complete with activation indicator lights.

.4 Unit shall have integral On/Off button.

.5 White finish unless noted otherwise. (final finish selection by Architect).

.2 Acceptable Materials:

.1 Legrand Cat. #RT-50

.3 Acceptable alternative manufacturer's include:

.1 Leviton

.2 Lutron

.3 Hubbell

2.2 RECEPTACLES

.1 Receptacles, plugs, and other similar wiring devices must conform to CSA 22.2 No 42 (latest edition).

.2 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, with following features (20A where noted):

.1 Urea molded housing (Colour by architect).

.2 Suitable for No. 10 AWG for back and side wiring.

.3 Break-off links for use as split receptacles.

.4 Eight back wired entrances, four side wiring screws.

.5 Triple wipe contacts and rivetted grounding contacts.

.3 Other receptacles with ampacity and voltage as indicated.

.4 Receptacles of one manufacturer throughout project.

.5 Acceptable materials:

.1 Tamper resistant

.1 Tamper resistant ground fault protected receptacle: Hubbell Cat. #GFTR15

.2 Tamper resistant ground fault protected T-slot receptacle: Hubbell Cat. #GFTR20

.3 Tamper resistant duplex receptacle complete with dual USB ports: Hubbell Cat. #USB15XXX

.4 Automatically Controlled Tamper Resistant Receptacles (Green): Hubbell Cat. #BR15C2GNTR

.6 Acceptable alternate manufacturers include:

.1 Pass & Seymour

.2 Leviton

2.3 COVER PLATES

.1 Cover plates from one manufacturer throughout project.

.2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.3 Stainless steel, brushed, 1 mm (1/32") thick cover plates for wiring devices mounted in flush-mounted outlet box.

.4 Sheet metal cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

.5 Weatherproof cover plates complete with gaskets and “heavy-duty in use” covers in conformance with the Electrical Safety Authority. Provide product equal to Intermatic Cat. #WP5100C.

.6 Where noted on plans for exterior weatherproof GFCI receptacles at grade, provide extra-duty single gang horizontal die cast receptacle covers. NEMA 3R rated complete with lockable hasp and reinforced hinge. Suitable for use with 12-gauge cord sets. Intermatic Cat. # WP1010HMXD or equal.

.7 Provide p-touch labels on cover plates for all receptacles. Labels shall include source panel and branch circuit, including switch leg indicator as applicable for automatically controlled receptacles.

Part 3 Execution

3.1 INSTALLATION

.1 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches at height specified in Electrical General Requirements Section or as indicated.

.2 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height specified in Electrical General Requirements Section or as indicated.

.3 Where split receptacle has one portion switched mount vertically and switch upper portion.

.3 Occupancy sensors:

.1 Occupancy sensors shall be set to 5 minutes “delay to off” unless otherwise noted.

.4 Occupancy sensors and dimmers:

.1 Switches with occupancy sensors and dimmers shall be programmed as follows:

.1 5 minutes “delay to off” unless otherwise noted.

.2 “Auto on” to 50% dimming level.

.5 Cover plates:

.1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.2 Install suitable common cover plates where wiring devices are grouped.

.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

.6 Dimmer:

.1 Dimming Switches

.1 Mount devices at height as specified in Electrical General Requirements Section.

.2 Install in upright position as per manufacturer's installation instructions.

.3 Provide class II 0-10V control wiring from 0-10V dimming switch to each fixture driver in 21mmC.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

.1 Submit product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 DISCONNECT SWITCHES

.1 Enclosed manual air break switches must conform to CSA C22.1 No.4 (latest edition).

.2 Fuseholder assemblies must conform to CSA C22.2 No.39 (latest edition).

.3 Fusible, and/or non-fusible, horsepower rated disconnect switches, size as indicated.

.4 Provision for padlocking in off switch position by three locks.

.5 Mechanically interlocked door to prevent opening when handle in ON position.

.6 Fuses: size as indicated, to Fuses - Low Voltage Section.

.7 Fuseholders: relocatable and suitable without adaptors, for type and size of fuse indicated.

.8 Quick-make, quick-break action.

.9 ON-OFF switch position indication on switch enclosure cover.

.10 Disconnects feeding elevator controllers must be equipped with two auxiliary contacts approved by the elevator supplier.

.11 Service entrance rated with fault bracing, fusing and barrier as required.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Electrical General Requirements Section.

.2 Indicate name of load controlled on size 4 nameplate.

2.3 ACCEPTABLE MANUFACTURERS

Manufacturer	General Purpose	Weather Proof
Eaton	IHD Series	3HD Series
Schneider Electric	Type A Series	Type R Series
Siemens	ID Series	NFR/FR Series

Part 3 Execution

3.1 INSTALLATION

.1 Install disconnect switches complete with fuses if applicable.

.2 Connect auxiliary contacts to elevator controller using conduit, wire and route approved by the elevator supplier.

.3 Disconnect switches mounted on mechanical rooftop equipment shall be installed minimum 750 mm (30") above finished roof to be protected against damage and weather (snow build up).

.4 For replacement mechanical rooftop equipment, existing feeder shall be extended as necessary from existing junction point to suit replacement unit disconnecting means to be installed minimum 750 mm (30") above finished roof to be protected against damage and weather (snow build up).

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE C62.41- 1991, Recommended Practices for Surge Voltages in Low-Voltage AC Power Circuits.

.2 American Society for Testing and Materials (ASTM)

.1 ASTM F1137- 88 (1993), Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.3 United States of America, Federal Communications Commission (FCC)

.1 FCC (CFR47) EM and RF Interference Suppression.

.4 IESNA LM-79-08, IES Electrical Method for the Electrical and Photometric Measurements of Solid State Lighting Products.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with Electrical General Requirements Section for all light fixtures supplied under this contract.

.2 Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Consultant.

.3 Photometric data to include: VCP Table spacing criterion.

1.3 SCOPE

.1 This contractor is responsible to supply and install all lighting fixtures as scheduled and/or indicated including lamp and those accessories required for a complete lighting system. This contractor must coordinate lighting installations with all other Divisions of this project.

.2 All fixtures must be CSA approved or approved at this contractor's expense by the Special Inspection Division of the Electrical Safety Authority.

1.4 GUARANTEE

.1 Guarantees for materials replacement shall be as follows from date of ready for takeover.

.1 LED lamps: 3 months

.2 LED fixtures, and driver: 5 years.

.2 The labour required to replace these ballasts, lamps or drivers must be included in the above guarantee, however only for the extent of the contract guarantee and warranty period as noted in Electrical General Requirements.

1.5 EXISTING FIXTURE BALLAST REMOVAL AND DESTRUCTION

.1 Scope

.1 This Contractor is responsible for contracting with an approved company for the dismantling, disposal and removal of all existing fluorescent ballasts and lamps from this project. This process must include but is not limited to the following:

.1 Removal of existing ballasts from fixtures by this contractor.

.2 This contractor is to compare the ballast number to the PCB ballast identification booklet provided by the disposal company.

.3 If the ballast is not contaminated it is to be disposed of by normal means.

.4 If the ballast is contaminated provide:

.1 Approved interm on site storage area.

.2 Approved interm on site storage containers.

.3 Any and all necessary on site inspections.

.4 All necessary approval certificates (include copies in maintenance manuals).

.5 Full dismantling, complete destruction and disposal of all ballasts components.

.2 Approved Disposal Companies

.1 PCB Containment Technology Inc.
75 Wanless Court
Ayr, ON N0B 1E0
Phone: (519) 740-1333 / Fax: (519) 740-2320

.3 Payment Procedures

.1 Cost of complete services of this sub-contractor shall be paid for by this Section. Refer to Allowances and Fees Section for allowance to be carried for this work.

Part 2 Products

2.1 FIXTURE CONSTRUCTION

.1 Fixtures must be constructed of 20 gauge (minimum) cold rolled steel. All metal edges require smooth finish.

.2 Light leaks must be prevented by providing gasketting, stops, and barriers.

.3 Fixtures must be finished in high reflective baked white enamel. This surface must have a reflectance of not less than 85%.

.4 All fixtures operating on 347 Volts must be provided with an integral disconnecting means.

2.2 FIXTURE LENS

.1 Unless otherwise noted fixture lenses shall be as follows:

.1 Lens thickness: 3.2 mm (1/8")

.2 Material: injection moulded clear prismatic virgin acrylic

.3 Frame: hinged, latched, steel.

2.3 LED FIXTURES

.1 Fixture LEDs must be tested in conformance with IESNA LM80 standard.

.2 LEDs must be selected using a binning algorithm to ensure colour and lumen output of a given fixture are consistent, as well as meet or surpass ANSI C78.377 specification for the rated lifetime of the fixture. Colour accuracy between products must be within a 2-step MacAdam ellipse.

.3 Luminaires must be tested to IESNA LM79 by an independent approved laboratory.

.4 Luminaires must be tested prior to shipping.

.5 Luminaires must be ULC certified and approved for use in Canada.

.6 Fixtures must maintain a minimum of 90% of their initial light output for 60,000 hours. Submit test results upon request.

.7 Lumen values indicated for fixtures in the project documents are to be considered as “absolute” or “delivered” values.

.8 Other than for specialty fixtures, and unless otherwise indicated, the maximum driver current is to be 750 mA.

2.4 STANDARD EXIT LIGHTING UNITS

.1 Exit lighting units must conform to CSA C860, CSA 22.2 No. 141 (latest edition).

.2 Housing: extruded aluminum housing, white finish.

.3 Face and back plates: extruded aluminum.

.4 Lamps: 2W LED.

.5 Operation: 25 year.

.6 Units are to be provided with three (3) pictogram legends indicating “left from here”, “straight from here”, and “right from here”.

.7 Face plate to remain captive for relamping.

2.5 SELF-POWERED COMBINATION EXIT/EMERGENCY LIGHTING UNITS

.1 Exit lighting units must conform to CSA C860, CSA 22.2 No. 141 (latest edition).

.2 Housing: Extruded aluminum housing. White Finish.

.3 Face and back plates: Extruded aluminum.

.4 Lamps 2W LED (EXIT).

.5 Operation: 25 year life.

.6 Units are to be provided with three (3) pictogram legends indicating “left from here”, “straight from here”, and “right from here”.

.7 Face plate to remain captive for relamping.

.8 Supply voltage: As noted on drawings.

.9 Output voltage: 12 V DC.

.10 Battery: Sealed maintenance free 10 year life.

Note: Battery must be capable of supplying the wattage indicated for a minimum of 30 minutes.

.11 Charger: Solid state, voltage/current regulated, inverse temperature compensated, short circuit protected, with regulated output of plus or minus 0.01 V for plus or minus 10% V input variation.

.12 Solid state transfer circuit.

.13 Signal lights: “AC Power On” condition and “charging” condition.

.14 Lamp heads: Integral on unit, 345º horizontal and 180º vertical adjustment. Lamp type: minimum 4 watt LED.

.15 Mounting: Suitable for universal mounting directly on junction box and complete with knockouts for conduit. Removable or hinged front panel for easy access to batteries.

.16 Cabinet: finish: White.

.17 Auxiliary equipment:

.1 Test switch.

2.6 EMERGENCY LIGHTING UNITS

.1 Emergency lighting units must conform to CSA C22.2 No 141 (latest edition).

.2 Supply voltage: As noted on drawings.

.3 Output voltage: 12 V DC.

.4 Battery: Sealed, maintenance free, 10 year life.

Note: Battery units must be capable of supplying the wattage indicated for a minimum of 30 minutes.

.5 Charger: Solid state, multi rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01 V for plus or minus 10% input variations.

.6 Solid state transfer circuit.

.7 Low voltage disconnect: Solid state, modular, operates at 80% battery output voltage.

.8 Signal lights: “AC Power ON” condition and “charging” condition.

.9 Lamp heads: Integral on unit, 345º horizontal and 180º vertical adjustment. Lamp type: minimum 4 watt LED.

.10 Cabinet suitable for direct of shelf mounting to wall and complete with knockouts for conduit. Removable or hinged front panel for easy access to batteries.

.11 Auxiliary equipment:

.1 Test switch.

.2 Ac input and DC output terminal blocks inside cabinet.

.3 Shelf.

.4 Cord and plug connection for AC. **(Not applicable on 347 V units)**.

2.7 ACCEPTABLE LIGHTING MANUFACTURERS

.1 Refer to the light fixture schedule as indicated on drawings.

Part 3 Execution

3.1 INSTALLATION

.1 Locate and install luminaires as indicated. Luminaires are not to be supported from the roof deck. Provide additional unistrut support channel and/or support from structure. Co-ordinate with consultant on site.

.2 Ball align hangers must be provided for rod suspended fixtures.

.3 Fixtures surface mounted to suspended ceilings must be secured through ceiling assembly to cross member supports. These supports are to be steel channels or angles independently secured **to structure** using # 12 “jack” chain. Each chain must be secured so no fixture weight is added to the ceiling assembly.

.4 Plaster frames/flange kits must be provided by this Division for fixtures recessed in plaster and/or drywall ceilings.

.5 Where specified, fixtures to be chain hung shall be hung using “jack” chain with a capacity to suit the fixture weight. Branch circuit wiring feeding these fixtures shall be AC90 cable “ty-wrapped” at 900 mm (36") intervals along length of drop. Final appearance must be neat and professional.

.6 Install exit lighting units with illuminated faces and chevrons/arrows indicating path(s) of exit as indicated. Unless otherwise noted install exit fixtures at 2400 mm (8'-0") above finished floor.

.7 Install emergency lighting units and associated remote mounted fixtures as indicated.

.8 Direct “heads” on units and remote mounted fixtures to illuminate path(s) of exit.

.9 Install emergency lighting units and remote fixtures at 300 mm (12") below finished ceiling, unless indicated otherwise.

.10 Provide a 15 A 120 V duplex receptacle (connected to circuit indicated) adjacent to unit. **Not applicable on 347 V units. This receptacle connection is to be no lower than 8'-0" (2400 mm) AFF.**

.11 Special installation: Secure fixtures to structure to conform to the Electrical Safety Code using "jack chain" NOT ceiling suspension wire. Where coreslab is used, suspension point must be independent of the one used for suspension of the ceiling assembly. As an alternate to jack chain the contractor may use a pre-manufactured aircraft cable suspension and fastening system as manufactured by Gripple (Gripple Cat. #HF02-10F2). Provide minimum 2 per fixture.

.12 All battery units are to be provided with a visible lamicoid label indicating the unit number as per drawings.

3.2 WIRING

.1 Connect luminaires to lighting circuits as indicated.

.2 Connect exit fixtures to exit lighting circuits and unit equipment (if applicable).

.3 Connect unit equipment to circuits as indicated.

.4 All wiring of remote emergency fixtures shall be minimum #10 T90 for each circuit and run in conduit. Wiring must be sized in conformance with manufacturer's recommendations for distances required.

3.3 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.

.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.4 DELIVERIES

.1 Fixtures are to be completely assembled at the manufacturer's plant and delivered to the project site in original unitized containers. Ensure that a dry, protected and secure space is available for proper storage before scheduling delivery of fixtures.

3.5 TESTING/CERTIFICATION

.1 At the completion of the project and in the presence of the consultant, test all exit and emergency fixtures. On company letterhead, the contractor is to prepare a chart indicating:

- .1 Project
- .2 Date
- .3 Equipment type
- .4 Certification of correct connection
- .5 Certification of correct operation
- .6 Duration of test in minutes (minimum 30)
- .7 Actual period of testing (time of day)

3.6 ADDITIONAL INSTALLED EXIT SIGNS

.1 The electrical contractor is to include in their bid the cost to add two (2) additional standard exit lighting units to be installed and tested in locations as directed by the consultant. Note: This installation and test will be occurring after the initial testing/certification testing is complete.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE).

.2 Underwriter Laboratories of Canada (ULC).

.3 International Electrotechnical Commission.

.4 International Organization for Standardization (ISO).

.5 National Electrical Manufacturers Association (NEMA).

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with Section 26 01 16.

.2 Submit composite wiring diagrams and control schedule for each room control circuit type as proposed to be installed. Include load type, sequence of operation, sensor parameters, time delays, sensitivities and daylighting set points.

.3 Catalog cut sheets with performance specifications demonstrating compliance with specified requirements.

1.3 SCOPE

.1 This contractor is responsible to supply and install all equipment and control wiring as specified for the digital occupancy and daylight control systems. This contractor must coordinate these control systems with the lighting fixtures being supplied for the project to ensure intended function as specified.

.2 Control Intent: Control Intent includes, but is not limited to:

.1 Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, etc.

.2 Initial sensor and switching zones.

.3 All equipment must be CSA approved or approved at this contractor's expense by the Special Inspection Division of the Electrical Safety Authority.

.4 Reference section 26 51 13 for Lighting information.

.5 Reference section 26 05 75 for line voltage occupancy sensors and switches (hard wired analog).

1.4 SYSTEM DESCRIPTION AND OPERATION

.1 The Digital Lighting Control (room level) as defined under this section covers the following equipment:

.1 Digital Room Controllers – Self-configuring, digitally addressable one, two or three relay controllers.

.2 Digital Occupancy Sensors – Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.

.3 Digital Switches – Self-configuring, digitally addressable pushbutton switches, dimmers, and scene switches with two-way active infrared (IR) communications.

.4 Digital Photosensors – Single-zone closed loop sensors with two-way active infrared (IR) communications can provide switching or dimming control for daylight harvesting.

.5 Configuration Tools – Handheld remote for room configuration provides two-way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from an accessible location.

1.5 LIGHTING CONTROL APPLICATIONS

.1 Provide a minimum application of intended lighting control functions as detailed on design drawings and specified herein. Control functions shall include the following:

.1 Space Control Requirements – Provide occupancy/vacancy sensors with Manual-ON functionality in all spaces except toilet rooms, storerooms, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors.

.2 Bi-Level Lighting – Provide single zone, multi-level controls in any enclosed office, conference room, meeting room, and training room in all enclosed spaces except where variable dimming or multi-zone switching is used.

.3 Daylit Areas – All luminaries closest to the daylight source, and zoned separately from other fixtures in the space, shall be controlled separately from luminaires outside of daylit zones. Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings.

1.6 WARRANTY

.1 Provide a five-year complete manufacturer's warranty on all products to be free of manufacturers' defects.

.2 The labour required to replace these products must be included in the above warranty, however only for the extent of the contract guarantee and warranty period as noted in Electrical General Requirements.

1.7 QUALITY ASSURANCE

.1 Manufacturer: Minimum 10-years experience in manufacture of lighting controls.

Part 2 Products

2.1 MANUFACTURERS

.1 Basis of design product: WattStopper Digital Lighting Management (DLM). Acceptable alternates are subject to compliance and prior approval with specified requirements of this section, as one of the following:

.1 Cooper Controls (Wavelinx).

.2 Acuity Controls (nlight).

.2 Substitutions:

.1 All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by the design professional a minimum of 7 working days prior to the bid date and must be made available to all bidders.

.2 By using pre-approved substitutions, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring.

2.2 DIGITAL WALL OR CEILING MOUNTED OCCUPANCY SENSOR SYSTEM

.1 Wall or ceiling mounted (to suit installation) passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor. Furnish the Company's system which accommodates the square-foot coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors and accessories which suit the lighting and electrical system parameters.

.2 Digital Occupancy Sensors shall provide calibration and electronic documentation for the following features:

.1 Digital calibration and pushbutton programming for the following variables:

.1 Sensitivity – 0-100% in 10% increments

.2 Time delay – 1-30 minutes in 1 minute increments

.3 Test mode – Five second time delay

.4 Detection technology – PIR, Ultrasonic or Dual Technology activation and/or re-activation.

.5 Walk-through mode

.6 Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.

.2 Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.

.3 Device Status LEDs including:

.1 PIR Detection

.2 Ultrasonic detection

.3 Configuration mode

.4 Load binding

.4 Manual override of controlled loads.

.5 One or two RJ-45 port(s) for connection to DLM local network.

.3 Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.

WattStopper product numbers: LMPX, LMDX, LMPC, LMUC, LMDC

2.3 DIGITAL WALL SWITCHES

.1 Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5, and 8 button configuration; colour per architect, compatible with wall plates with decorator opening. Wall switches shall include the following features:

.1 Two-way infrared (IR) transceiver for use with personal and configuration remote controls.

.2 Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.

.2 Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required to achieve multi-way switching.

.3 The following switch attributes may be changed or selected using a wireless configuration tool:

.1 Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).

.2 Individual button function may be configured to Toggle, On only or Off only.

.3 Individual scenes may be locked to prevent unauthorized change.

.4 Switch buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads.

.4 Two RJ-45 ports for connection to DLM local network.

.5 Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required to achieve multi-way switching.

.6 WattStopper product numbers: LMSW-101, LMSW-102, LMSW-103, LMSW-104, LMSW-105, LMSW-108, LMDM-101.

2.4 DIGITAL POWER PACKS (ROOM CONTROLLERS)

.1 Room Controllers automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room Controllers shall be provided to match the room lighting load and control requirements. The controllers will be simple to install and will not have, dip switches, potentiometers or require special configuration. The control units will include the following features:

- .1 Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.
- .2 Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf unit without requiring any configuration or setup.
- .3 Device Status LEDs to indicate:
  - .1 Data transmission
  - .2 Device has power
  - .3 Status for each load
  - .4 Configuration status
- .4 Quick installation features including:
  - .1 Standard junction box mounting
- .5 Plenum rated
- .6 Manual override and LED indication for each load
- .7 120 VAC, 60 Hz operation.
- .8 Zero cross circuitry for each load.

.2 On/Off Room Controllers shall include:

- .1 One or multiple relay configuration to suit control details
- .2 Efficient 150 mA switching power supply
- .3 Sufficient sensor connection points to suit indicated function without the requirement for additional hardware
- .4 Discrete model listed for connection to receptacles, for schedule-based control of plug loads within the space.
  - .1 One relay configuration only.
  - .2 Automatic-ON/OFF configuration.
  - .3 Optional Network Bridge for BACnet MS/TP communications
- .5 Three RJ-45 DLM local network ports.
- .6 WattStopper product numbers: LMRC-101, LMRC-102, LMPL-101, LMPL-201.

.3 On/Off Room/Dimming enhanced Room Controllers shall include:

- .1 One or multiple relay configuration to suit control details.
- .2 Efficient 250 mA switching power supply.
- .3 One 0-10 volt analog output per relay for control of compatible ballasts and LED drivers.

.4 The following dimming attributes may be changed or selected using a wireless configuration tool:

.1 Establish preset level for each load from 0-100%.

.2 Set high and low trim for each load.

.3 Set lamp burn in time for each load up to 100 hours.

.5 Four RJ-45 DLM local network ports.

.6 Optional Network Bridge for BACnet MS/TP communications.

.7 WattStopper product numbers: LMRC-211, LRMC-212, LRMC-213, LMPL-201, LMRC-311, LMRC-312, LMRC-313.

2.5 DIGITAL ROOM CONTROL SYSTEMS

.1 Digital occupancy and daylight control system designed to control a small area of a building (room level). Digital devices connect to the room controller(s) using CAT 5e cables (LMRJ) with RJ-45 connectors which provide both data and power to room devices. Features of the system shall include:

.1 Plug n' Go automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.

.2 Simple replacement of any device in the system with a standard off the shelf unit without requiring commissioning, configuration or setup.

.3 Push n' Learn configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices which are part of the local system.

.4 Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.

2.6 CONFIGURATIONS TOOLS

.1 A configuration tool facilitates optional customization of digital lighting control system featuring infrared communications.

.2 Features and functionality of the wireless configuration tool shall include:

.1 Two-way infrared (IR) communication with DLM IR-enabled devices within a range of approximately 30 feet.

.2 Read, modify and send parameters for occupancy sensors, daylighting sensors, room controllers and buttons on digital wall switches.

.3 Save up to nine occupancy sensor setting profiles and apply profiles to selected sensors.

.3 WattStopper Product Numbers: LMCT-100, LMCI-100/LMCS-100

2.7 PROGRAMMING, CONFIGURATION AND DOCUMENTATION SOFTWARE

.1 PC-native application for optional programming of detailed technician-level parameter information for all DLM products, including all parameters not accessible via BACnet and the handled IR configuration tool. Software must be capable of accessing room-level parameter information locally within the room when connected via the optional LMCI-100 USB programming adapter, or globally for many segment networks simultaneously utilizing standard BACnet/IP communication.

.2 Additional parameters exposed through this method include but are not limited to:

.1 Occupancy sensor detection LED disable for performance and other aesthetic spaces where blinking LEDs present a distraction.

.2 Six occupancy sensor action behaviors for each controlled load, separately configurable for normal hours and after hours modes. Modes include: No Action, Follow Off Only, Follow On Only, Follow On and Off, Follow On Only with Override Time Delay, Follow Off Only with Blink Warn Grace Time, Follow On and Off with Blink Warn Grace Time.

.3 Separate fade time adjustments per load for both normal and after hours from 0 - 4 hours.

.4 Configurable occupancy sensor re-trigger grace period from 0 - 4 minutes separate for both normal hours and after hours.

.5 Separate normal hours and after hours per-load button mode with modes including: Do nothing, on only, off only, on and off.

.6 Load control polarity reversal so that on events turn loads off and vice versa.

.7 Per-load DR (demand response) shed level in units of percent.

.8 Load output pulse mode in increments of 1second.

.9 Fade trip point for each load for normal hours and after hours that establishes the dimmer command level at which a switched load closes its relay to allow for staggered On of switched loads in response to a dimmer.

.3 Generation of reports at the whole file, partial file, or room level. Reports include but are not limited to:

.1 Device list report: All devices in a project listed by type.

.2 Load binding report: All load controller bindings showing interaction with sensors, switches, and daylighting.

.3 BACnet points report: Per room Device ID report of the valid BACnet points for a given site's BOM.

.4 Room summary report: Device manifest for each room, aggregated by common BOM, showing basic sequence of operations.

.5 Device parameter report: Per-room lists of all configured parameters accessible via hand held IR programmer for use with O&M documentation.

.6 Scene report: All project scene pattern values not left at defaults (i.e. 1 = all loads 100 percent, 2 = all loads 75 percent, 3 = all loads 50 percent, 4 = all loads 25 percent, 5-16 = same as scene 1).

.7 Occupancy sensor report: Basic settings including time delay and sensitivities for all occupancy sensors.

.4 Network-wide programming of parameter data in a spreadsheet-like programming environment including but not limited to the following operations:

.1 Set, copy/paste an entire project site of sensor time delays.

.2 Set, copy/paste an entire project site of sensor sensitivity settings.

.3 Search based on room name and text labels.

.4 Filter by product type (i.e. LMRC-212) to allow parameter set by product.

.5 Filter by parameter value to search for product with specific configurations.

.5 Network-wide firmware upgrading remotely via the BACnet/IP network.

.1 Mass firmware update of entire rooms.

.2 Mass firmware update of specifically selected rooms or areas.

.3 Mass firmware upgrade of specific products

.6 Wattstopper Product Number: LMCS-100, LMCI-100

2.8 SYSTEM INPUT/OUTPUT

.1 Provide a means to allow seamless integration with third party devices to provide additional functionality to the Digital Lighting Management system via low voltage input/output interface. Wattstopper Product Number: LMIN-104.

.2 Provide a means to integrate analog occupancy sensors to the Digital Lighting Management system via low voltage analog sensor input module. Wattstopper Product Number: LMIO-201.

Part 3 Execution

3.1 INSTALLATION

.1 Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated.

.2 When using wire for connections other than the DLM local network (LMRJ Cat 5e with RJ-45 connectors), provide detailed point to point wiring diagrams for every termination. Provide wire specifications and wire colors to simplify contactor termination requirements.

.3 Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings.

.1 Adjust time delay so that controlled area remains lighted for 5 minutes after occupant leaves area.

.4 Install power packs in accessible maintenance areas unless noted otherwise. Provide access doors if power packs are installed above drywall ceilings.

.5 Install sensors in gym where noted on plan at mid-height of wall.

.6 It shall be the contractor's responsibility to locate and aim sensors in the correct location required for complete and proper coverage within the range of coverage as per the manufacturer's recommendations. The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective rooms.

.7 Provide written or computer-generated documentation on the commissioning of the system including room by room description including:

.1 Sensor parameters, time delays, sensitivities, and daylighting setpoints.

.2 Sequence of operation, (e.g. manual ON, Auto OFF. etc.)

.3 Load Parameters (e.g. blink warning, etc.)

.8 Re-commissioning – After 30 days from occupancy re-calibrate all sensor time delays and sensitivities to meet the Owner's Project Requirements. Provide a detailed report to the Architect / Owner of re-commissioning activity.

3.2 FACTORY COMMISSIONING

.1 Upon completion of the installation, the system shall be commissioned by the manufacturer's factory authorized representative who will verify a complete fully functional system.

.2 The electrical contractor shall provide both the manufacturer and the electrical engineer with ten working days written notice of the system startup and adjustment date.

.3 Upon completion of the system commissioning the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.

.4 Factory commissioning shall include functional testing and documentation of the control system conforming to the "Functional Testing" requirements included in the current ASHRAE standard. This cost shall be included in the Tender Price.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CAN/ULC-S524 (latest edition), Installation of Fire Alarm Systems.

.2 ULC-S525 (latest edition), Audible Signal Appliances for Fire Alarm Systems.

.3 CAN/ULC-S526 (latest edition), Visual Signal Appliances, Fire Alarm.

.4 CAN/ULC-S527 (latest edition), Control Units, Fire Alarm.

.5 CAN/ULC-S528 (latest edition), Manual Pull Stations.

.6 CAN/ULC-S529 (latest edition), Smoke Detectors.

.7 CAN/ULC-S530 (latest edition), Heat Actuated Fire Detectors, Fire Alarm.

.8 CAN/ULC-S531 (latest edition), Smoke Alarms.

.9 CAN/ULC-S536 (latest edition), Inspection and Testing of Fire Alarm Systems.

.10 CAN/ULC-S537 (latest edition), Verification of Fire Alarm Systems.

.11 CAN/ULC-S552 (latest edition), Inspection, Testing and Maintenance of Smoke Alarms.

.12 CAN/ULC-S553 (latest edition), Installation of Smoke Alarms.

.13 OBC-2024, Ontario Building Code Compendium.

1.2 DESCRIPTION OF EXISTING SYSTEM

.1 The existing addressable system includes :

.1 An addressable control panel as manufactured by **Edwards – EST3X** to carry out fire alarm and protection functions including receiving alarm signals, initiating general alarm, supervising system continuously, actuating zone annunciators, and initiating trouble signals.

.2 Trouble signal devices.

.3 Power supply facilities.

.4 Addressable manual alarm stations.

.5 Addressable automatic alarm initiating devices.

.6 Audible and visual signal devices.

.7 End-of-line devices.

.8 Annunciator(s).

.9 Ancillary devices.

.10 Interface and zone modules.

.11 Remote trouble indicator.

1.3 REQUIREMENTS OF REGULATORY AGENCIES

.1 This system is subject to review by local building department officials, local fire department officials. **Therefore, submission of verification certificate and field technician device verification sheets is required prior to inspection by these officials. Schedule accordingly.**

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Electrical General Requirements Section.

.2 Include:

.1 New components.

.2 Complete wiring diagram for control panel replacements.

1.5 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for Fire Alarm System for incorporation into manual specified in Electrical General Requirements Section.

.2 Include:

.1 Operation and maintenance instructions for complete fire alarm system to permit effective operation and maintenance.

.2 Technical data - illustrated parts lists with parts catalogue numbers.

.3 Copy of approved shop drawings.

.4 List of recommended spare parts for system.

1.6 TRAINING

.1 Arrange and pay for on-site demonstrations by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system. **Obtain written receipt of training session and include in maintenance manual.**

1.7 SYSTEM OPERATION

.1 The system shall be configured for single stage operation as outlined on the design drawings to match existing system operation.

.2 The existing Fire Alarm Sequence of Operation shall remain as currently programmed and to include new devices and zones per design drawings.

.3 Refer to Fire Alarm Sequence of Operation for specific fire alarm sequence functions which generally include the following:

.1 Activation of audible and visual signal devices.

.2 Cause alarm and supervisory zone of alarm device to be indicated on control panel and remote annunciator(s).

.3 Cause system trouble indications.

.4 Activate auxiliary functions.

.5 Transmit signal to fire department via monitoring station.

.6 Log the alarm in the historical alarm log file.

.7 System silence parameters.

.8 System reset parameters.

1.8 PERFORMANCE CRITERIA

.1 These specifications describe the minimum functional requirements for an electronically supervised, microprocessor based, fully integrated system. The initial installation shall include all the necessary electronic hardware, software and memory for a completely operable system in accordance with these specifications.

1.9 QUALITY ASSURANCE

.1 Each and all items of the fire alarm system shall be listed as the products of a single manufacturer under the appropriate category by the Underwriter's Laboratories of Canada and shall bear the "U.L.C." label.

.2 Each and all items of the fire alarm system shall be covered by a one year parts and labour warranty covering defects resulting from faulty workmanship and materials. The warranty shall be deemed to begin on the date the system is accepted by the Project Manager on issuance of the substantial performance certificate for the project.

.3 All control equipment must have Transient Protection Devices to comply with U.L.C. requirements.

Part 2 Products

2.1 GENERAL

.1 It is the intention of this renovation to maintain the existing addressable fire alarm system control panel and remote annunciator, as well as existing signal and detection devices, while expanding the system to include additional control panel components, additional signal devices, and additional detection devices as shown on design drawings to suit the project scope.

.2 For information & coordination purposes, the following fire alarm manufacturer representative contact information is provided to the bidding trade:

.1 Troy Life & Fire Safety Ltd. (Edwards)
Ross McKay (519)-778-5839

2.2 INTELLIGENT DETECTORS-GENERAL OPERATION

.1 Addressable devices shall use simple to install and maintain decade, numbered 0 to 9, address switches. Detectors that have expanded addressing will have decade switch numbered from 0 to 15 for the most significant digit to allow detector addressing from 1 to 250.

.2 Device addressing shall be accomplished by either an electrical or mechanical means.

.3 Detectors shall be intelligent (analog) and addressable and shall connect with two wires to the fire alarm control panel signalling line circuits.

.4 Addressable smoke detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.

.5 The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. Sensitivity shall be automatically adjusted by the panel on a time-of-day basis.

.6 Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance.

.7 The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature.

.8 The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.

.9 Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (PHOTO, THERMAL).

.10 Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.

.11 Detectors shall provide address-setting means using decimal switches and shall also store an internal identifying code that the control panel shall use to identify the type of device. LEDs shall be provided that shall flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.

.12 Addressable devices shall provide address-setting means using decimal switches and shall also store an internal identifying code that the control panel shall use to identify the type of device. LED(s) shall be provided that shall flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.

.13 The sensors shall be of a low profile design and ULC listed for both ceiling and wall mount applications.

.14 Automatic smoke sensors shall be equipped with a dust cover, which shall be removed at the time of verification to prevent dust and dirt entering the smoke chamber during construction.

.15 A magnetic test switch shall be provided to test detectors and modules. Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.

2.3 INTELLIGENT MULTI-DETECTOR

.1 The intelligent multi-detector shall be an addressable device, which is designed to monitor photoelectric, ionization, and thermal technologies in a single sensing device. This detector shall utilize advanced electronics which react to smaller products of combustion found in fast flaming fires (ionization), slow smouldering fires (photoelectric), and heat (thermal) all within a single sensing device.

.2 The multi-detector shall include two bicolor LEDs, which flash green in normal operation and turn on steady red in alarm.

.3 Detectors are to be provided with relay base where noted on the drawings.

.4 Separately mounted photoelectric ionization and heat detectors in the same location are not acceptable alternatives.

2.4 FIXED TEMPERATURE HEAT DETECTOR

.1 These heat detectors shall have a low mass thermistor heat sensor and operate at a fixed temperature. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the/ time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. The heat detector shall have a nominal alarm point rating of 57ºC (1 35ºF). The heat detector shall be rated for ceiling installation at a minimum of 21.3m (70') centres and be suitable for wall mount applications.

2.5 FIXED TEMPERATURE / RATE OF RISE HEAT DETECTOR

.1 These heat detectors shall have a low mass thermistor heat sensor and operate at a fixed temperature and at a temperature rate-of-rise. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm, The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable. The intelligent heat detector shall have a nominal fixed temperature alarm point rating of 57ºC (135ºF) and a rate-of-rise alarm point of 9ºC (15ºF) per minute. The heat detector shall be rated for ceiling installation at a minimum of 21.3 m (70') centres and be suitable for wall mount applications.

2.6 PHOTOELECTRIC SMOKE DETECTOR

.1 The intelligent photoelectric detector shall utilize a light scattering type photoelectric smoke sensor to sense changes in air samples from its surroundings. The integral microprocessor shall dynamically examine values from the sensor and initiate an alarm based on the analysis of data. The detector shall continually monitor any changes in sensitivity due to the environmental affects of dirt, smoke, temperature, aging, and humidity. The photo detector shall be rated for ceiling installation at a minimum of Soft (Olin) centres and be suitable for wall mount applications.

.2 The percent smoke obscuration per foot alarm set point shall be field selectable to any of five sensitivity settings ranging from 1.0% to 3.5%. The photo detector shall be suitable for operation in the following environment:

.1 Temperature: 0ºC to 49ºC (32ºF to 120ºF)

.2 Humidity: 0-93% RH, non-condensing

.3 Elevation: no limit

.3 Detectors are to be provided with relay base where noted on the drawings.

2.7 STANDARD DETECTOR MOUNTING BASES

.1 Provide standard detector mounting bases suitable for mounting on North American 1-gang, 85mm (3 ½ ") or 100 mm (4") octagon box and 100 mm (4") square box. The base shall, contain no electronics, support all detector types and have the following minimum requirements:

.1 Removal of the respective detector shall not affect communications with other detectors.

.2 Terminal connections shall be made on the room side of the base. Bases which must be removed to gain access to the terminals shall not be acceptable.

2.8 INTELLIGENT DUCT SMOKE DETECTOR

.1 The smoke detector housing shall accommodate an intelligent photoelectric detector (as noted above) that provides continuous analog monitoring and alarm verification from the panel.

.2 When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

.3 Duct smoke detector sensor assemblies shall be complete with duct housing, photoelectric smoke detector, and sampling tubes as required. The duct-housing base shall come complete with an auxiliary set of form C dry contacts rated at 120 VAC, 3 Amps.

.4 The system shall automatically indicate when an individual duct sensor needs cleaning.

2.9 CONVENTIONAL AUTOMATIC ALARM INITIATING DEVICES

.1 Thermal fire detectors: fixed temperature, non-restorable, rated 57°C (135ºF) or 88°C (194ºF) as indicated.

.2 Thermal fire detectors, combination fixed temperature and rate of rise, non-restorable fixed temperature element, self-restoring rate of rise, fixed temperature 57°C (135ºF) or 88°C (194ºF), rate of rise 8.3°C (15ºF) per minute.

.3 Smoke detector: ceiling mounted, photo electric type, visual alarm indicator, complete with relay base where noted.

.4 Smoke detector: photo electric type air duct type with sampling tubes with protective housing.

.1 Plug-in type with fixed base.

.2 Wire-in base assembly with integral red alarm LED, and terminals for remote alarm LED.

2.10 AUDIBLE/VISUAL SIGNAL DEVICES

.1 150 mm (6") Bells: surface mounted bell, vibration type 24Vdc, 150 mm (6"), 92dBA rating at 3 m (10'), red finish, FM and ULC listed.

.2 250 mm (10") Bells: surface mounted bell, vibration type 24Vdc, 250 mm (10"),94dBA rating at 3 m (10'), red finish, FM and ULC listed.

.3 Strobe: semi-recessed, 24Vdc operation, complete with selectable 15/30/75/110 candela output (unless otherwise noted set at 75 cd), synchronized strobe, red finish, FM and ULC listed. Suitable for mounting on a single gang box.

NOTES:

.1 Signal devices with integral strobe lights in high abuse areas (i.e. gymnasium, change rooms, etc.) must be provided with protective wireguards.

.2 Any surface mounted signal devices must be provided with suitable backboxes supplied by the manufacturer.

.3 Provide synchronization modules to suit signal devices (if required by manufacturer).

.4 Set signal devices in classrooms to LOW setting.

2.11 END OF LINE RESISTORS

.1 End-of-line resistors for signalling circuits shall be sized to ensure the correct supervisory current flows in each circuit.

.2 End-of-line resistors shall be mounted on a stainless steel plate for mounting on a standard single gang box and bear the ULC label.

2.12 INTELLIGENT MODULES – GENERAL OPERATION

.1 The modules shall have a minimum of 2 diagnostic LED's mounted behind a finished coverplate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The module shall be capable of storing up to 24 diagnostic codes, which can be retrieved for troubleshooting assistance. Input and output circuit wiring shall be supervised for open and ground faults. The module shall be suitable for operation in the following environment:

.1 Temperature: 0ºC to 49ºC (32ºF to 120ºF).

.2 Humidity: 0-93% RH, non-condensing.

2.13 MONITOR MODULE

.1 The monitor modules shall have the following operating characteristics:

A flashing LED indicates that the module is in communication with the control panel. The LED latches steady on alarm (subject to current limitations on the loop).

.2 The monitor modules shall have the following features:

Nominal operating voltage:	15 to 32 VDC.
Maximum current draw:	5.1 mA (LED on)
Average operating current:	400 uA (LED flashing)
EOL resistance:	47K ohms.
Temperature range:	0°C to 49°C (32°F to 120°F)
Humidity range:	10% to 93% noncondensing
Dimensions:	114.3 mm (4.5") high x 101.6 mm (4") wide x 31.75 mm (1.25") deep. Mounts to a 101.6 mm (4") square x 53.975 mm (2.1/8") deep box.

2.14 ISOLATOR MODULE

.1 Fault isolator modules shall be provide to automatically isolate wire-to-wire short circuits on an SLC loop. The fault isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop. If a wire-to wire short occurs, the fault isolator module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the fault isolator module shall automatically reconnect the isolated section of the SLC loop. The fault isolator module shall not require any address-setting, and its' operations shall be totally automatic. It shall not be necessary to replace or reset a fault isolator module after its normal operation. The fault isolator module shall mount in a standard 10.16 cm (4") deep electrical box, in a surface-mounted backbox, or in the fire alarm control panel. It shall provide a single LED which shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

2.15 CONTROL MODULE

.1 Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay.

.2 The control module NACs may be wired for Style Z or Style Y (Class A/B) with up to 1 Amp of inductive A/V signal, or 2 Amps of resistive A/V signal operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% or all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

.3 The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 Amps at 30 VDC.

2.16 DOOR HOLD OPEN DEVICES

.1 Units to be complete with the following features:

.1 Wall mounted style.
.2 Long life electromagnet.
.3 Low current operation.
.4 Completely silent operation.
.5 25 lbf (111N) minimum holding force.
.6 Adjustable swivel contact plate.
.7 Brushed zinc finish.
.8 Maintenance free operation.
.9 Water resistant design.
.10 ULC, CSA, and FM approved.

2.17 SPRINKLER AND SUPERVISED VALVE CONNECTIONS

.1 Sprinkler and standpipe system contacts shall be provided by the mechanical/sprinkler contractor but connected into the fire alarm system by this Division.

2.18 REMOTE TROUBLE INDICATOR

.1 A system remote trouble indicator where noted on the drawings shall be provided complete with the following features:

.1 Flush mounted in a double gang box.
.2 Trouble LED.
.3 Trouble buzzer.

2.19 SYSTEM WIRING

.1 Replace existing device wiring where noted on drawings for replacement devices.

.2 The system wiring must be FSA rated in conformance with the Electrical Safety Code to suit the type of installation.

.3 Wiring shall be minimum #18 AWG twisted shielded pair in conduit. “Securex 2” armoured cable will be permitted to be used for “drops” to devices on accessible ceilings.

.4 As indicated on system riser diagram initiating device wiring shall be run in a loop with a home run from the last device to the control panel (Class ‘A’ configuration). Wiring from the “loop” module to conventional devices must be supervised, run in conduit, and conform to the standards of the Electrical Safety Code.

.5 Signal wiring is to be cross connected in a class ‘B’ configuration.

.6 Install isolator modules and end of line resistors in service rooms no higher than 2.4 M AFF. Provide location of these devices at the time of shop drawing submission.

.7 **These are the basic wiring requirements for system operation. Prior to tender close manufacturer and contractor are to confirm all necessary wiring specifications and requirements.**

2.20 APPROVED EQUIPMENT

DEVICE	**EDWARDS**
Control Panel	
	EST 3X
Intelligent Devices	
Addressable Multi-Sensor	SIGA2-PS
Addressable Base	SIGA-SB
Addressable Base c/w Relay	SIGA-RB
Heat Sensor	SIGA2-HRS or SIGA2-HFS
Smoke Detectors	SIGA-PS
Duct Type Smoke Detector (c/w Air Sampling Tubes)	SIGA-SD c/w SIGA-PS
Monitor Module	SIGA-CT Series
Control Module	SIGA-CR
Isolator Module	SIGA-IM

Conventional and Auxiliary Devices	
150 mm (6”) Bells	439D Series or MB Series
250 mm (10)” Bells	439D Series or MB Series
Door Holder	1500 Series
Strobe	G1R-VM

Part 3 Execution

3.1 INSTALLATION

.1 Install new and replacement components in accordance with CAN/ULC-S524 (latest edition) and approved manufacturers manuals and wiring diagrams. The contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation, All wiring shall be of the type recommended by the Electrical Safety Code, approved by local authorities having jurisdiction for the purpose, and shall be installed in dedicated conduit throughout.

.2 Disruption of fire alarm coverage for the building shall be kept to a minimum. Coordinate with owner and consultants required system shutdowns, periods of bypass, etc. to suit the required scope of renovation and replacement work.

.3 Locate and install detectors and connect to alarm circuit wiring. **Do not mount detectors within 1 m (39") of air outlets.** Maintain at least 600 mm (24") radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.

.4 Connect alarm circuits to main control panel.

.5 Locate and install signal devices and connect to signalling circuits.

.6 Connect signalling circuits to main control panel.

.7 Install end-of-line devices at end of applicable alarm and signalling circuits.

.8 Locate and install door releasing devices.
Note: Door holders must release by way of local smoke detector and signal from main control panel. Provide additional relays to suit.

.9 Locate and install remote relay units to control fan shut down.

.10 Sprinkler system: wire alarm and supervisory switches and connect to control panel.

.11 Provide 120V power and fire alarm connections to all fire smoke dampers c/w integral smoke detector. Connect all fire / smoke damper integral detector outputs to monitor modules for alarm condition and for monitoring of AC power to smoke damper as trouble condition at fire alarm panel based on module address. Coordinate exact location and connection requirements with mechanical contractor prior to rough-in. All fire smoke dampers c/w integral smoke detectors shall be provided and installed by mechanical contractor.

3.2 PROTECTION

.1 Contractor is to ensure all fire protection system detectors are protected from dust, dirt, humidity, and water at all times during construction. This applies to detectors installed, stored on site or stored in storage containers. Any detectors that are damaged or dirty shall be replaced at the contractor's expense.

3.3 FIELD QUALITY CONTROL

.1 The system shall be installed and fully tested under the supervision of trained manufacturer's representative. The system shall be demonstrated to perform all the functions as specified.

3.4 ACCEPTABLE INSTALLER

.1 The fire alarm / life safety system specified herein shall be installed by an Authorized Electrical Contractor who is CFAA certified.

3.5 EXAMINATION

.1 Prior to the commencement of any of the work detailed herein, an examination and analysis of the area(s) where the Fire Alarm / Life Safety System and all associated components are to be installed shall be made.

.2 Any of these area(s) which are found to be outside the manufacturers' recommended environments for the particular specified products shall be noted on a Site Examination Report which shall be given to the Building Owners Representative, and the Consultant.

.3 Any shorts, opens, or grounds found on existing wiring shall be corrected prior to the connection of these wires to any panel component or field device.

3.6 DEMONSTRATION

.1 Each of the intended operations of the installed Fire Alarm / Life Safety System shall be demonstrated to the Building Owners' Representative and the Consultant.

3.7 SYSTEM TEST

.1 It is the intention of this renovation to have the entire system, including existing, fully tested and verified.

.2 Perform tests in accordance with General Electrical Requirements Section and CAN/ULC-S537-(latest edition) Standard for the Verification of Fire Alarm Systems.

.3 Fire alarm system:

.1 Test each device and alarm circuit to ensure noted devices transmit alarm to control panel and actuate general alarm and ancillary devices.

.2 Check annunciator panels to ensure zones are shown correctly.

.3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of system.

.4 Class A circuits.

.1 Test each conductor on all circuits for capability of providing alarm signal on each side of single open-circuit fault condition imposed near middlemost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.2 Test each conductor on all circuits for capability of providing alarm signals during ground-fault condition imposed near middlemost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.5 Class B circuits

.1 Test each conductor on all circuits for capability of providing alarm signal on line side of single open-circuit fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.4 The control panel shall continuously perform as automatic self-test routine on each sensor, which will functionally check the sensor electronics and ensure the accuracy of the valves being transmitted to the control panel.

.5 Automatic testing will occur at a rate of one sensor every four minutes.

.6 The sensor's average analogue value is the average of the last 2000 recorded analogue entries of its chamber.

.7 Any sensor that fails this test shall indicate a '**SELF-TEST ABNORMAL'** trouble condition with the sensor's address at the control panel.

.8 The system shall automatically indicate when an individual sensor needs cleaning. When the sensor's average value reaches a predetermined value, a **'DIRTY SENSOR'** trouble condition shall be audibly and visually indicated at the local control panel for that sensor. IF a **'DIRTY SENSOR'** indication is left unattended and its average value increases to a second predetermined value, an **'EXCESSIVELY DIRTY SENSOR'** trouble condition shall be indicated at the local control panel for that sensor. To prevent false alarms, these **'DIRTY'** conditions shall in no way decrease the amount of smoke obscuration necessary to generate an alarm condition.

.9 An operator having a proper access level, shall have the capability to manually access the following information from the control panel:

.1 Primary Status

.2 Device Type

.3 Present Average Value

.4 Present Sensitivity Selected*

.5 Highest Peak Detection Values (HVP)*

.6 Sensor Range (Normal, Dirty, Excessively Dirty)

* Values shall be in 'percent of smoke obscuration' format so that no interpretation is required by the operator.

3.8 AUDIBILITY TESTING

.1 It is the intention of this renovation to have the audibility tested in portions of the building within the scope of the project as indicated on drawings.

.2 Audibility Testing:

.1 The contractor is to coordinate an audibility test prior to occupancy of the facility. The test is to be performed by the representatives of the fire alarm manufacturer in the presence of the consultant. The test report is to be in chart form indicating:

.1 Project

.2 Date of test

.3 Room name and number

.4 Ambient dB level

.5 Alarm dB level

.6 Name of testing technician

.2 The test results are to be submitted to the consultant for review prior to issuing to owner's representatives and/or authorities having jurisdiction.

3.9 INTEGRATED LIFE SAFETY SYSTEM TESTING

.1 This electrical contractor shall participate in integrated testing of this life safety system in conformance with Electrical General Requirements. Include all associated costs in tender.

3.10 ADDITIONAL INSTALLED FIRE ALARM SYSTEM COMPONENTS

.1 The electrical contractor is to include in their bid the cost to add two (2) additional signaling devices to be installed and verified in locations as directed by the consultant. Note: This installation and verification and subsequent audibility test will be occurring after the initial audibility testing is complete.

.2 The electrical contractor is to include in their bid the cost to add one (1) additional fire smoke damper connection and 120V loss of power trouble signal with associated module and including two (2) additional isolation modules to be installed and verified as directed by the consultant.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Related excavation and backfill operations.

.2 Chain link fence, gates, and concrete piers.

1.2 RELATED SECTIONS

.1 Section 03 30 00 - Cast-In-Place Concrete: concrete for piers.

1.3 REFERENCES

.1 CAN/CGSB-138.1-M80: Fence, Chain Link, Fabric.

.2 CAN/CGSB-138.2-M80: Fence, Chain Link, Framework, Zinc-Coated, Steel.

.3 CAN/CGSB-138.4-M82: Fence, Chain Link, Gates.

.4 CAN/CSA-G164-M92: Hot Dip Galvanizing of Irregularly Shaped Articles.

.5 OPSS 541: Construction Specification for Chain Link Security Fence.

.6 OPSD 900.01: Chain Link Security Fence.

2 Products

2.1 MANUFACTURERS

.1 Manufacturers of chain link fence having Product considered acceptable for use:
- .1 Frost.
- .2 Lundy.
- .3 Dominion.
- .4 General Wire and Cable.

2.2 MATERIALS

.1 Steel Wire: to CAN/CGSB-138.1-M, Type 1, Class A, Zinc-Coated; 3.5 mm diameter, Style 2, medium steel wire fabric, 610 g/m^2 hot dip galvanized before weaving.

.2 Steel Posts and Rails: steel, to CAN/CGSB-138.2-M; 550 g/m^2 hot dipped galvanizing;

2.3 COMPONENTS

.1 Wire Fabric: 2438 mm wide or 1219mm wide, as noted on drawings, with a uniform 38 mm diamond pattern chain link mesh, to OPSS.MUNI 772.

.2 Line, End, Corner, Straining and Gate Posts: to OPSD 972.102.

.3 Top and Bottom Rail: to OPSD 972.102, joined by galvanized couplings.

.4 Tension Wire and Braces: to OPSD 972.102.

.5 Fittings and Hardware: hot dipped galvanized to CAN/CSA-G164-M; adequate to resist induced stresses and form a rigid joint.

.6 Concrete: as specified under Section 03 30 00.

2.4 FABRICATION

.1 Factory manufacture all mesh and rigid frames.

.2 Electrically weld all factory assembled units.

3 Execution

3.1 EXAMINATION

.1 Verify existing conditions are ready to receive work.

3.2 INSTALLATION

.1 Install chain link fencing to requirements of OPSD 972.102 AND OPSS.MUNI 772.

.2 Set all posts in concrete base.

.3 Install framing with specially designed fittings to form a rigid framework.

.4 Fasten fabric to top rail and braces with suitable tie wire at 450 mm OC and to line posts at 350 mm OC.

.5 Install gates and hardware. Ensure proper framing and operation.

.6 Ensure entire installation is rigid, vertical and perpendicular.

END OF SECTION

26-7841-RFT - Southwood Secondary School RAAC Phase 1

Opening Date: March 12, 2026 2:40 PM

Closing Date: April 2, 2026 2:00 PM

Schedule of Prices

* Denotes a "**MANDATORY"** field

Do not enter $0.00 dollars unless you are providing the line item at zero dollars to the Board.

Bid Price Form

The amounts stipulated on the Bid Price Form(s) are intended to cover the cost of the complete Work as described in this Procurement and must remain fixed and firm for the term of the Contract unless otherwise specified in this Procurement.

All prices shall be in Canadian Funds, Free On Board (FOB) Destination, and Freight Prepaid (Board locations). and shall be exclusive of Harmonized Sales Tax (HST) but shall include all materials, labour, equipment, disbursements, expenses, insurance, bonding, customs charges, freight, shipping and handling costs, travel costs and all other charges of every kind attributable to the Work and Services provided.

Bid Price includes Cash Allowance

Line Item	Description	Unit of Measure	Quantity	Bid Price *	Total
1	As per scope of work outlined in 26-7841-RFT Southwood Secondary School RAAC Phase 1	Lump Sum	1		
				Subtotal:	

Summary Table

Bid Form	Amount
Bid Price Form	
HST (13%)	$ 0.00
Total Contract Amount:	

Bid Questions

Bidder Instructions

Answer all questions that are marked Mandatory.

Bill S-211 - This enactment enacts the Fighting Against Forced Labour and Child Labour in Supply Chains Act, which imposes an obligation on certain government institutions entities to ensure measures are taken to prevent and reduce the risk that forced labour or child labour is used by suppliers or in their supply chains. The Board principles align with Bill S-211. Please confirm that your organization will comply with this Act. YES or NO. If no, please explain.	
As per the “Ontario Business” definition as per the BOBI Act is a supplier, manufacturer or distribution of any business structure; conducts its activities on a permanent basis in Ontario; and has either a) its headquarters or main office in Ontario, or b) at least 250 full-time employees in Ontario at the time of the applicable procurement process. Does your company qualify as an Ontario Business under the BOBI Act? YES or NO	
is your company a Canadian business? YES or NO	
Is your company a U.S. business, as defined by the Ontario Treasury Board / Management Board of Cabinet (TB/MBC) as a supplier, manufacturer or distributor of any business structure (includes a sole proprietorship, partnership, corporation or other business structure) that: has its headquarters or main office located in the U.S., and has fewer than 250 full-time employees in Canada at the time of the applicable procurement process? Yes or No. (Comments are allowed).	

Specifications

Bidder's Contact Information

A Project Manager and Site Supervisor to manage and supervise the Work, must be named in this form. A dedicated Site Supervisor shall be in full-time attendance at the Place of the Work while the Work is being performed. Personnel will be subject to Board approval and may not be changed without prior written approval from the Board.

Note: resumes are required to be uploaded in the document section.

Title	Name	E-mail	Cell Phone Number	
Project Manager				*
Site Supervisor				*

Documents

It is your responsibility to ensure the uploaded file(s) is/are not defective or corrupted and are able to be opened and viewed by the Owner. If the attached file(s) cannot be opened or viewed, your Bid Submission may be rejected.

Instructions to Bidders

Upload a resume for each person named in the Specification section.

- Project Manager * (mandatory)
- Site Supervisor * (mandatory)
- Certificate of Recognition (COR) Certification * (mandatory)

BONDING UPLOAD SECTION

Refer to the Bonding Requirements Section of the Terms and Conditions.

Instructions to Bidders

Bidders shall upload their electronically verifiable and enforceable (e-Bond) format for Bid Deposit Bond and Agreement to Bond separately in this section. If both Bonds are in the same file, please upload it to both fields and indicate one is a copy.

Tender # and Project Title must be included on the Bonds.

Bonding requirements are based on the total base bid amount, inclusive of all applicable taxes.

- Bid Deposit Bond * (mandatory)
- Agreement to Bond * (mandatory)

Addenda, Terms and Conditions

I/We have read and understand this Bid Solicitation document, and agree to perform the Work required in accordance with this Bid

Solicitation document, including all addenda, at the price(s) detailed in the Bid.

I/We confirm that:

1. The person named in this Bid is authorized to sign and electronically submit this Bid through the Bidding System.

2. I/We meet all mandatory requirements of the Bid Solicitation document.

3. The bid will remain open for a specified acceptance period after the Closing Time. The Board may, at any time within this period, accept the Bid whether or not any other Bid has previously been accepted.

4. All prices provided in the Bid will remain fixed and firm for the duration of the term of the agreement, unless specified otherwise.

5. All prices provided in my/our Bid are in Canadian funds and include all charges of every kind attributable to the Work. Harmonized Sales Tax will be extra and not shown, unless specified otherwise.

6. To the best of my/our knowledge and belief:

a) the information provided in the Bid is correct; and

b) the Bid is made without any comparison of figures or arrangement with any other individual, corporation or person submitting a Bid for the same Work and is in all respects fair and without collusion or fraud.

7. I/We comply with the all applicable Board policies, provincial, and federal laws, and are aware of the Board's "Principles of Business Conduct" and will comply.

8. I/We agree and understand that the recommendation to award the Work may be subject to the approval from the Board as well as availability of funds.

9. I/We agree to be bound by the terms and conditions of the Bid Solicitation document and submit this Bid on behalf of the Bidder.

☐ I have the authority to bind the Bidder.

The Bidder/Proponent is to declare any actual, potential or perceived conflict of interest that could arise from submitting the Bid/Proposal.

Do you have a potential conflict of interest?

○ **Yes** ○ **No**

The Bidder acknowledges and agrees that the addendum/addenda below form part of the Bid Solicitation Document.

Please check the box in the column "**I have reviewed this addendum"** below to acknowledge each of the addenda.

File Name	I have reviewed the below addendum and attachments (if applicable)	Pages
There have not been any addenda issued for this bid.		