Simcoe County
District School Board
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Phone: 705-728-7570

Interior Childcare Renovation,
Tecumseth Beeton Elementary School,
43 Patterson Road,
Beeton, ON

TENDER NO: 2022-13062T

List of Consultants:

Architectural:
Formworks, Inc. Architects,
Phone: (705) 737-3365

Sub-Consultants:
Mechanical:
John Angus & Associates Inc.
2000 Argentia Road,
Mississauga, ON L5N 1W1
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Electrical:
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4 Industrial Parkway South,
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Structural:
Gerrits Engineering Ltd.,
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FORMWORKS

PROJECT **SIMCOE COUNTY DISTRICT SCHOOL BOARD,
INTERIOR CHILDCARE RENOVATIONS,
TECUMSETH BEETON ELEMENTARY SCHOOL,
43 PATTERSON ROAD,
BEETON, ON**

TENDER NO: 2022-13062T

DIVISION 5 - METALS

DIVISION 6 - WOOD & PLASTICS

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

DIVISION 8 - DOORS AND WINDOWS

DIVISION 9 - FINISHES

DIVISION 10 - SPECIALTIES

DIVISION 11 - EQUIPMENT

DIVISION 12 - FURNISHINGS

DIVISION 31 - EARTHWORK

DIVISION 32 - EXTERIOR IMPROVEMENTS

MECHANICAL

DIVISION 10 - SPECIALTIES (**This Section is included in addition to Architectural Division 10, specifically for mechanical equipment)

DIVISION 21 - FIRE SUPPRESSION, COMMON WORK MECHANICAL

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1 SCOPE OF WORK

1.1 Work covered under this Contract:

1.1.1 This is a single phase project slated for completion as noted in the contract documents to complete an interior renovation with new exterior entrance for a Childcare Facility.

1.1.2 The following outline is a general description of the Work and is not a list of all components of work to be included:

.1 The intent of the project is to renovate three existing classrooms, custodian office and storage room to provide a new Childcare Facility. The existing custodian office will be replaced in Room 120. The work requires removal of partitions, ceilings, millwork, classroom sinks, doors and frames, movable partitions and partial demolition of exterior wall to increase the sizes of some existing windows and construction of new entrance door and canopy. New work includes new partitions, millwork, washrooms, windows, doors, kitchen and Toddler and Pre-school classrooms. Exterior work includes removal of existing concrete pavers, concrete sidewalk, sod, and asphalt. New work includes the installation of new playground area with engineered wood fibre surfacing, new asphalt, concrete walks, sod repairs and chain link fences and gates and playground equipment. All existing lighting and ceiling mounted fixtures and equipment to be replaced. Refer to drawings and specifications for full extent of architectural, mechanical and electrical work.

.2 Structural work is required for a new canopy with associated roofing and cladding to match the existing.

.3 Review the Cash Allowances – the base bid to include engineered wood fibre impact surface and the alternate price shall include artificial turf for the playground surfaces where indicated on drawings.

1.2 WORK SEQUENCE

1.2.1 It is understood that the work of this contract will be substantially complete by August 7, 2023 and constructed to accommodate Board's continued use of premises by this date.

1.2.2 The Contractor shall provide SCDSB with a complete plan or layout of their work schedule prior to commencing any work on SCDSB property.

1.2.3 The Contractor must report to the School Office before proceeding elsewhere on SCDSB property.

1.2.4 Co-ordinate and continually update Progress Schedule and co-ordinate with Board to accomplish expeditious completion of the work in a timely manner. Cooperate with the Board in scheduling operations to minimize conflict and to facilitate Board usage of the premises.

1.2.5 Maintain fire access/control at all times.

********END********

1. INTRODUCTION

1.1 INVITATION

1.1.1 Simcoe County District School Board (the "**Owner**") is soliciting Bids from prequalified general contractors to perform the work described in the Bid Documents (the "**Work**") at ***Tecumseth Beeton Elementary School at 43 Patterson Street, Beeton, Ontario L0G 1A0*** (the "**Place of the Work**").

1.2 KEY INFORMATION

1.2.1 This Section provides a summary of some key information contained in the Bid Documents and is provided solely as a convenience. Bidders are urged to read all of the Bid Documents carefully and thoroughly to ensure they fully understand all of the terms and conditions, including all Contract requirements.

(a) The Owner has scheduled a mandatory site meeting at ***Tecumseth Beeton Elementary School*** on ***Friday November 25th, 2022***, commencing at ***10:00am***.

(b) The Owner requires that all Bidders attend the mandatory site meeting.

(c) The deadline for submitting questions (the **"Question Deadline"**) is 10 days before the Submission Deadline.

(d) Questions must be submitted through the online portal www.bidsandtenders.ca

(e) Bids must be submitted online through the Portal BEFORE 1:30:00PM Local Time on ***Friday December 16th, 2022*** (the "**Submission Deadline**").

(f) Bids must be irrevocable for a period of ninety (90) days starting from the day after the Submission Deadline (the "**Irrevocability Period**").

(g) The form of bid security to be delivered as part of the Bid is a digital bond, no other form of bond is acceptable. Bids submitted without digital bond will be considered noncompliant.

(h) The successful Bidder is permitted to commence work on site as of ***Monday, January 9th, 2023.***

(i) The successful Bidder will be required to achieve Substantial Performance of the Work by ***Monday, August 7th, 2023.***

(j) The Bid Coordinator is Brian Torrie, Supervisor of Purchasing, at "btorrie@scdsb.on.ca".

1.3 PREQUALIFICATION

1.3.1 The following general contractors are prequalified to submit a Bid (each a "**Prequalified Contractor**"):

(a) Anacond Contracting Inc.

(b) Area Construction inc.

(c) Bertram Construction (Ontario) Ltd.

(d) BDA Inc.

(e) Les Bertram & Sons (1985) Limited

(f) Maracon Construction Limited

(g) Quinan Construction Limited
(h) Ritestart Limited
(i) R.J.B. Construction (1989) Ltd.
(j) Rutherford Contracting Ltd.
(k) Shertine Construction Limited
(l) Silver Birch Contracting Ltd
(m) W.E. Marshall Construction (1986) Ltd.
(n) W.S. Morgan Construction Limited
(o) West Metro Contracting Inc.

1.3.2 The following ***Mechanical*** Subcontractors are prequalified for the Work:

(a) Anvi Services Ltd.
(b) Bruno Plumbing & Contracting Inc.
(c) Carmicheal Engineering Ltd.
(d) CEC Mechanical Ltd.
(e) Division 15 Plumbing & Mechanical Inc.
(f) H.S. St. Amant & Sons Inc.
(g) Kelson Mechanical Inc.
(h) Litek Mechanical Services Inc.
(i) Marnoch Electrical Services Inc. (MFM)
(j) Pipe All Plumbing & Heating Ltd.
(k) Sexton's Mechanical Limited
(l) Soan Mechanical Ltd
(m) Zencorp Mechanical Inc.

1.3.3 The following ***Electrical*** Subcontractors are prequalified for the Work:

(a) Best Electric Co.
(b) Brian's Little Electric Ltd.
(c) CEC Services Limited
(d) Electro-Works Ltd.
(e) Energy Network Services Inc.
(f) Marnoch Electrical Services Inc.
(g) N.S.E. 2000 INC.
(h) Pentor Electric Ltd.
(i) Sutherland Schultz Ltd.
(j) Walker's Electric 2000

(k) Wallwin Electric Services Ltd.

(l) Western Mechanical Electrical

1.3.4 The Owner reserves the right to issue one or more addenda naming additional Prequalified Contractors and/or additional prequalified Subcontractors.

1.3.5 Only Prequalified Contractors are eligible to participate in this Bid Process and to submit a Bid. Submissions received from those who are not a Prequalified Contractor will not be considered.

1.4 THE BID CONTRACT

1.4.1 The Bidders and the Owner acknowledge it is their intention to create a process contract, sometimes referred to as "Contract A" (the "**Bid Contract**"), between the Owner and each Bidder whose Bid meets all Mandatory Requirements. The Bidders and the Owner further acknowledge that if a Bid Contract is created between the Owner and one or more Bidders, the terms of the Bid Contract are represented by the Bid Documents and include an obligation on the successful Bidder, if any, to sign the Contract.

1.5 BIDDERS' EXPENSES

1.5.1 Bidders shall bear all costs and expenses incurred by them in any way related to any aspect of their participation or intended participation in this Bid Process including, without limitation, all costs and expenses related to a Bidder's involvement in:

(a) due diligence, investigations, and information gathering processes;

(b) attendances and/or participation at any and all site visits and/or meetings;

(c) the preparation and submission of a Bid and responding to Requests for Additional Information.

2. DEFINITIONS

Capitalized terms used in the Instructions to Bidders and not otherwise defined in this Article or elsewhere in these Instructions to Bidders shall have the meanings ascribed to them in the Definitions to the Contract. All references in the Instructions to Bidders to "Article", "Section" or "paragraph" shall, unless specifically indicated otherwise, refer to an Article, Section or paragraph of these Instructions to Bidders.

2.1.1 **"Adjusted Bid Price"** has the meaning set out in the table in paragraph 10.4.1.

2.1.2 **"Bid"** means all documents and information submitted through and/or uploaded to the Portal by a Bidder in response to and in accordance with these Instructions to Bidders, together with the documents and information specified in Section 9.4 and Section 10.2, where applicable.

2.1.3 **"Bidder"** means a Prequalified Contractor that participates in this Bid Process, whether or not it submits a Bid. The term "**Bidder**" also includes a Prequalified Contractor prior to the submission of its Bid.

2.1.4 **"Bid Contract"** means the contract described in paragraph 1.4.1 for the evaluation of Bids and the execution of the Contract, if any.

2.1.5 **"Bid Coordinator"** is the person identified as such in paragraph 1.2.1(j).

2.1.6 **"Bid Documents"** means the documents listed in paragraph 3.2.1.

2.1.7 **"Bid Price"** has the meaning set out in paragraph 9.2.1.

2.1.8 **"Bid Process"** means the procurement process described in the Bid Documents which commences with the issuance of these Instructions to Proponents and ends on the earliest of the following:

(a) the date on which the Contract is signed;

(b) the date on which the Bid Process is cancelled;

(c) the day after the expiry of the Irrevocability Period.

2.1.9 **"Board"** means the Board of Trustees of the Owner.

2.1.10 **"Conflict of Interest"** has the meaning set out in paragraph 13.2.1.

2.1.11 **"Contract"** means the written agreement to be signed between the Owner and the successful Bidder, in the form of CCDC 2 – 2020 stipulated price contract, as amended by Supplementary Conditions.

2.1.12 Reserved.

2.1.13 **"Irrevocability Period"** has the meaning set out in paragraph 1.2.1(f).

2.1.14 **"Local Time"** means the time measured and recorded on the Portal.

2.1.15 **"Mandatory Requirements"** means the mandatory requirements listed in paragraph 10.3.1.

2.1.16 **"MFIPPA"** means the *Municipal Freedom of Information and Protection of Privacy Act* (Ontario).

2.1.17 **"Owner"** means Simcoe County District School Board and includes its employees, agents, trustees, officers and directors, whether involved with the Bid Process or not, and includes the Board.

2.1.18 **"Place of the Work"** has the meaning set out in paragraph 1.1.1.

2.1.19 **"Portal"** has the meaning set out in paragraph 3.1.1.

2.1.20 **"Prequalified Contractor"** has the meaning set out in paragraph 1.3.1.

2.1.21 **"Question Deadline"** is the date identified as such in paragraph 1.2.1(c).

2.1.22 **"Reports"** has the meaning set out in paragraph 4.1.1.

2.1.23 **"Request for Additional Information"** has the meaning set out in paragraph 10.2.1.

2.1.24 **"Security Documents"** has the meaning set out in paragraph 9.3.1.

2.1.25 **"Submission Deadline"** is the date and time identified as such in paragraph 1.2.1(e).

2.1.26 **"Supplementary Conditions"** means the Supplementary Conditions for the CCDC 2 – 2020 stipulated price contract included on the Portal.

2.1.27 **"Work"** means the total construction and related services described in the Bid Documents.

3. BID DOCUMENTS

3.1 ACCESS TO THE BID DOCUMENTS

3.1.1 The Bid Documents will be made available to Bidders through the online digital bidding system established for this Bid Process on the website hosted by eSolutions Group Limited at "www.bidsandtenders.ca" (the "**Portal**"). The Portal will include all Bid Documents as well as Reports and other relevant notices, information and communications.

3.1.2 Each Bidder is solely responsible to ensure that it:

(a) registers with and obtains access to the Portal; and

(b) has the appropriate software to access, input, download and upload contents from and to the Portal; and

(c) visits and reviews the Portal as frequently as is necessary to ensure that it has the most current information, documents and addenda.

Bidders are solely responsible for visiting and checking the Portal for new content and the Owner accepts no responsibility for any Bidder lacking any documents or information posted to the Portal.

3.1.3 If there is a conflict or inconsistency between an electronic version of any document included or posted to the Portal and any other version of the same document, whether in electronic or paper form, the electronic version on the Portal shall govern.

3.2 THE BID DOCUMENTS

3.2.1 Bidders should ensure they have and/or have access to all of the documents listed below (collectively the "**Bid Documents**"). A Bid will be deemed to have been prepared on the basis of all Bid Documents issued and posted to the Portal prior to the Submission Deadline, and the Owner accepts no responsibility for any Bidder lacking or not being able to access any part of the Bid Documents.

(a) Instructions to Bidders (this document).

(b) Supplementary Conditions.

(c) Specifications prepared and issued by the Consultants

(d) Drawings prepared and issued by the Consultants.

(e) Addenda, if any.

3.2.2 Bidders should inform the Bid Coordinator immediately if any documents are missing or incomplete and/or upon finding any discrepancies or omissions in the Bid Documents.

3.2.3 The Bid Documents are made available only for the purpose of submitting Bids for the Work. Availability and/or use of the Bid Documents does not confer a license or grant for any other purpose.

4. BIDDERS' DUE DILIGENCE

4.1.1 In addition to the Bid Documents, the Portal may include the Owner's information, data and environmental, geotechnical or other reports prepared or obtained with respect to the Place of the Work (collectively the **"Reports"**). The Reports should not be considered a representation of the conditions of the entire Place of the Work and are provided for general information and guidance purposes only. The Owner does not guarantee the accuracy or completeness of the Reports nor assumes any responsibility for any interpretations or conclusions that Bidders may make or draw from the Reports.

4.1.2 Nothing in this Bid Process or in the Bid Documents or in the Reports is intended to relieve Bidders from undertaking their own research, investigations or other due diligence, or forming their own opinions and conclusions with respect to the Work, the Place of the Work, the Bid Documents, the Contract, and all other matters related to this Bid Process. The Owner (a) does not accept or

assume any responsibility for any interpretations or conclusions that Bidders may make or draw from the Bid Documents or the Reports, (b) does not represent, warrant or guarantee that the Bid Documents or the Reports are complete, accurate or comprehensive or exhaustive, and (c) assumes no responsibility for the completeness or accuracy of the Bid Documents or the Reports, or anything else provided or made available by the Owner during this Bid Process.

4.1.3 No allowances will be made for additional costs and no claims will be entertained in connection with:

(a) conditions which could reasonably have been ascertained by the Bidders through investigation or other due diligence undertaken prior to the Submission Deadline; and/or

(b) Work which is required and which is reasonably inferable from the Bid Documents and/or the Reports as being necessary.

5. COMMUNICATIONS, QUESTIONS AND ADDENDA

5.1 COMMUNICATIONS

5.1.1 Except as may be permitted in the Bid Documents, Bidders are not to communicate with or otherwise contact the Owner regarding this Bid Process at any time before execution of the Contract, if any. A Bidder's failure to comply with this paragraph may result in the disqualification of the Bidder and the rejection of its Bid.

5.1.2 Except where provided otherwise in these Instructions to Bidders, all communications (including questions) with the Owner permitted by this Bid Process are to be in writing and are to be submitted online through the Portal

5.2 BIDDERS' QUESTIONS

5.2.1 Bidders are encouraged to ask questions or request clarification with respect to any part of this Bid Process or any Bid Documents which do not appear to be clear. Questions received by the Question Deadline will be reviewed and if the Owner believes that a response is warranted, it will include the question and its answer in an addendum. Questions received after the Question Deadline may not be considered and may not be answered, although the Owner reserves the discretion, but has no obligation, to consider and respond to questions received after the Question Deadline. In responding to questions the Owner may answer similar questions from different Bidders only once, may edit or rephrase the questions, and may ignore questions which, in the Owner's opinion, do not require a response. All questions must be submitted through the Portal.

5.3 ADDENDA

5.3.1 This Bid Process and the Bid Documents may be amended only by written addendum posted to the Portal. Answers, responses, clarifications, instructions or any other information provided by any other means, by any person, in whatever context or setting, will not in any way bind the Owner or amend this Bid Process or any Bid Documents, and are not to be relied upon by any Bidder, unless and until they are posted to the Portal in the form of an addendum.

5.3.2 Addenda will be posted on the Portal only and will not be sent or otherwise distributed to the Bidders. Bidders are solely responsible:

(a) to visit and review the Portal for addenda, and the Owner shall not be responsible if any addenda are not obtained by a Bidder;

(b) to ensure they have received and that their Bid incorporates all addenda issued and posted to the Portal before the Submission Deadline and takes into account all resulting costs.

Bidders will be required to confirm their Bid incorporates all addenda by so indicating in their Bid.

6. MANDATORY SITE MEETING

6.1 MANDATORY ATTENDANCE

6.1.1 The Owner has scheduled a mandatory site meeting at the location, date and time specified in paragraph 1.2.1(a). The purpose of the meeting is to review the Bid Process and to provide those in attendance an opportunity to ask questions and tour the Place of the Work.

6.1.2 Attendance at the site meeting is mandatory:

(a) for Bidders;

All persons attending the site meeting will be required to sign an attendance log to confirm their attendance.

6.2 CONSEQUENCES OF FAILING TO ATTEND THE MANDATORY SITE MEETING

6.2.1 Bids received from Bidders who fail to attend the mandatory site meeting, as determined from the attendance log, will not be considered.

6.2.2 Where the Owner has required that prequalified Subcontractors attend the mandatory site meeting, as indicated in paragraph 6.1.2(a), then, Bids that fail to carry a prequalified Subcontractor that attended the mandatory site meeting, as determined from the attendance log, will not be considered.

6.3 INFORMATION OBTAINED AT THE MANDATORY SITE MEETING

6.3.1 Each Bidder acknowledges and agrees that:

(a) notwithstanding the Owner may give answers and may provide information during the site meeting, such answers and information, whether in verbal or in written form, will not in any way bind the Owner or amend this Bid Process or any Bid Documents, and are not to be relied upon in any way by a Bidder, except and only to the extent expressly confirmed in an addendum;

(b) anything said, written or done by the Owner or any other person, and any views or comments expressed in response to anything said or done during the site meeting, will not in any way bind the Owner or amend this Bid Process or any Bid Documents, and are not to be relied upon in any way by a Bidder except and only to the extent expressly confirmed in an addendum.

7. SITE INVESTIGATION BY BIDDERS

7.1.1 Each Bidder is solely responsible, at its own cost and expense, to carry out its own independent research and due diligence and to perform any investigations considered necessary by the Bidder to satisfy itself as to the existence and/or locations of utilities and underground services and all other existing conditions, circumstances and limitations affecting the Place of the Work, the Work, the Bid Documents, the Contract, and all other matters related to this Bid Process. The Bidders'

obligations set out in this paragraph apply irrespective of the information contained in the Bid Documents or the Reports or that is made available to the Bidders during this Bid Process.

7.1.2 Bidders shall not undertake any investigation activities at the Place of the Work except as provided in this Article 7.

7.1.3 Bidders who would like an opportunity to undertake an investigation of the Place of the Work must submit an e-mail request to the Bid Coordinator. Such request must be received at least 2 business days before the Bidder's proposed date for the proposed investigation, provided that all investigations must be completed by the Question Deadline. The request must include:

(a) the proposed date and time and alternate date and time for the proposed investigation;

(b) the anticipated duration of the proposed investigation;

(c) names, titles and contact information of who will be attending;

(d) details of the proposed investigation, including who is proposed to carry out the investigation;

(e) area(s) of the Place of the Work for which access is requested;

(f) such other information as the Owner may reasonably require.

A Bidder's request will not be complete and an appointment for the investigation will not be scheduled until all of the required information has been provided.

7.1.4 If the Owner approves a Bidder's request to investigate the Place of the Work, the Owner will issue a written notification of the date and time on which the Bidder may attend at the Place of the Work, as well as the investigation activity(ies) which the Bidder is authorized to undertake, and the duration of such activity(ies). A representative of the Owner may attend to monitor the Bidder's activities.

7.1.5 Bidders acknowledge that unforeseen circumstances may arise and the Owner may, in its sole discretion, cancel, reschedule and/or modify the Bidder's visit and/or investigation activities on short notice or no notice to the Bidder.

7.1.6 Each Bidder acknowledges and agrees:

(a) that anything said, written or done by the Owner or its representatives, and any views or comments expressed in response to anything said or done during the investigation of the Place of the Work will not in any way bind the Owner or amend this Bid Process or any Bid Documents, and are not to be relied upon by any Bidder;

(b) to waive any and all right to contest, claim, complain, protest and/or dispute this Bid Process based on the fact that findings, information, results or data may have been obtained by another Bidder as a result of that Bidder's investigation of the Place of the Work, that were not obtained by, shared with, or provided to other Bidders.

7.1.7 Bidders shall, for their own forces and for their agents, consultants, contractors, subcontractors and all others attending at the Place of the Work with them or on their behalf:

(a) assume overall responsibility for compliance with all aspects of the applicable workers' compensation and health and construction safety legislation and all related rules, regulations and practices, and shall ensure that appropriate occupational health and safety instruction and training are provided to all those attending the Place of the Work;

(b) perform only investigations authorized by the Owner;

(c) avoid disturbing and take all reasonable steps necessary to promote and maintain the safety of the occupants of the Place of the Work and any adjacent properties and the public in general;

(d) respect and comply with local regulations and the Owner's requirements regarding permitted work hours and noise levels;

(e) indemnify and save the Owner harmless from, and be responsible for, all claims, demands, losses, costs or damages related to or arising from any activities performed by the Bidder or anyone attending with or on behalf of the Bidder at the Place of the Work, whether or not authorized by the Bidder or the Owner.

8. DESIGNATED SUBSTANCES

8.1 Without limiting the obligations of the bidders set out in Article 5, where the Place of the Work is within or part of an existing building, bidders should note they may encounter designated substances such as lead, mercury, silica, asbestos-containing material ("ACM"), benzene, arsenic, etc. If applicable, a list of designated substances present at the Place of the Work has been provided to all bidders and, if ACM is included in the list of designated substances, a report has also been provided indicating the condition and location of any ACM that may be present at the Place of the Work (collectively the "OHSA Reports").

8.2 In carrying out the Work under the Contract, bidders shall ensure they do not handle, deal with, disturb or remove any designated substance whether identified in the OHSA Reports or not, unless included in the Work required by the Bid Documents. Should a bidder determine, prior to the Closing Date, that the Work cannot be completed without handling, dealing with, disturbing or removing any designated substance identified in the OHSA Reports (and the Work does not otherwise require the bidder to handle, deal with, disturb and/or remove such substance), it shall immediately notify the Owner and the Consultant in writing so that, if necessary, instructions and/or clarifications may be issued in the form of an addendum.

8.3 All information provided to or obtained by bidders in connection with this bid process, including all Reports, Data and the OHSA Reports, are and shall remain the property of the Owner and must be treated as confidential whether or not a contract is awarded, and which confidentiality obligations shall survive termination of the bid process. Such information is not to be used for any purpose other than submitting a Bid.

9. INSTRUCTIONS FOR BID COMPLETION

9.1 BID COMPLETION

9.1.1 Bids which are completed and/or submitted by any means other than as set out in this Article 9 will not be considered.

9.1.2 Bidders shall:

(a) provide, input, post and/or upload all requested information and shall fill in all spaces and blanks on the Portal, as provided in Section 9.2; and

(b) submit the Security Documents described in Section 9.3 in accordance with and as provided in Section 9.4.

9.1.3 Bidders shall ensure all required information and documents are submitted through and uploaded / posted to the Portal BEFORE the Submission Deadline. Bidders who fail to do so before the Submission Deadline will be unable to submit their Bid.

9.2 INSTRUCTIONS

9.2.1 Bid Price. Bidders shall input in the space provided on the Portal the fixed, all-inclusive lump sum price for the Work (the "**Bid Price**"). The Bid Price shall exclude the Harmonized Sales Tax (HST) but shall include all other applicable taxes and duties.

9.2.2 Listing Subcontractors.

(a) If required, Bidders shall input a list of the Subcontractors proposed to perform or supply an item of the Work identified on the Portal. Failure to do so may result in the Bid being declared non-compliant.

(b) Where the Owner has prequalified one or more Subcontractors to perform or supply an identified item of the Work, Bidders shall select only a prequalified Subcontractor to perform or supply that item of Work. Failure to do so may result in the Bid being declared non-compliant.

(c) Where the Owner has required that prequalified Subcontractors attend the mandatory site meeting, as indicated in paragraph 6.1.2(a), Bidders shall select and carry only a prequalified Subcontractor that attended the mandatory site meeting, as determined from the attendance log. Failure to do so will result in the Bid being declared non-compliant.

(d) Where a Bidder lists "own forces" in place of a Subcontractor, the Bidder shall perform such item of the Work with its own forces. In such case the Owner reserves the right to obtain information from the Bidder and from third parties respecting the qualifications and experience of the Bidder's own forces for such item of the Work. If the Owner determines, acting reasonably, that the Bidder's own forces are not qualified or experienced to perform such item of the Work, the Owner may declare the Bid non-compliant.

9.2.3 Unit, Separate, Itemized and Alternative Prices. If required, Bidders shall submit the following prices, all of which shall exclude the Harmonized Sales Tax (HST) but shall include all other applicable taxes and duties:

(a) unit prices;

(b) separate prices for work, if any, which is not included in the Bid Price and which the Owner may add for the amount(s) indicated;

(c) itemized prices for Work, if any, which is included in the Bid Price and which the Owner may delete for the amount(s) indicated;

(d) alternative prices for work, if any, which is not included in the Bid Price and which the Owner may substitute for Work which is included in the Bid Price for the amount(s) indicated.

The Owner reserves the right to accept or reject any or all unit, separate, itemized and alternative prices submitted, and such prices shall remain in effect for the duration of the Contract.

9.3 SECURITY DOCUMENTS

9.3.1 Each Bidder shall submit the form of bid security specified or permitted in paragraph 1.2.1(f), as further described in paragraph 9.3.2. Where applicable, Bidders shall also submit the agreement

to bond / surety's consent specified in paragraph 9.3.3 (the bid security and, where applicable, the agreement to bond / surety's consent are collectively referred to as the "**Security Documents**").

9.3.2 Bid Security.

The bid security specified in paragraph 1.2.1(f) is a digital bid bond, the digital bid bond shall be in the amount of 10% of the Bid Price in the form CCDC 220 – 2002 naming "Simcoe County District School Board" as obligee and issued by a surety licensed to conduct surety and insurance business in Canada. The bid bond shall remain valid for at least the duration of the Irrevocability Period. No other form of bid bond is acceptable.

The bid security of the successful Bidder will be retained by the Owner as compensation towards the damages the Owner will suffer should the successful Bidder fail to sign the Contract and/or fail to provide the specified performance security and/or otherwise breach the Bid Contract.

9.3.3 Agreement to Bond / Surety's Consent. Each Bidder that submits bid security in the form of a digital bid bond shall also submit an agreement to bond or surety's consent issued by the same surety that provides the digital bid bond, undertaking to provide a performance bond and a labour and material payment bond, each in the amount of fifty percent (50%) of the Bid Price. The agreement to bond / surety's consent shall remain valid for at least the duration of the Irrevocability Period.

9.3.4 Bidders shall include the costs of all Security Documents in their Bid Price.

9.4 DELIVERY OF THE SECURITY DOCUMENTS

9.4.1 Each Bidder that intends to submit bid security in the form of a digital bid bond shall:

(a) upload or post the digital bond described in paragraph 0 to the Portal; and

(b) upload or post to the Portal a scanned copy (in "pdf" format) of the agreement to bond or surety's consent described in paragraph 9.3.3.

9.4.2 Reserved.

9.4.3 Bids that do not comply with this Section 9.4 will be declared non-compliant.

9.5 BID IRREVOCABILITY

9.5.1 Each Bid shall be irrevocable and shall remain open for consideration by the Owner for the duration of the Irrevocability Period.

10. EVALUATING BIDS

10.1 GENERAL

10.1.1 Bids will be reviewed and evaluated by the Owner in private.

10.1.2 Notwithstanding anything else contained in the Bid Documents, the award of the Contract, if any, shall be subject to the approval of the Board, in its sole and unfettered discretion. Bidders shall have no claims whatsoever against the Owner or the Board arising out of the exercise of authority by the Board, and/or in the event the Owner, in its sole and unfettered discretion, and for any or no reason, decides not to award the Contract.

10.2 REQUESTS FOR ADDITIONAL INFORMATION

10.2.1 The Bid Coordinator, on behalf of the Owner, may contact any one or more Bidders to request clarification of any information or documents submitted as part of a Bid, or to request supplementary information (collectively, "**Request for Additional Information**"), without any obligation to make the same or any Request for Additional Information of any other Bidder. Notwithstanding the preceding sentence, the Owner has no obligation to make any Request for Additional Information.

10.2.2 Bidders shall respond to all Requests for Additional Information within the time and in the manner stipulated in each Request for Additional Information, and any response received will form an integral part of a Bidder's Bid. If a Bidder fails to respond to a Request for Additional Information, its Bid will be considered and evaluated based solely on the original Bid contents submitted.

10.2.3 A Bidder's response to a Request for Additional Information shall not be an opportunity for the Bidder to either correct errors or to change its Bid in any substantive manner. Subject to that, information, prices, rates and documents submitted in response to a Request for Additional Information shall form part of a Bidder's Bid.

10.3 MANDATORY REQUIREMENTS

10.3.1 Subject to paragraph 10.3.2, only Bids which are submitted through the Portal before the Submission Deadline and which meet all of the mandatory requirements listed below (collectively, the **"Mandatory Requirements"**) on a "pass/fail" basis will be eligible for evaluation and award of the Contract:

(a) the Bidder is a Prequalified Contractor; and

(b) the Bidder attended the mandatory site meeting, as determined from the attendance log; and

(c) where the Owner has required that prequalified Subcontractors attend the mandatory site meeting, as indicated in paragraph 6.1.2(a), the Bid includes prequalified Subcontractor(s) that attended the mandatory site meeting, as determined from the attendance log;

(d) the Bid includes the specified Security Documents and complies with Section 9.4; and

(e) the Bid substantially complies with the requirements of the Bid Documents. In this respect, the Owner reserves the right, in its sole and unfettered discretion, to waive minor errors and matters of non-compliance contained in a Bid.

10.3.2 If all Bids fail at least one of the Mandatory Requirements the Owner, in its sole discretion, may:

(a) evaluate one or more Bids and proceed with the Bid Process and treat such Bid(s) as having met all of the Mandatory Requirements; and/or

(b) negotiate a Contract for the whole or any part of the Work with any Bidder; and/or

(c) take any action in accordance with paragraph 12.2.1.

10.4 EVALUATION

10.4.1 Only Bids which pass all of the Mandatory Criteria or that are selected in accordance with paragraph 10.3.2(a) will be evaluated.

10.4.2 Reserved

10.4.3 It is the intent of the Simcoe County District School Board that a compliant bid submitted by a Bidder with the lowest base bid price be awarded the contract.

10.4.4 If there is a tie in the evaluation of two or more Bids, the tie will be broken by a coin toss or by the drawing of lots performed by the Owner in the presence (in person or virtually) of the tied Bidders.

11. AWARD OF THE CONTRACT, DOCUMENTS TO BE DELIVERED, AND SIGNING THE CONTRACT

11.1 AWARD OF THE CONTRACT

11.1.1 Subject to receiving the approval of the Board, and subject to the other provisions of the Bid Documents, if the Owner decides to award the Contract it will issue an award letter to the Bidder that submitted the Bid which received the highest Evaluation Score.

11.2 DOCUMENTS TO BE DELIVERED

11.2.1 Within 10 business days of receiving an award letter from the Owner the successful Bidder shall deliver to the Owner:

(a) where the Bidder submitted an agreement to bond / surety's consent, the Bidder shall deliver the performance bond and the labour and material payment bond described in the Bid Documents, the forms of such bonds to comply with the requirements of the Contract;

(b) certified true copies of the insurance policies required by the Contract or certificates of insurance, at the option of the Owner;

(c) the Bidder's current WSIB clearance certificate;

(d) the Bidder's health and safety policy for the Work; and

(e) a copy of the notice of project issued by the Ministry of Labour naming the Bidder as the "constructor" for the Work.

11.2.2 A Bidder's failure to comply with paragraph 11.2.1 will constitute a breach of the Bid Contract.

11.3 SIGNING THE CONTRACT

11.3.1 The successful Bidder shall sign the Contract and shall deliver the signed original to the Owner within 10 business days of the Bidder's receipt of the execution copy of the Contract. A Bidder's failure to comply with this paragraph will constitute a breach of the Bid Contract.

12. OWNER'S RIGHTS

12.1 GENERAL

12.1.1 In addition to any other express rights contained in the Bid Documents or any other rights which may be implied in the circumstances, the Owner reserves the right to exercise any or all or a combination of the rights described in this Article. The Owner shall not be liable for any costs, expenses or damages incurred or claimed by a Bidder resulting from the Owner's exercise of any of its rights.

12.1.2 A Bidder's submission or the Owner's evaluation of any Bid, even where only one Bid is submitted before the Submission Deadline and even where only one Bid meets all Mandatory Requirements, will not obligate the Owner to accept any Bid, award the Contract, or proceed further with this Bid Process.

12.2 THE OWNER'S RIGHTS

12.2.1 The Owner may, in its sole discretion, and for any or no reason:

(a) reject any or one or more or all Bids, even if only one Bid is received;

(b) reject the whole or any part of any Bid;

(c) accept the whole or any part of a Bid;

(d) if only one Bid meets all of the Mandatory Requirements, elect to accept or reject all or any part of it;

(e) cancel this Bid Process at any time before the award of the Contract;

(f) cancel this Bid Process at any time before the award of the Contract and issue a new procurement process for work which is same or similar to the Work, with the same or different participants.

12.2.2 The Board reserves the right to disqualify a Bidder and reject a Tender on the basis of: (I) past performance on previous Contracts awarded by the Simcoe County District School Board; (II) other relevant information that arises during this RFT Process, or (III) information provided by references.

12.2.3 The Owner reserves the right to:

(a) waive minor errors and matters of non-compliance contained in a Bid;

(b) adjust an Evaluation Score or reject a Bid on the basis of information received in response to a Request for Additional Information;

(c) disqualify any Bidder whose Bid contains misrepresentations or any other inaccurate or misleading information relating to matters which the Owner, in its sole discretion, considers material;

(d) Reserved.

13. GENERAL

13.1 PROHIBITION ON LOBBYING AND COLLUSION

13.1.1 Bidders and their directors, officers, employees, consultants, agents, advisors and other representatives are strictly prohibited from engaging in conduct which is or could reasonably be considered as any form of political or other lobbying, or as an attempt to influence the outcome of this Bid Process. Without limiting the generality of the foregoing, and except as provided in the Bid Documents, no such person shall contact, communicate with or attempt to contact or communicate with, directly or indirectly and in any manner whatsoever, any staff, personnel or representative of the Owner or the Board in connection with this Bid Process, including for the purpose of:

(a) commenting on, or attempting to influence the views on, the merits of the Bidder's Bid, or in relation to the Bids of other Bidders;

(b) influencing or attempting to influence the evaluation of the Bids;

(c) promoting the Bidder or its interests, including in preference to that of other Bidders;

(d) commenting on or criticizing aspects of this Bid Process, the Bid Documents, the Work, or the Contract, including in a manner which may give the Bidder a competitive or other advantage over other Bidders;

(e) criticizing other Bidders or the Bids of other Bidders.

13.1.2 Bidders and their directors, officers, employees, consultants, agents, advisors and other representatives are prohibited from communicating with or attempting to contact or communicate with, directly or indirectly and in any manner whatsoever, any information whatsoever regarding the preparation of a Bid to any other Bidder.

13.1.3 Failure of a Bidder to comply with this Section may result in the disqualification of the Bidder and the rejection of its Bid.

13.2 CONFLICT OF INTEREST

13.2.1 Bidders shall disclose all perceived, potential and actual Conflicts of Interest. For the purposes of this Bid Process, "**Conflict of Interest**" includes:

(a) any situation or circumstances where, in relation to this Bid Process, the Work, and/or the Contract, the Bidder's other commitments, relationships or financial interests could or could be perceived to exert an improper influence over the objective, unbiased and impartial exercise of independent judgment by any member or representative of the Owner or the Board;

(b) any situation or circumstances where any person employed by the Owner in any capacity:

(i) has a direct or indirect financial or other interest in any Bidder;

(ii) is an employee or a consultant to or under contract to any Bidder;

(iii) is negotiating or has an arrangement concerning future employment or contracting with any Bidder;

(iv) has an ownership interest in or is an officer or director or partner of any Bidder.

13.2.2 If a Bidder discovers, before or after the Submission Deadline, any perceived, potential or actual Conflict of Interest, the Bidder shall immediately send a written statement to the Bid Coordinator describing the perceived, potential or actual Conflict of Interest, along with a written proposal that, if implemented, would address the identified perceived, potential or actual Conflict of Interest. The Owner will review the Bidder's written statement and proposal and, without limiting the generality of Article 12, the Owner may, in its sole discretion:

(a) disqualify the Bidder from participating in this Bid Process and reject its Bid;

(b) waive any and all perceived, potential or actual Conflict of Interest upon such terms and conditions as the Owner, in its sole discretion, requires to satisfy itself that the Conflict of Interest has been appropriately managed, mitigated and minimized.

13.2.3 Failure of a Bidder to comply with this Section may result in the disqualification of the Bidder and the rejection of its Bid.

13.3 CONFIDENTIALITY, DISCLOSURE AND MFIPPA

13.3.1 All information provided by or obtained from the Owner in connection with this Bid Process, the Work, and/or the Contract, including all Reports, is and shall remain the property of the Owner and must be treated as confidential, and such confidentiality obligations shall survive the Bid Process. Such information is not to be used for any purpose other than responding to this Bid Process and, upon conclusion of this Bid Process, if requested by the Owner, Bidders shall return all such information.

13.3.2 Bidders acknowledge that the contents of their Bids will be disclosed within the Owner's organization and/or to the Owner's consultants and advisors. The Owner will use reasonable efforts to protect sensitive and confidential information provided by the Bidders, however, the Owner shall not be liable in any way whatsoever if such information, or any part of it, is disclosed, even if the Owner, its consultants, advisors, staff or any other person associated with them may have been negligent with respect to such disclosure. By submitting a Bid each Bidder agrees to such disclosure and releases the Bid Coordinator and the Owner from any liability for the same.

13.3.3 The Owner may be required to disclose parts or all of a Bid pursuant to the provisions of MFIPPA or other legislation. Subject to the provisions of such legislation, the Owner will use reasonable efforts to safeguard the confidentiality of any information identified by a Bidder as confidential, however, the Owner shall not be liable in any way whatsoever if such information is disclosed based on an order or decision made under such legislation or any other applicable law. By submitting a Bid each Bidder agrees to such disclosure and releases the Bid Coordinator and the Owner from any liability for the same.

13.4 DEBRIEFING

13.4.1 Following the conclusion of this Bid Process, and provided the Contract has been signed, the Owner will offer separate debriefings to unsuccessful Bidders, but only if requested in accordance with paragraph 13.4.2. Debriefings will be held in person or by telephone conference call, at the Owner's discretion, and will be scheduled on a date and time and for a duration to be confirmed by the Owner.

13.4.2 If an unsuccessful Bidder desires a debriefing it shall submit a written e-mail request to the Bid Coordinator within sixty (60) days after the expiry of the Irrevocability Period, failing which no debriefing will be provided.

13.4.3 Evaluations and scoring of Bids are confidential and during a debriefing the Owner will not provide critiques or discuss the scores or the merits of any Bid other than the Bid submitted by the Bidder that requested the debriefing.

13.5 PUBLIC STATEMENTS

13.5.1 Bidders shall not publish, issue, advertise, distribute or make any statements, postings, blogs or releases, electronic or otherwise, concerning their or any other Bid, the Bid Process, the Contract, the evaluation of Bids, or the award of the Contract, without the Owner's prior express written consent. A Bidder's failure to comply with this paragraph may result in the disqualification of the Bidder and the rejection of its Bid.

13.6 AWARD DOES NOT CONSTITUTE ENDORSEMENT

13.6.1 The Owner's award of the Contract, if any, does not constitute a general endorsement of the successful Bidder's work or services.

13.7 LIMIT OF LIABILITY

13.7.1 Each Bidder agrees that the liability of the Owner to any Bidder and the aggregate amount of damages recoverable against the Owner for any and all claims relating to or arising from this Bid Process including:

(a) claims arising from negligence, wilful misconduct or other conduct; and/or

(b) claims arising from a breach of the Bid Contract or any other contractual or other relationship or obligation that may arise as a result of a Bidder's participation in this Bid Process and/or submission of a Bid,

shall be limited to the Bidder's reasonable demonstrated costs of preparing its Bid.

13.8 DISPUTES

13.8.1 If a dispute arises in connection with this Bid Process including, without limitation, a dispute concerning the existence of the Bid Contract or a breach of the Bid Contract, or a dispute as to whether a Bid meets the Mandatory Requirements, the parties to the dispute agree:

(a) to use their best efforts to resolve the dispute through amicable and good faith negotiations for a period of at least fifteen (15) days, having such written and oral communications and meetings as appropriate;

(b) if the dispute is not resolved through negotiations the Owner, in its unqualified subjective discretion, may refer the dispute to confidential final binding arbitration before a single arbitrator, selected by the Owner, to be held at Barrie, Ontario pursuant to the *Arbitration Act, 1991* (Ontario), as amended. If the Owner refers the dispute to arbitration, each Bidder agrees that it is bound to arbitrate such dispute. Unless the Owner refers such dispute to arbitration, there shall be no arbitration of such dispute.

13.8.2 The Owner may give notice of a dispute to one or more Bidders, each of whom shall be a party to and shall be entitled to participate in the negotiation and/or arbitration, as the case may be and, in the case of arbitration, each of whom shall be bound by the arbitrator's award, whether or not they participated in the arbitration.

13.8.3 If the Owner refers a dispute to arbitration, the parties to the arbitration shall exchange brief statements of their respective positions on the dispute, together with the relevant documents, and submit to an arbitration hearing which shall last no longer than two (2) days, subject to the discretion of the arbitrator to increase such time. The parties to the arbitration further agree that the arbitrator's award shall be final and binding and shall not be subject to appeal. The costs of the arbitrator and the venue shall be shared equally among the parties to the arbitration.

END OF DOCUMENT

These Supplementary Conditions modify, delete and/or add to the Agreement between Owner and Contractor, the Definitions, and the General Conditions of the Stipulated Price Contract, Standard Construction Document CCDC 2 – 2020.

SC 1. AGREEMENT BETWEEN OWNER AND CONTRACTOR

SC 1.1 ARTICLE A-5 PAYMENT

1.1.1 Delete paragraph 5.2 and replace it with the following:

"5.2 Should either party fail to make payments as they become due under this *Contract* or in an award by arbitration, adjudication or court, interest will begin to accrue on the amount that is not paid from the date when it is due until the date it is paid at the prejudgment interest rate prescribed by the Courts of Justice Act (Ontario)."

SC 1.2 ARTICLE A-6 RECEIPT OF AND ADDRESSES FOR NOTICES IN WRITING

1.2.1 Amend paragraph 6.2 by adding the following to the end:

"Provided that a *Notice in Writing* shall not be delivered by facsimile transmission."

SC 1.3 ARTICLE A-9 TIME IS OF THE ESSENCE

1.3.1 Add a new Article A-9 as follows:

"**ARTICLE A-9 TIME IS OF THE ESSENCE**

9.1 The *Contractor* represents and warrants that it will attain *Ready-for-Takeover* by the date stipulated in paragraph 1.3 of Article A-1 of the Agreement – THE WORK, as such date may be adjusted in accordance with this *Contract*, and acknowledges that it has been advised by the *Owner* that it is critical to the *Owner* that *Ready-for-Takeover* is attained by such date. The *Contractor* agrees that time shall be of the essence in the performance of the *Contractor's* obligations under this *Contract*."

SC 1.4 ARTICLE A-10 EXECUTION OF THE CONTRACT

1.4.1 Add a new Article A-10 as follows:

"**ARTICLE A-10 EXECUTION OF THE CONTRACT**

10.1 This *Contract* may be executed in counterparts, including by electronic means, and each counterpart shall be deemed an original and both of which, taken together, shall constitute one and the same instrument. Delivery by e-mail of a PDF of any executed counterpart shall be deemed to be an original and of full force and effect and equally as effective as delivery of a manually executed original counterpart thereof."

SC 2. DEFINITIONS

2.1.1 Amend the following Definitions:

(a) Amend the Definition of "*Consultant*" by adding the following to the end:

"For purposes of this *Contract*, the terms "*Consultant*", "Architect" and "Engineer", wherever used in the *Contract Documents*, shall be considered synonymous."

(b) Amend the Definition of "*Contract Documents*" by adding the words "in writing" after the word "upon" in the second line.

(c) Amend the Definition of "*Owner*" by adding the following to the end:

"For purposes of this *Contract*, the terms "*Owner*", "SCDSB" and the "Board", wherever used in the *Contract Documents*, shall be considered synonymous."

2.1.2 Add the following new Definitions:

(a) **Act**

"*Act* means the Construction Act (Ontario), as amended."

(b) **Blackout Period**

"*Blackout Period* means the following dates in each calendar year:

.1 January 1 to January 5, inclusive; and

.2 December 15 to December 31, inclusive."

(c) **Environmental Programs**

"*Environmental Programs* means the environmental plans, programs, procedures and requirements of the *Owner*. The *Environmental Programs* includes *Owner's* asbestos control program, its mould program, and a program for controlling and handling designated substances."

(d) **Labour Dispute**

"*Labour Dispute* means any lawful or unlawful labour problems, work stoppage, labour disruption, strike, lock-outs (including lock-outs decreed or recommended for its members by a recognized contractor's association of which the *Contractor* is a member or to which the *Contractor* is otherwise bound), job action, slow down, 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*."

(e) **OHSA**

"*OHSA* means the Occupational Health and Safety Act (Ontario), as amended, and all rules and regulations made thereunder."

(f) **Proper Invoice**

"*Proper Invoice* means an application for payment given by the *Contractor* to the *Owner* that fully complies with the requirements of GC 5.1A – PROPER INVOICE."

(g) **WSIB**

"*WSIB* means the Ontario Workplace Safety & Insurance Board."

SC 3. GENERAL CONDITIONS

SC 3.1 GC 1.1 CONTRACT DOCUMENTS

3.1.1 Amend paragraph 1.1.2 by adding the following to the end:

"The intent of the *Contract Documents* is to include all labour, *Products*, materials, *Construction Equipment* and services necessary or normally considered necessary for the performance of the *Work*. Any item of *Work* mentioned in the *Contract Documents* or reasonably inferable from the *Contract Documents* but not otherwise shown or described, shall be provided by the *Contractor* as if shown or otherwise described or inferable. Any items omitted from the *Contract Documents* which are reasonably necessary or inferable for the completion of the *Work* shall be considered a portion of the *Work* and included in the scope of *Work* to be performed under this *Contract*."

3.1.2 Amend paragraph 1.1.5 by changing the order of the first four bullet points so that, as reordered, the bullet points read as follows:

"
- Supplementary Conditions,
- the Agreement between *Owner* and *Contractor*,
- the Definitions,
- the General Conditions"

3.1.3 Add a new paragraph 1.1.5A as follows:

"1.1.5A Notwithstanding paragraph 1.1.5, if there is a conflict or discrepancy between *Drawings* or between *Drawings* and *Specifications* or any other *Contract Documents* in relation to the *Products* to be supplied or the amount of labour or materials required to complete a particular item of *Work*, the *Contractor* shall supply and shall include in the *Work* the *Products*, labour and materials which would provide the greatest benefit to the *Owner*, as determined by the *Owner*."

3.1.4 Amend paragraph 1.1.9 by adding new paragraphs 1.1.9.1 and 1.1.9.2 as follows:

"1.1.9.1 The *Specifications* shall be read as a whole and are the minimum construction requirements. Neither the organization nor the division of the *Specifications* nor anything else contained in the *Contract Documents* will be construed to place responsibility on the *Consultant* to settle disputes among the *Subcontractors* and *Suppliers* in respect to such organization or division.

1.1.9.2 The *Drawings* are intended to convey the scope of the *Work* and indicate elevations and general and approximate locations, arrangement and sizes of fixtures, equipment, outlets, utilities and underground services. The *Contractor* shall obtain more accurate information and shall satisfy itself as to the conditions of the pre-grade elevations and the locations, arrangement and sizes of fixtures, equipment, outlets, utilities and underground services from study and coordination of the *Drawings*, including *Shop Drawings*, and shall satisfy itself and become familiar with conditions and spaces affecting these matters before proceeding with the *Work*. Where site conditions require reasonable minor changes to indicated locations and arrangements, the *Contractor* shall make such changes at no additional cost to the *Owner*. The *Contractor* shall arrange and install fixtures and equipment in such a way as to conserve as much headroom and space as possible."

3.1.5 Amend paragraph 1.1.11 by deleting the words "at the *Owner's* expense".

3.1.6 Add new paragraphs 1.1.12 to 1.1.15 as follows

"1.1.12 The *Contractor* shall review the *Contract Documents* and shall report promptly to the *Consultant* any error, inconsistency or omission the *Contractor* may discover. Except for the obligation to make such review and report the result, the *Contractor* does not assume any responsibility to the *Owner* or the *Consultant* for the accuracy of the *Contract Documents*. Provided it has exercised the degree of care and skill described in paragraph 3.11.1 of GC 3.11 – STANDARD OF CARE, the *Contractor* will not be liable for damages or costs resulting from such errors, inconsistencies or omissions in the *Contract Documents* which the *Contractor* did not discover.

1.1.13 If the *Contractor* finds any error, inconsistency or omission in the *Contract Documents* or has any doubt as to the meaning or intent of any part thereof, the *Contractor* shall immediately notify the *Consultant*, who will provide written instructions or explanations. Neither the *Owner* nor the *Consultant* will be responsible for oral instructions.

1.1.14 Notwithstanding paragraphs 1.1.12 and 1.1.13, errors, inconsistencies and/or omissions shall not include lack of reference on the *Drawings* or in the *Specifications* to labour and/or *Products* that are normally required or normally recognized within respective trade practices as being necessary for the complete execution of the *Work*.

1.1.15 The *Contractor* shall keep one copy of the current *Contract Documents*, *Supplemental Instructions*, proposed or contemplated change notices, *Change Orders*, *Change Directives*, record drawings marked up with any changes to be included in as-built drawings, cash allowance disbursement authorizations, reviewed *Shop Drawings*, reports and records of meetings at the *Place of the Work*, available to the *Owner* and *Consultant* in either electronic or paper format."

SC 3.2 GC 1.3 RIGHTS AND REMEDIES

3.2.1 Add a new paragraph 1.3.3 as follows:

"1.3.3 To be effective, the *Owner's* waiver of a right or remedy under this *Contract* must be expressly written by an authorized representative of the *Owner*. For greater certainty, actions of the *Owner* which shall not constitute a waiver include, but are not limited to, the following:

.1 making partial payments to the *Contractor*;

.2 any partial or entire use or occupancy of the *Project*;

.3 final acceptance of the *Work*;

.4 failure to object to known defects;

.5 specifying a list of defects will not be held a waiver of defects not listed."

SC 3.3 GC 2.2 ROLE OF THE CONSULTANT

3.3.1 Amend paragraph 2.2.12 by adding the following to the end:

"If, in the opinion of the *Contractor*, a *Supplemental Instruction* involves an adjustment in the *Contract Price* or the *Contract Time*, the *Contractor* shall, within ten (10) *Working Days* of receipt of a *Supplemental Instruction*, provide the *Consultant* with a *Notice in Writing* to that effect and shall await further instructions. The *Contractor's* failure to provide such *Notice in Writing* within the time stipulated in this paragraph 2.2.12 shall be deemed an acceptance of the *Supplemental Instruction* by the *Contractor* without adjustment to the *Contract Price* or *Contract Time*."

3.3.2 Delete paragraph 2.2.18 and replace it with the following:

"2.2.18 The *Contractor* shall not have any claim against the *Consultant* as a result of the performance or non-performance of the *Consultant's* services. The *Contractor* shall include this provision in any contracts it makes with its *Subcontractors* and *Suppliers*."

SC 3.4 GC 2.3 REVIEW AND INSPECTION OF THE WORK

3.4.1 Amend paragraph 2.3.5 by adding the following to the end of the second sentence:

"and there shall be no extension of the *Contract Time* resulting from any delay caused by such examination and correction."

SC 3.5 GC 2.4 DEFECTIVE WORK

3.5.1 Amend paragraph 2.4.1 by adding 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 *Owner* and 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 defective work or deficiencies identified as priorities by the *Owner* or the *Consultant*."

SC 3.6 GC 3.0 PRECONSTRUCTION SUBMITTALS

3.6.1 Add a new GC 3.0 as follows:

"**GC 3.0 PRECONSTRUCTION SUBMITTALS**

3.0.1 Within 10 *Working Days* of signing this *Contract* and, in any event, before commencing any *Work* the *Contractor* shall submit to the *Owner* all of the following:

.1 a current *WSIB* clearance certificate;

.2 true copies of certificates of insurance evidencing the *Contractor* has secured the insurance policies required by the *Contract Documents*;

.3 the bonds described in GC 14.7 – CONTRACT SECURITY;

.4 documentation of the *Contractor's* safety program to be implemented for the *Project*;

.5 a copy of the "Notice of Project" filed with the appropriate government agency or ministry naming the *Contractor* as the "constructor" under *OHSA*; and

.6 the construction schedule referred to in paragraph 3.4.1.1 of GC 3.4 – CONSTRUCTION SCHEDULE."

SC 3.7 GC 3.1 CONTROL OF THE WORK

3.7.1 Add new paragraphs 3.1.3 to 3.1.7 as follows:

"3.1.3 Notwithstanding paragraphs 3.1.1 and 3.1.2, the *Contractor* shall fully incorporate and comply with all policies and procedures of the *Owner* which are relevant to any activity to be performed under the *Contract*. The *Contractor* shall inquire from the *Owner* if such policies or procedures exist and the *Owner* agrees that it will use reasonable efforts to communicate to the *Contractor* all relevant policies or procedures.

3.1.4 Prior to commencing fabrication and construction activities, the *Contractor* shall verify 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 shall obtain written instructions from the *Consultant* before proceeding with any part of the affected *Work*. Failure to do so shall be at the sole risk and cost of the *Contractor*.

3.1.5 The *Contractor* shall be entirely responsible for the proper laying out of the whole of the *Work*. The *Contractor* shall employ an experienced and licensed land surveyor to establish and check grades, benchmarks, references, elevations, points and lines as from time to time may be required for the purposes of the *Work*, or layout of same, and the *Contractor* shall at every appropriate stage of the *Work* take all proper steps to have all proper checks and surveys made so as to ensure that the *Work* and all components thereof will be wholly within the boundaries of the *Project* site and in the exact position (or respective positions) established for such *Work*, and shall assume full responsibility for the correctness of all such lines, levels and measurements.

3.1.6 The *Contractor* shall perform the *Work* in accordance with modern practice and shall employ only good workmanship in accordance with the *Contract Documents*, applicable laws, ordinances, rules, regulations, or codes relating to the performance of the *Work*. Without limiting the generality of the foregoing, the *Contractor* is responsible for coordinating the *Work* so that no part shall be left in an unfinished or incomplete condition.

3.1.7 The *Contractor*, without in any way limiting its responsibilities under this *Contract*, shall:

.1 perform the *Work* so as to avoid causing excessive noise, annoyance and so as not to disturb the occupants of the *Place of the Work* or any occupants of adjacent premises or the public in general,

.2 respect and comply with local regulations and all *Owner's* requirements regarding permitted work hours, noise levels and work conditions,

.3 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, to avoid conditions likely to propagate mould or fungus of any kind, and shall take all other steps reasonably necessary to promote and maintain the safety and comfort of any occupants of the *Place of the Work* or any occupants of adjacent premises and the public in general, and to maintain access to and the operation of any existing facilities at the *Place of the Work*,

.4 take precautions not to allow any unauthorized visitors entry to the *Place of the Work*.

The *Contractor* shall not permit any workers, *Subcontractors* or *Suppliers* to use any existing facilities including, without limitation, elevators, lavatories, toilets, entrances and parking areas other than those designated by the *Owner*."

SC 3.8 GC 3.2 CONSTRUCTION BY THE OWNER OR OTHER CONTRACTORS

3.8.1 Amend paragraph 3.2.2 by deleting the word "*Owner*" in the second line and replacing it with the word "*Contractor*".

3.8.2 Delete paragraphs 3.2.2.2 and 3.2.2.3.

3.8.3 Amend paragraph 3.2.3.4 by adding the following to the end:

"Failure by the *Contractor* to so report shall invalidate any claims against the *Owner* by reason of the deficiencies in the work of *Other Contractors* or *Owner's* own forces except for those deficiencies not then reasonably discoverable; and"

3.8.4 Add a new paragraph 3.2.3.5 as follows:

"3.2.3.5 assume overall responsibility for the *Owner's* own forces and for *Other Contractors* for compliance with all aspects of the applicable health and construction safety legislation at the *Place of the Work*, including all of the responsibilities of the "constructor" under the *OHSA*."

3.8.5 Amend paragraph 3.2.6 by adding the following to the end:

"Notwithstanding the foregoing, the *Contractor* shall not be entitled to any adjustment in the *Contract Time* or the *Contract Price* where the need for the cutting or remedial work was caused or contributed to by the *Contractor's* failure to properly coordinate and schedule the *Work* with the work of *Other Contractors* and the *Owner's* own forces."

3.8.6 Add a new paragraph 3.2.7 as follows:

"3.2.7 The placement, installation, application and connection of work by the *Owner's* own forces or by *Other Contractors* on and to the *Work* shall not relieve the *Contractor* of its responsibility to provide and maintain the warranties specified in this *Contract*. If the *Contractor* is of the view that the work of *Other Contractors* or the work of the *Owner's* own forces will compromise, void or nullify any of the warranties to be provided pursuant to this *Contract*, the *Contractor* shall immediately give *Notice in Writing* to the *Owner* and shall include in such notice the reasons why, in the *Contractor's* view, a warranty or warranties will be compromised, voided or nullified, together with the *Contractor's* recommendations for avoiding such result."

SC 3.9 GC 3.4 CONSTRUCTION SCHEDULE

3.9.1 Delete paragraph 3.4.1 and replace it with the following:

"3.4.1 The *Contractor* shall:

.1 within ten (10) *Working Days* of entering into this *Contract*, submit to the *Owner* and the *Consultant*, for the *Owner's* approval, a construction schedule that indicates the timing of major activities and critical milestone dates for the *Work*, demonstrating that the *Work* will be performed in conformity with the *Contract Time*. Such schedule:

(a) shall be provided in native editable electronic format approved by the *Owner* that includes and shows all logic links between activities, and

(b) shall be prepared in collaboration with, and supported by, the *Subcontractors* and *Suppliers* whose activities affect the critical path of the *Work*, and

(c) shall include and make provision for statutory holidays, weather conditions that are normally experienced at the *Place of the Work*, and the rectification of defects and deficiencies; and

(d) shall provide sufficient detail of the critical events and their inter-relationship and shall include a baseline schedule indicating the critical path for the *Project*; and

.2 provide the expertise and resources, including labour and *Construction Equipment*, as are necessary to maintain progress under the construction schedule; and

.3 monitor the adequacy of *Subcontractor* and *Supplier* personnel and equipment and the availability of *Products* to meet the construction schedule and take appropriate action when requirements of a contract with a *Subcontractor* or *Supplier* are not being met; and

.4 monitor the progress of the *Work* relative to the construction schedule, update the schedule on a monthly basis, and advise the *Consultant* and the *Owner* in writing of any variation from the baseline or slippage in the schedule within twenty four (24) hours of such variation or slippage becoming apparent; and

.5 at each site meeting, provide in writing (or if the *Owner* so permits, verbally to be recorded in minutes) to the *Owner* and the *Consultant* a two (2) week look-ahead schedule indicating the major activities to be undertaken or constructed in such two (2) week period.

3.4.2 If at any time it should appear that the actual progress of the *Work* is behind schedule or is likely to fall behind schedule, or if the *Contractor* has so advised the *Owner* and the *Consultant*, the *Contractor* shall take appropriate steps, at the *Contractor's* own expense, to cause the actual progress of the *Work* to conform to the schedule and shall produce and present to the *Owner* and the *Consultant*, for review and approval, a recovery plan demonstrating how the *Contractor* will achieve recovery of the schedule.

3.4.3 If after applying the expertise and resources required under paragraphs 3.4.1.2 and 3.4.2 the *Contractor* forms the opinion that the slippage in the construction schedule cannot be recovered, the *Contractor* shall give *Notice in Writing* to the *Owner* and the *Consultant* of any revisions required to the schedule.

3.4.4 The *Contractor* shall not change the scheduled *Ready-for-Takeover* date."

SC 3.10 **GC 3.5 SUPERVISION**

3.10.1 Delete paragraph 3.5.1 and replace it with the following:

"3.5.1 The *Contractor* shall provide all necessary supervision and shall appoint a full-time superintendent 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 and the *Owner's* prior written consent, which consent will not be unreasonably withheld. All costs associated with the transition of new staff onto the *Project* shall be at the sole cost and expense of the *Contractor*."

SC 3.11 **GC 3.6 SUBCONTRACTORS AND SUPPLIERS**

3.11.1 Add a new paragraph 3.6.1.4 as follows:

"3.6.1.4 ensure that all *Subcontractors* and *Suppliers* and anyone employed or engaged by them directly or indirectly have the qualifications, technical skills, levels of experience and knowledge required (including with respect to all applicable construction safety rules and regulations), and all applicable permits, licenses and approvals necessary to perform the work assigned to them in accordance with the terms of this *Contract*."

3.11.2 Amend paragraph 3.6.2 as follows:

(a) delete the words "before signing the *Contract*" in the third line; and

(b) add the following to the end:

"The *Contractor* agrees not to change *Subcontractors* or *Suppliers* without the prior written approval of the *Owner*, which approval will not be unreasonably withheld."

3.11.3 Amend paragraph 3.6.3 by deleting the words "before the *Owner* has signed the *Contract*" in the first line.

3.11.4 Add new paragraphs 3.6.7 and 3.6.8 as follows:

"3.6.7 If the *Contractor* intends to change any *Subcontractors* or *Suppliers*, the *Contractor* shall advise the *Owner* in writing, giving the *Contractor's* reasons for the proposed change. The *Contractor* shall not change any *Subcontractors* or *Suppliers* without the prior written approval of the *Owner*.

3.6.8 Notwithstanding paragraph 3.6.5, the *Owner* may assign to the *Contractor*, and the *Contractor* shall accept the assignment of, any contract procured by the *Owner* for *Work* or *Products* required on the *Project* that has been pre-tendered or pre-negotiated by or on behalf of the *Owner*. In such event the *Contract Price* shall be increased by the balance of the contract price remaining under such assigned contract."

SC 3.12 GC 3.7 LABOUR AND PRODUCTS

3.12.1 Amend paragraph 3.7.1 as follows:

(a) insert the words "agents, *Subcontractors* and *Suppliers*" after the word "employees" in the first line; and

(b) add the following to the end:

"Without in any way limiting the generality of the foregoing, the *Contractor* shall prepare and implement the job site rules more particularly described in the *Contract Documents*. If no job site rules are described in the *Contract Documents*, the *Contractor* shall draft job site rules for the review and approval of the *Owner*. Any such job site rules prepared by the *Contractor* shall be consistent with the *Contractor's* duties and obligations under *OHSA* and shall also include provisions making smoking, vaping and the consumption of alcohol or non-prescription drugs on the *Project* site the subject of discipline proceedings and/or termination of employment."

3.12.2 Amend paragraph 3.7.2 by adding the following sentence to the end:

"The *Contractor* represents and warrants that the *Products* supplied are not subject to any conditional sales contracts and are not subject to any security rights claimed or obtained by any third party which may subject any of the *Products* to seizure and/or removal from the *Place of the Work*."

3.12.3 Delete paragraph 3.7.3 and replace with the following:

"3.7.3 *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, Ontario Building Code and all governmental authorities 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, and such *Products* shall be brought to the *Place of the Work* at the sole risk of the *Contractor*."

1.1.1 Add new paragraphs 3.7.4 to 3.7.7 as follows:

"3.7.4 The *Contractor* is responsible for the safe on-site storage of *Products* and their protection (including *Products* supplied by the *Owner* and *Other Contractors*) so as to avoid dangerous conditions, deterioration, damage or contamination to the *Products*, persons or property and in locations at the *Place of the Work* to the satisfaction of the *Owner* and the *Consultant*.

3.7.5 The *Contractor* shall cooperate with the *Owner* and shall take all reasonable and necessary actions to maintain stable and harmonious labour relations on the *Project*, including cooperation to attempt to avoid *Labour Disputes*. The *Contractor* shall not, and shall ensure that its *Subcontractors* and *Suppliers* do not, employ any persons on the *Project* whose labour affiliation, or lack thereof, is incompatible with other labour employed in connection with the *Work*. All costs arising from *Labour Disputes* arising from the *Contractor's* failure to comply with this paragraph shall be the sole expense of the *Contractor*.

3.7.6 The *Owner* or the *Consultant*, acting reasonably, shall have the right to order the *Contractor* to remove from the *Project*, without cost to the *Owner*, any representative or employee of the *Contractor* or any representative or employee of any *Subcontractor* or *Supplier* whose conduct, in the opinion of the *Owner* or the *Consultant*, jeopardizes the safety or security of the *Project*, any person, the *Owner's* operations, is a detriment to the *Project*, or whose behaviour may be considered as harassment in the workplace. Immediately upon receipt of such order the *Contractor* shall make arrangements for the appointment of a replacement representative or employee acceptable to the *Owner*. All costs associated with the transition of new staff onto the *Project* shall be at the sole cost and expense of the *Contractor*.

3.7.7 The *Owner* is required by provincial legislation to ensure that all contractors and other individuals who potentially have direct and regular contact with students are cleared by a vulnerable sector check ("**VSC**") covering convictions, charges and occurrences that would be revealed by the long version vulnerable persons search of the automated criminal records system maintained by the Royal Canadian Mountain Police at the Canadian Police Information Centre. The *Contractor* must obtain a satisfactory *VSC* for all persons, including employees, *Subcontractors* and *Suppliers* who, in the course of performing the *Work*, may have direct and regular contact with students."

SC 3.13 GC 3.8 SHOP DRAWINGS

3.13.1 Amend paragraph 3.8.1 by adding the following to the end:

"Prior to the first application for payment, the *Contractor* and the *Consultant* shall jointly prepare a schedule of the dates for submission and return of *Shop Drawings*."

3.13.2 Delete paragraph 3.8.3.1 and replace it with the following

"3.8.3.1 the *Contractor* has determined and correlated the field measurements with the *Shop Drawings* and field construction conditions, *Product* requirements, catalogue numbers and similar data, or will do so if not possible at that time, and"

3.13.3 Add new paragraphs 3.8.8 to 3.8.11 as follows:

"3.8.8 Reviewed *Shop Drawings* shall not authorize a change in the *Contract Price* or the *Contract Time*.

3.8.9 The *Contractor* shall not use the term "by others" on *Shop Drawings* but shall identify the responsible *Subcontractor* or *Supplier* where such work is within the scope of the *Work*.

3.8.10 Where *Specifications* require the *Shop Drawings* to bear the seal and signature of a professional, such professional shall 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*.

3.8.11 The *Consultant's* review of the *Shop Drawings* shall not relieve the *Contractor* from responsibility for defective *Work* resulting from errors or omissions of any kind on the reviewed *Shop Drawings* and shall not constitute authorization to the *Contractor* to perform additional *Work* or changed *Work*. The *Contractor* is solely responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes, and for techniques of construction and installation."

SC 3.14 GC 3.9 USE OF THE WORK

3.14.1 Add a new GC 3.9 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, 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*."

SC 3.15 GC 3.10 CLEANUP

3.15.1 Add a new GC 3.10 as follows:

"**GC 3.10 CLEANUP**

3.10.1 The *Contractor* shall maintain the *Work* and the *Place of the Work* in a safe and tidy condition and free from the accumulation of waste products and debris. The *Contractor* shall ensure the *Place of the Work* is cleaned and left in a tidy condition on a daily basis. In the event of any dispute regarding the removal of waste products and debris, the *Owner* may remove the said waste products and debris upon twenty-four (24) hours' written notice and charge the cost of doing so to the *Contractor*.

3.10.2 Before delivering the application for *Ready-for-Takeover* the *Contractor* shall remove any and all surplus *Products*, tools, *Construction Equipment*, *Temporary Work*, waste products and debris and shall ensure the *Place of the Work* is clean and tidy and suitable for occupancy by the *Owner*."

SC 3.16 GC 3.11 STANDARD OF CARE

3.16.1 Add a new GC 3.11 as follows:

"**GC 3.11 STANDARD OF CARE**

3.11.1 In performing this *Contract* the *Contractor* shall exercise a standard of care, skill, judgment and diligence that would normally be exercised by an experienced, skilled and prudent contractor performing similar work for similar projects. The *Contractor* acknowledges and agrees that, throughout this *Contract*, 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, judgment and diligence in respect of any *Products*, *Subcontractors*, *Suppliers*, personnel or procedures which it may employ on the *Project*.

3.11.2 The *Contractor* represents, covenants and warrants to the *Owner* that:

.1 the personnel assigned to the *Project* are appropriately experienced and trained;

.2 it has sufficient qualified and competent personnel to replace its designated supervisor, superintendent and project manager, subject to the *Owner's* approval, in the event of incapacity, removal or resignation; and

.3 there are no pending, threatened or anticipated claims that would have a material effect on the financial ability of the *Contractor* to perform this *Contract*."

SC 3.17 GC 3.12 CONTRACTOR'S USE OF PERMANENT EQUIPMENT OR SYSTEMS

3.17.1 Add a new GC 3.12 as follows:

"**GC 3.12 CONTRACTOR'S USE OF PERMANENT EQUIPMENT OR SYSTEMS**

3.12.1 The *Contractor* shall not make use of elements of the mechanical and electrical systems or equipment comprising a permanent part of the *Work*, including the HVAC system and elevators, without the *Owner's* prior express written consent obtained in accordance with this GC 3.12.

3.12.2 If the *Contractor* wishes to make use of such mechanical and electrical systems or equipment the *Contractor* shall:

.1 obtain the manufacturer's instructions regarding any preventative maintenance services to be performed on such systems and equipment; and

.2 submit a written request to the *Owner* for consent to use such systems or equipment, which request shall include all of the information received from the manufacturer(s) of such systems or equipment and shall include the *Contractor's* comprehensive operation and preventative maintenance plan for such systems and equipment.

3.12.3 If the *Owner* consents to the *Contractor's* use of elements of the mechanical and electrical systems or equipment comprising a permanent part of the *Work*, the *Contractor* shall:

.1 operate and maintain such systems and equipment in strict compliance with the requirements set out in the *Specifications*, any instructions received from the manufacturer(s) of such systems and equipment, and the *Contractor's* comprehensive operation and preventative maintenance plan; and

.2 perform all preventative maintenance services on such systems and equipment in accordance with the *Specifications*, any instructions received from the manufacturer(s) of such systems and equipment, and the *Contractor's* comprehensive operation and preventative maintenance plan; and

.3 before applying for *Ready-for-Takeover*, clean and make good, to the satisfaction of the *Consultant*, all such systems and equipment as it had been permitted to use; and

.4 pay any and all costs associated with such use, operation, preventative maintenance services, cleaning and making good, at no cost or charge to the *Owner*; and

.5 obtain and pay for, at the *Contractor's* sole cost and expense, an extension of the manufacturer's warranty equal to the time that the *Contractor* had used such systems and equipment."

SC 3.18 GC 4.1 CASH ALLOWANCES

3.18.1 Add new paragraphs 4.1.8 and 4.1.9 as follows:

"4.1.8 Purchases from cash allowances must be authorized by written instructions issued by the *Consultant* and the form and methods of accounting for costs shall be approved by the *Consultant* before the *Contractor* proceeds with the purchase.

4.1.9 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."

SC 3.19 GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

3.19.1 Delete GC 5.1.

SC 3.20 GC 5.1A PROPER INVOICE

3.20.1 Add a new GC 5.1A as follows:

"**GC 5.1A PROPER INVOICE**

5.1A.1 In this Contract a *Proper Invoice* shall mean an application for payment made by the *Contractor* that:

.1 is given to the *Owner* by email to both "fservices@scdsb.on.ca" and the specified *Project* coordinator, with a copy to the *Consultant*; and

.2 includes all of the following:

.1 the *Contractor's* name and address and HST registration number;

.2 the date of the application for payment and the period during which the *Work* was performed;

.3 information identifying the authority, whether in the *Contract* or otherwise, under which the *Work* was performed;

.4 a description, including quantities where appropriate, of the services and materials that were supplied;

.5 the amount payable for the services or materials that were supplied, and the payment terms;

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

.7 a statement based on the schedule of values for the *Work*;

.8 where the application includes amounts charged on the basis of hourly rates, documentation in support of the amount claimed, including dates that services were performed, identity of the person(s) involved, the hours spent, and a description of the services performed;

.9 where the application includes amounts expended under a cash allowance, documentation in support of the amount claimed, including copies of all invoices and charges incurred;

.10 for all applications for payment except the final payment, an updated construction schedule that complies with the requirements of paragraph 3.4.1.1 of GC 3.4 – CONSTRUCTION SCHEDULE;

.11 a current valid clearance certificate issued by the *WSIB*;

.12 for the second and all subsequent applications for payment, a CCDC 9A Statutory Declaration stating that all accounts for services and materials and other indebtedness incurred by the *Contractor* for which the *Owner* may in any way be held responsible have been paid in full, except for amounts properly retained as a holdback or as an identified matter in dispute; and

.13 in respect of any subcontract with a value that exceeds $100,000, a statutory declaration in form CCDC 9B – 2001."

SC 3.21 **GC 5.2 APPLICATIONS FOR PAYMENT**

3.21.1 Delete paragraphs 5.2.1 and 5.2.2 and replace them with the following:

"5.2.1 Subject to paragraph 5.2.2, *Proper Invoices* for progress payment shall be given monthly to the *Owner* and the *Consultant* simultaneously as the *Work* progresses on a day of the month agreed to by the parties.

5.2.2 The *Contractor* shall not give a *Proper Invoice* for progress payment:

.1 on any day that is not a *Working Day*; and

.2 on any day that is within the *Blackout Period*; and

.3 between the date certified as the date of *Substantial Performance of the Work* and the date that the *Contract* is completed."

3.21.2 Amend paragraph 5.2.3 by adding the following to the end:

"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."

3.21.3 Amend paragraph 5.2.4 by adding the following to the end:

"Such schedule of values shall include line items which assign an appropriate portion of the *Contract Price* for the preparation and delivery of as-built drawings, quality control, cleanup, and closeout of the *Work*."

3.21.4 Amend paragraph 5.2.5 by inserting the words ", or as directed by the *Consultant*" after the words "as specified in the *Contract*".

3.21.5 Amend paragraph 5.2.6 by adding the following to the end:

", as modified by paragraph 5.1A.1.2 of GC 5.1A – PROPER INVOICE."

3.21.6 Amend paragraph 5.2.8 by adding the following to the end:

"Any *Products* delivered to the *Place of the Work* but not yet incorporated into the *Work* shall remain at the risk of the *Contractor* notwithstanding that title has passed to the *Owner* pursuant to GC 14.1 – OWNERSHIP OF MATERIALS."

SC 3.22 **GC 5.3 PAYMENT**

3.22.1 Delete paragraph 5.3.1 and replace it with the following:

"5.3.1 After receipt by the *Consultant* and the *Owner* of an application for payment submitted by the *Contractor* in accordance with GC 5.2 – APPLICATIONS FOR PAYMENT, the *Consultant* will issue to the *Owner* and copy to the *Contractor*, no later than 10 calendar days after the date of receipt of the *Proper Invoice*, a certificate for payment in the amount applied for, or in such other amount as the *Consultant* determines to be properly due.

5.3.2 Subject to the *Owner's* right to give notice of non-payment in accordance with the *Act*, and subject to the holdback provisions of the *Act*, the *Owner* will pay the amount payable under a *Proper Invoice* for progress payment no later than 28 days after the date the *Owner* receives the *Proper Invoice*. Provided that the *Owner's* obligation to make payment shall not arise unless and until the *Contractor's* application for payment constitutes a complete *Proper Invoice* as provided in GC 5.1A – PROPER INVOICE. For certainty, and without limitation, the *Owner* may refuse to pay all or any portion of an application for progress payment where:

.3 the application does not comply with all of the requirements of a *Proper Invoice* in GC 5.1A – PROPER INVOICE; and/or

.4 the *Owner* is entitled to deduct and retain amounts in accordance with the *Contract Documents*; and/or

.5 the amount applied for exceeds the amount stated in the certificate for payment issued by the *Consultant* pursuant to paragraph 5.3.1."

SC 3.23 **GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK**

3.23.1 Delete paragraphs 5.4.2 through 5.4.6 and replace them with the following:

"5.4.2 Immediately after the issuance of the certificate of *Substantial Performance of the Work*, the *Contractor*:

.1 shall, in consultation with the *Owner* and the *Consultant*, establish reasonable dates for finishing the *Work* and correcting deficient *Work*; and

.2 shall cause the certificate to be published in the manner prescribed by the *Act* and shall immediately thereafter deliver a copy of the published certificate to the *Owner*.

5.4.3 The *Contractor* shall submit an application for payment of the lien holdback amount which shall include all of the following.

.1 a written request for the release of the holdback amount;

.2 a declaration that no written notices of lien have been received by the *Contractor*;

.3 a copy of the published certificate of *Substantial Performance of the Work*;

.4 a current valid clearance certificate issued by the *WSIB*; and

.5 a CCDC 9A Statutory Declaration stating that all accounts for services and materials and other indebtedness incurred by the *Contractor* for which the *Owner* may in any way be held responsible have been paid in full, except for amounts properly retained as a holdback or as an identified matter in dispute.

5.4.4 Subject to the *Owner's* right to give notice of non-payment of holdback in accordance with the *Act*, the *Owner* will pay the amount authorized by the certificate for payment of the holdback in accordance with the *Act*. For certainty, and without limitation, the *Owner* may refuse to pay a portion of the holdback where the *Owner* is entitled to deduct and retain amounts in accordance with the *Contract Documents*."

SC 3.24 **GC 5.5 FINAL PAYMENT**

3.24.1 Delete paragraph 5.5.1 and replace it with the following:

"5.5.1 When the *Contractor* considers that the *Contract* is completed, the *Contractor* shall give to the *Owner* and the *Consultant a Proper Invoice* for final payment, provided that the *Contractor* shall not give such *Proper Invoice* on any day that is within the *Blackout Period*."

3.24.2 Amend paragraph 5.5.2 by adding the following to the end:

"Without limiting the generality of the foregoing, the application for final payment will not be considered valid until *Products* installed are tested and conform to the requirements specified in the *Contract Documents* and all documents required by the *Contract Documents* have been received and accepted by the *Consultant*."

3.24.3 Delete paragraphs 5.5.3 and 5.5.4 and replace them with the following:

"5.5.3 Subject to the *Owner's* right to give notice of non-payment in accordance with the *Act*, the *Owner* will pay the amount payable under a *Proper Invoice* for final payment no later than 28 days after the date the *Owner* receives the *Proper Invoice*. Provided that the *Owner's* obligation to make payment shall not arise unless and until the *Contractor's* application for payment constitutes a complete *Proper Invoice* as provided in GC 5.1A – PROPER INVOICE. For certainty, and without limitation, the *Owner* may refuse to pay all or any portion of an application for final payment where:

.1 the application does not comply with all of the requirements of a *Proper Invoice* in GC 5.1A – PROPER INVOICE; and/or

.2 the *Owner* is entitled to deduct and retain amounts in accordance with the *Contract Documents*; and/or

.3 the amount applied for exceeds the amount stated in the certificate for payment issued by the *Consultant* pursuant to paragraph 5.5.2."

SC 3.25 GC 5.8 WITHHOLDING OF PAYMENT

3.25.1 Add a new GC 5.8 as follows:

"**GC 5.8 WITHHOLDING OF PAYMENT**

5.8.1 Notwithstanding any provision in the *Contract Documents* to the contrary, the *Owner* may withhold payment of any amount claimed in an application for payment, in a *Proper Invoice*, or in any certificate for payment to the extent required to offset any claims the *Owner* may have against the *Contractor*, or to offset previous over-payment made to the *Contractor*, or for damages or costs incurred by the *Owner*, or to the extent as may be necessary to protect and/or indemnify the *Owner* from loss, claims, and/or damage, including as a result of:

.1 the *Contractor's* failure to perform any of its material obligations under this *Contract*, or where the *Contractor* is otherwise in default under the *Contract Documents*;

.2 defective portions of the *Work* not remedied;

.3 damage done to work performed by *Other Contractors* or by the *Owner's* own forces;

.4 the *Contractor's* failure to make prompt payments to its *Subcontractors* and *Suppliers* respecting *Work* for which the *Owner* has made payment to the *Contractor*;

.5 claims or reasonable evidence indicating possible commencement of claims for which the *Contractor* may be responsible to indemnify the *Owner*;

.6 the *Contractor's* failure to remove liens arising from the *Work* or to otherwise satisfy its obligations under GC 14.2 – LIENS AND ACTIONS;

.7 reasonable evidence the *Contractor* will not achieve *Ready-for-Takeover* in accordance with the construction schedule and/or within the *Contract Time*.

5.8.2 Where the *Owner* has withheld payment to the *Contractor* pursuant to the provisions of this *Contract*, the *Owner* shall be entitled to apply the funds withheld toward the costs of any required remedial work, completion costs, or toward damages or losses suffered and for which the *Owner* is entitled to compensation under this *Contract*, including legal costs and expenses."

SC 3.26 GC 6.1 OWNER'S RIGHT TO MAKE CHANGES

3.26.1 Amend paragraph 6.1.2 by adding the following to the end:

"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 is strict compliance with PART 6 – CHANGES IN THE WORK. No course of conduct or dealings between the parties, no express or implied acceptance of alterations or additions to the *Contract* or the *Work*, and no claims that the *Owner* has been unjustly enriched by any alteration or addition to the *Work*, whether or not there is any such unjust enrichment, shall be the basis of a claim for damages or additional payment or for a change in the *Contract Price* or *Contract Time*. Without limiting the generality of the foregoing, under circumstances of expediency the *Contractor* shall proceed with a change in the *Work* without first obtaining a *Change Order* or a *Change Directive* where it has received from the *Owner* or the *Owner's* authorized representative some form of written or e-mail direction agreeing to the change, in which case such change, and the value of such change, if any, will be determined pursuant to GC 6.2 or GC 6.3, at the option of the *Owner*."

3.26.2 Add a new paragraph 6.1.3 as follows:

"6.1.3 The *Contractor* agrees that changes resulting from construction coordination or *Subcontractor* or *Supplier* coordination are included in the *Contract Price* and shall not entitle the *Contractor* to claim any increase to the *Contract Price*."

SC 3.27 GC 6.2 CHANGE ORDER

3.27.1 Amend paragraph 6.2.1 by adding the following sentence to the end:

"Such adjustments and method of adjustment must be submitted by the *Contractor* to the *Consultant* in sufficient time to prevent interruption of the orderly process of construction and, in any event, no later than ten (10) days from the *Contractor's* receipt of the proposed change in the *Work*."

3.27.2 Add new paragraphs 6.2.3 to 6.2.6 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 *Owner*:

.1 by estimate and acceptance of a lump sum. The lump sum shall include overhead, profit and other reasonable charges and mark-ups of the *Contractor* and shall be the total cost to the *Owner*; or

.2 by unit prices established in the *Contract* or subsequently agreed upon. Unit prices shall include all costs related to *Products*, labour, equipment, delivery and handling, statutory charges, overhead and profit, other related charges, and shall include all applicable duties (excluding *Value Added Taxes*), measured in place prior to excavation, or compacted/complete in place, and shall be the total cost to the *Owner*. Adjustment to the *Contract Price* shall be based on a net quantity difference from the original quantity; or

.3 by actual credits and cost to the *Owner*. The cost to the *Owner* shall be the actual cost of labour charged at the prevailing rates at the *Place of the Work* plus statutory charges on labour including workers' compensation, employment insurance, Canada Pension, vacation pay, medical and health benefits, together with the actual costs, without mark-up, of materials and *Products* utilized in the change, plus the percentage fees set out in the table below for overhead and profit after all credits included in the change have been deducted. For certainty, no mark-up or other charges shall be permitted for overhead and profit where the change results in a net decrease (credit) to the *Contract Price*.

Cost of the Change (excl HST)	***Subcontractor* Mark-Up on Material and *Products* only**	***Contractor* Mark-Up on *Subcontractor* work**
$0 to $24,999.99	10%	10%
$25,000 to $49,999.99	10%	7.5%
$50,000 or more	5%	5%

Interpretive Note: The mark-ups in the above table are flat not graduated. For example, a *Subcontractor* performed change valued at $35,000 attracts a mark-up of 10% for the *Subcontractor* (on the cost of material and *Products* only) and 7.5% for the *Contractor*. The table is not intended to provide one set of mark-ups for the first $25,000 of the change and a different set of mark-ups for the balance.

6.2.4 The percentage fee mark-ups set out in the table at paragraph 6.2.3.3 shall constitute the only compensation the *Contractor* shall be entitled to for any and all overhead, profit, general expenses, incidental and administrative costs whatsoever related to the change including, but not limited to, costs relating to superintendence and supervision, general cleanup, *Shop Drawing* production, estimating, site office and head office expenses and personnel, administration costs, workers' tools, temporary facilities and controls, record drawings, as-built drawings, warranty, insurance, bonding, job safety costs, and coordination of any and all *Work*-related activities.

6.2.5 No claim whatsoever for a change in the *Contract Time*, delay, prolongation charges, remobilization or otherwise shall be permitted with respect to a change, unless first authorized by the *Consultant* and approved by the *Owner* and set out in a *Change Order*. For certainty, an adjustment to the *Contract Time* will be considered only when the *Contractor* demonstrates to the *Owner* that a change in the *Work* affects the critical path of the *Work*. Any costs associated with an adjustment to the *Contract Time* shall be identified by the *Contractor* and shall be limited to the reasonable direct costs directly attributable to the adjustment to the *Contract Time*.

6.2.6 The *Contractor* shall not be entitled to any additional compensation or an adjustment to the *Contract Time* arising out of changes to the *Work* aside from the amounts stated in *a Change Order*. In no event shall the *Owner* be liable to the *Contractor* for any costs, including indirect, impact or consequential costs, arising out of changes to the *Work* beyond the agreed upon amount of the *Change Order*."

SC 3.28 **GC 6.3 CHANGE DIRECTIVE**

3.28.1 Delete paragraph 6.3.6.3 and replace it with the following:

"6.3.6.3 The *Contractor's* fee shall be equal to the applicable percentage mark-up rates set out in paragraph 6.2.3.3 of GC 6.2 – CHANGE ORDER or as otherwise agreed by the parties."

3.28.2 Amend paragraph 6.3.7 as follows:

(a) insert the words "Subject to paragraph 6.3.14," at the beginning; and

(b) delete paragraphs 6.3.7.1(1), (2), (3) and (4) and replace them with the following:

"(1) performing the *Work*, including necessary supervisory services;
(2) engaged in the preparation of *Shop Drawings*, fabrication drawings, coordination drawings and as-built drawings; or
(3) including clerical staff engaged in processing changes in the *Work*.

(c) delete paragraphs 6.3.7.5, 6.3.7.12 to and including 6.3.7.15, and 6.3.7.17 to and including 6.2.7.19."

3.28.3 Amend paragraph 6.3.12 by adding the following to the beginning:

"An adjustment to the *Contract Time* will be considered only where the change affects the critical path of the *Work*."

3.28.4 Add a new paragraph 6.3.14 as follows:

"6.3.14 Without limitation, the following shall not form part of the cost of performing the work attributable to a *Change Directive*, and shall not be recoverable by the *Contractor*:

.1 head office salaries and benefits and all other overhead or general expenses, except only for the amounts described in paragraph 6.3.7.1;

.2 capital expenses and interest on capital;

.3 general clean-up, except where the performance of the work attributed to the *Change Directive* causes specific additional clean-up requirements;

.4 wages paid for project managers, superintendents, assistants, watch persons and administrative personnel;

.5 wages, salaries, rentals, or other expenses that exceed the rates that are standard in the locality of the *Place of the Work* or that are otherwise deemed unreasonable by the *Consultant*;

.6 costs or expenses attributable to the negligence, improper work, deficiencies, or breaches of contract by the *Contractor*;

.7 costs of quality assurance, such as inspection and testing services, charges levied by authorities having jurisdiction, and any legal fees unless any such costs or fees are pre-approved in writing by the *Owner*;

.8 amounts for small tools;

.9 insurance and bonding premiums, unless such costs or fees are approved in writing by the *Owner*; and

.10 preparation of as-built drawings."

SC 3.29 **GC 6.4 CONCEALED OR UNKNOWN CONDITIONS**

3.29.1 Add a new paragraph 6.4.0 as follows:

"6.4.0 The *Contractor* confirms that, before signing the *Contract*, it carefully investigated and examined the *Place of the Work*, the *Contract Documents*, and any other documents made available by the *Owner*, and applied to such investigations and examinations the degree of care, skill and diligence described in paragraph 3.11.1 of GC 3.11 – STANDARD OF CARE. Through such investigations and examinations, the *Contractor* has satisfied itself as to the conditions, circumstances, limitations and requirements necessary for the *Contractor* to perform the *Work* in accordance with the *Contract Documents* including, but not necessarily limited to, such things as:

.1 the nature and location of the *Work*, including the availability / restrictions of access to the *Project* site;

.2 the character and content of the *Work*;

.3 the character and scope of work to be done by *Other Contractors* and *Owner's* own forces;

.4 the availability of labour, equipment, material, *Products* and facilities needed for the on-time performance and completion of the *Work*;

.5 all labour restrictions, including availability of skilled trades;

.6 safety hazards and labour contract negotiations which may have an impact on the performance of the *Work*;

.7 the location of any required utility services;

.8 without limiting the generality of the foregoing, any contingency and/or circumstances which may affect the *Work*.

If the *Contractor* has not conducted the investigations and examinations described in this paragraph 6.4.0, it is deemed to assume all risk of conditions or circumstances now existing or arising in the course of the *Work* which could make the *Work* more expensive or more difficult to perform than was contemplated at the time the *Contract* was entered into. No allowances will be made for additional costs and no claims by the *Contractor* will be considered for an adjustment in the *Contract Price* or *Contract Time* in connection with conditions which were reasonably apparent or which could reasonably have been discovered by such investigations or examinations made before the signing of the *Contract*."

3.29.2 Amend paragraphs 6.4.1.1 and 6.4.1.2 by adding the following to the end of each paragraph:

"and which were concealed from discovery notwithstanding the conduct of the investigations and examinations described in paragraph 6.4.0"

3.29.3 Amend paragraph 6.4.2 as follows:

(a) add a new first sentence as follows:

"Having regard to paragraph 6.4.0, if the *Contractor* believes that the conditions of the *Place of the Work* differ materially from those reasonably anticipated, or differ materially from those indicated in the *Contract Documents*, or were concealed from discovery notwithstanding the conduct of the investigation described in paragraph 6.4.0, it shall notify the *Owner* and *Consultant* in writing no later than five (5) *Working Days* after first observing such conditions."

(b) insert the words "and were concealed from discovery notwithstanding the conduct of the investigations and examinations described in paragraph 6.4.0" after the word "materially" in the second line.

SC 3.30 **GC 6.5 DELAYS**

3.30.1 Amend paragraph 6.5.1 by deleting the last sentence and replacing it with the following:

"The *Contractor* shall be reimbursed by the *Owner* for reasonable direct costs directly flowing from the delay, but excluding the costs of the *Contractor's* head office personnel and overhead costs, any consequential, indirect or special damages, and any loss of profit or loss of opportunity costs and damages arising from or caused by such delay, regardless of whether any such excluded costs, damages or claims are made or incurred by the *Contractor* or any *Subcontractor* or *Supplier*."

3.30.2 Amend paragraph 6.5.2 by deleting the last sentence and replacing it with the following:

"The *Contractor* shall be reimbursed by the *Owner* for reasonable direct costs directly flowing from the delay, but excluding the costs of the *Contractor's* head office personnel and overhead costs, any consequential, indirect or special damages, and any loss of profit or loss of opportunity costs and damages arising from or caused by such delay, regardless of whether any such excluded costs, damages or claims are made or incurred by the *Contractor* or any *Subcontractor* or *Supplier*. Provided that this paragraph 6.5.2 shall not apply where the stop work order is issued as a result of a declaration of a state of emergency or the occurrence of an epidemic or pandemic, in which case any resulting delay shall be governed by paragraph 6.5.3."

3.30.3 Amend paragraph 6.5.3 as follows:

(a) add a new subparagraph 6.5.3.0 as follows:

"6.5.3.0 acts, orders, legislation, regulations or directives of any court, government or other public authority, including stop work orders or *Project* closures or suspensions, made or issued as a result of a declaration of a state of emergency or the occurrence of an epidemic or pandemic,"

(b) add the following to the last sentence of paragraph 6.5.3:

", in which case the *Contractor* shall be reimbursed by the *Owner* for reasonable direct costs directly flowing from the delay, but excluding the costs of the *Contractor's* head office personnel and overhead costs, and excluding any consequential, indirect or special damages, and excluding any loss of profit or loss of opportunity costs and damages, both direct and indirect, arising from or caused by such delay, and regardless of whether any such costs, damages or claims are made or incurred by the *Contractor* or any *Subcontractor* or *Supplier*."

3.30.4 Amend paragraph 6.5.4 by adding the following to the end:

"For greater certainty: (a) the fact there may be a discussion of delay during a meeting or the fact delay may be mentioned in minutes of meetings does not constitute *Notice in Writing* of the cause of delay nor an effective notice of delay; and (b) it is the intention of the parties that an extension for delay will be

considered only when the *Contractor* demonstrates that the delay affects the critical path of the *Work* and any adjustment to the *Contract Time* shall only be to the extent that the critical path of the *Work* is affected."

3.30.5 Add new paragraphs 6.5.6 to 6.5.9 as follows:

"6.5.6 The *Contractor* shall take all reasonable steps to reschedule the *Work* and to minimize the effect of the delay referred to in paragraphs 6.5.1, 6.5.2 and 6.5.3. If the *Contractor* fails to do so, the extension of the *Contract Time* and/or any amounts payable to the *Contractor* will be reduced accordingly.

6.5.7 The *Contractor* shall be responsible for the care, maintenance and protection of the *Project* in the event of any suspension of the *Work* as a result of the delay described in paragraphs 6.5.1, 6.5.2 or 6.5.3, and the *Contractor* shall be reimbursed by the *Owner* for the reasonable direct costs incurred by the *Contractor* for such care, maintenance and protection, but excluding the *Contractor's* head office personnel and overhead costs.

6.5.8 The parties acknowledge and agree that the *Owner* shall not be liable for any delay or part thereof that occurs concurrently with an independent cause of delay for which the *Owner* is not responsible. In addition, in the event the *Owner* is responsible for two or more separate causes of delay that run in whole or in part parallel to each other, those two or more events shall be considered as one for the purpose of determining the duration of the extension of the *Contract Time* and/or any amount payable to the *Contractor*.

6.5.9 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 the *Contract Time* shall be extended for such reasonable time as the *Consultant* may decide in consultation with the *Owner*. The *Contractor* shall be responsible for the care, maintenance and protection of the *Project* in the event of any suspension of the *Work* as a result of the delay described in this paragraph, at its sole cost and expense. In addition, the *Owner* shall be reimbursed by the *Contractor* for all reasonable costs and expenses incurred by the *Owner* as a result of such delay including, but not limited to, the costs of all additional services required by the *Owner* from the *Consultant* or any other consultants, project managers, contractors, or others employed or engaged by the *Owner*."

SC 3.31 GC 7.1 OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK OR TERMINATE THE CONTRACT

3.31.1 Delete paragraph 7.1.2 and replace it with the following:

"7.1.2 If the *Contractor* neglects to prosecute the *Work* properly, or fails or neglects to maintain the construction schedule, or otherwise fails to comply with the requirements of the *Contract*, the *Owner* may, without prejudice to any other right or remedy the *Owner* may have, notify the *Contractor* in writing that the *Contractor* is in default of the *Contractor's* contractual obligations and instruct the *Contractor* to correct the default in the five (5) *Working Days* immediately following the receipt of such notice, but without affecting in any respect the liability of the *Contractor* in respect of earlier defaults."

3.31.2 Add new paragraphs 7.1.5A and 7.1.5B as follows:

"7.1.5A The *Owner* may terminate the *Contract* at any time for any or no reason. In such event, the *Owner* shall pay for the *Work* performed up to the effective date of termination, including demobilization costs, and for such additional costs, if any, directly flowing from such termination which are a reasonable consequence of the termination, but excluding any consequential, indirect or special damages, and excluding any loss of profit or loss of opportunity costs and damages, both direct and indirect, arising from or caused by such termination, and regardless of whether any such costs, damages or claims are made or incurred by the *Contractor* or any *Subcontractor* or *Supplier*. The *Owner* shall not be liable to the *Contractor* for any other claims, costs or damages whatsoever arising from such termination of the *Contract*.

7.1.5B If the *Owner* terminates the *Contractor's* right to continue with the *Work* in whole or in part or terminates the *Contract* as provided in this GC 7.1, the *Contractor* shall deliver to the *Owner*, within five (5) days of the effective date of the termination, all of the materials listed in paragraph 12.1.1 of GC 12.1 – READY-FOR-TAKEOVER in the possession of or available to the *Contractor*."

SC 3.32 GC 7.2 CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT

3.32.1 Delete paragraph 7.2.2.

3.32.2 Amend paragraph 7.2.3 as follows:

(a) delete paragraphs 7.2.3.1 and 7.2.3.2;

(b) delete paragraphs 7.2.3.3 and 7.2.3.4 and replace them with the following:

"7.2.3.3 the *Owner* fails to pay the *Contractor* when due the amount certified by the *Consultant* or awarded by arbitration or a court; provided that this paragraph shall not apply to the *Owner's* withholding of payments in accordance with the *Contract Documents*, or

7.2.3.4 the *Owner* breaches this *Contract* to a substantial degree, and the *Consultant* gives a written statement to the *Owner* and the *Contractor* that provides details of such breach and confirms to the *Contractor* and the *Owner* that sufficient cause exists to justify the *Contractor's* action."

3.32.3 Amend paragraph 7.2.4 by deleting the number "5" in the second line and replacing it with "10".

3.32.4 Delete paragraph 7.2.5 and replace it with the following:

"7.2.5 If the default cannot be corrected within the 10 *Working Days* specified in paragraph 7.2.4, the *Owner* shall be deemed to have cured the default if it

.1 commences the correction of the default within the specified time; and

.2 provides the *Contractor* with a reasonable schedule for such correction; and

.3 completes the correction in accordance with such schedule.

7.2.6 If the *Contractor* terminates the *Contract* under the conditions described in this GC 7.2, the *Contractor* shall ensure the *Work* and the *Place of the Work* are left in a safe and secure condition as required by authorities having jurisdiction and the *Contract Documents*, and shall be entitled to be paid for all *Work* performed to the date of termination. Subject to the *Contractor's* obligation to mitigate costs, the *Contractor* shall also be entitled to recover the costs directly flowing from and which are a reasonable consequence of the termination, but excluding the costs of the *Contractor's* head office personnel and overhead costs, any consequential, indirect or special damages, and any loss of profit or loss of opportunity costs and damages arising from or caused by such termination, regardless of whether any such excluded costs, damages or claims are made or incurred by the *Contractor* or any *Subcontractor* or *Supplier*. Such payment is further subject to the *Owner's* right to claim damages or set off for any costs or loss or damage suffered or which will be suffered by the *Owner*. The *Owner* shall not be liable to the *Contractor* for any other claims, costs or damages whatsoever arising from such termination of the *Contract*."

SC 3.33 GC 8.4 RETENTION OF RIGHTS

3.33.1 Add a new paragraph 8.4.3 as follows:

"8.4.3 If either party elects to have a dispute resolved by arbitration, the *Contractor* agrees that this paragraph 8.4.3 shall be construed as a formal consent to the stay of any lien proceedings relating to the dispute until an award is rendered in the arbitration or such dispute is otherwise resolved between the parties. Provided that nothing in this paragraph 8.4.3 shall prevent the

Contractor from taking the steps required by the *Act* to preserve and/or perfect a lien to which it may be entitled."

SC 3.34 GC 9.1 PROTECTION OF WORK AND PROPERTY

3.34.1 Delete paragraph 9.1.1.1 and replace it with the following:

"9.1.1.1 errors or omissions in the *Contract Documents* which the *Contractor* could not reasonably have discovered; or"

3.34.2 Delete paragraph 9.1.2 and replace it with the following:

"9.1.2 Before commencing any *Work*, the *Contractor* shall determine the locations of all underground utilities and structures indicated in the *Contract Documents* or that are discoverable from an inspection of the *Place of the Work*."

3.34.3 Add a new paragraph 9.1.5 as follows:

"9.1.5 Without in any way limiting the *Contractor's* obligations under this GC 9.1, should the *Contractor* or any *Subcontractor* or *Supplier* cause loss or damage to property, including roads, buildings, structures, paving, grass, sod, trees or other plantings, whether owned by the *Owner* or others, and whether at the *Place of the Work* or not, the *Contractor* shall be liable for the cost of making good such damage and for the repair and replacement costs, including the costs of any consultants, and such costs may be deducted by the *Owner* from amounts otherwise owing to the *Contractor*."

SC 3.35 GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

3.35.1 Amend paragraph 9.2.3 by deleting the words "The *Owner*" in the first line and replacing them with "The *Contractor*".

3.35.2 Amend paragraph 9.2.4 by deleting the words "Unless the *Contract* expressly provides otherwise, the *Owner*" in the first line and replacing them with "The *Contractor*".

3.35.3 Amend paragraph 9.2.5.3 by adding the following after the words "*Place of the Work*" in line two:

"and no property is damaged or destroyed as a result of exposure to or the presence of the toxic or hazardous substances,"

3.35.4 Add a new paragraph 9.2.5.5 as follows:

"9.2.5.5 take all necessary steps to mitigate the impact on *Contract Time* and *Contract Price*."

3.35.5 Amend paragraph 9.2.6 by inserting the following after the word "responsible":

"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 damage to the property of the *Owner* or others,"

3.35.6 Amend paragraph 9.2.7.3 by adding the following after the words "as a result of the delay" at the end:

", but excluding the costs of the *Contractor's* head office personnel and overhead costs, any consequential, indirect or special damages, any loss of profit or loss of opportunity costs and damages arising from or caused by such delay, and regardless of whether any such excluded costs, damages or claims are made or incurred by the *Contractor* or any *Subcontractor* or *Supplier*"

3.35.7 Delete paragraph 9.2.7.4.

3.35.8 Amend paragraph 9.2.8 by adding the following after the word “responsible” in the second line:

“or that any toxic or hazardous substances 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 damage to the property of the *Owner* or others,"

3.35.9 Add new paragraphs 9.2.10 and 9.2.11 as follows:

“9.2.10 Without limiting its other obligations under this GC 9.2, the *Contractor* acknowledges that its obligations under the *Contract* include compliance with the *Environmental Programs*. The *Contractor* acknowledges that the *Owner* may suffer loss and damage should the *Contractor* fail to comply with the *Environmental Programs* and agrees to indemnify and hold harmless the *Owner* with respect to any loss or damage to which the *Owner* is exposed by the *Contractor's* failure to comply. The *Contractor* acknowledges that should it fail to comply with the *Environmental Programs*, such failure will constitute a failure to comply with the requirements of the *Contract* in a material way within the meaning of 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

9.2.11 The *Contractor* shall indemnify the *Owner* and its agents, officers, directors, trustees, employees, consultants, successors and assigns in respect of any loss, costs, expense or fine which might be imposed in respect of any failure by the *Contractor* to satisfy its obligations under this GC 9.2 and, without limiting the general nature of this indemnity, the *Contractor* shall indemnify the *Owner* and its agents, officers, directors, trustees, employees, consultants, successors and assigns in respect of any loss, costs, expense or fine if the *Project* is made subject to an order from a court or government agency requiring remediation of any contamination caused as a result of the *Work* performed by the *Contractor* or its *Subcontractors* or *Suppliers*.”

SC 3.36 **GC 9.4 CONSTRUCTION SAFETY**

3.36.1 Add new paragraphs 9.4.6 to 9.4.9 as follows:

“9.4.6 Without limiting the generality of paragraph 9.4.1, the *Contractor* shall be and shall assume all of the responsibilities of the “constructor” under the *OHSA* for the *Project* and shall file the “Notice of Project” with the appropriate government agency naming the *Contractor* as the “constructor”.

9.4.7 The *Contractor* shall be solely and exclusively responsible for controlling the workplace and the *Place of the Work* and shall take all steps to effectively direct and supervise the *Work* in order to ensure conformity and compliance with *OHSA* and all other applicable construction health and safety requirements, regulations, industry standards and guidelines, including COVID-19 protocols for construction sites. The *Contractor* represents and warrants to the *Owner* that appropriate health and construction safety instruction and training have been provided and will be provided to the *Contractor's* employees, *Subcontractors*, *Suppliers* and all others attending at the *Place of the Work*, including the *Owner's* representatives, the *Owner's* own forces, and *Other Contractors*. No comments, suggestions or instructions from the *Owner*, the *Consultant* or any other representative of the *Owner* are to be relied upon or assumed to reduce or replace the *Contractor's* designation as the “constructor” or its responsibility for construction safety on the *Project*.

9.4.8 The *Contractor* shall indemnify and save harmless the *Owner* and its agents, officers, directors, trustees, employees, consultants, successors and assigns from and against any and all liability, costs, expenses, charges, fines, damages and all other consequences arising from any and all safety infractions on the *Project*, including the payment of legal fees and disbursements on a full indemnity basis.

9.4.9 The *Contractor* shall ensure that every "controlled Product" used at the *Project* site shall meet the labelling requirements and shall have an updated corresponding "Material Safety Data Sheet", all as required by the WHMIS legislation. The *Contractor* shall ensure that all Material Safety Data Sheets are and are made available for review at the Project site**.**"

SC 3.37 **GC 9.5 MOULD**

3.37.1 Amend paragraph 9.5.3.3 by adding the following after the words "as a result of the delay" at the end:

", but excluding the costs of the *Contractor's* head office personnel and overhead costs, any consequential, indirect or special damages, and any loss of profit or loss of opportunity costs and damages arising from or caused by such delay, regardless of whether any such excluded costs, damages or claims are made or incurred by the *Contractor* or any *Subcontractor* or *Supplier*"

SC 3.38 **GC 10.1 TAXES AND DUTIES**

3.38.1 Amend paragraph 10.1.2 by adding the following to the end:

"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 and duties."

3.38.2 Add new paragraphs 10.1.3 to 10.1.6 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.

10.1.4 The *Contractor* shall maintain accurate records of equipment, material and component costs reflecting the sales taxes, customs duties, excise taxes and *Value Added Taxes* paid.

10.1.5 Any refund of taxes including, without limitation, any government sales tax, customs duty, excise tax or *Value Added Tax*, whether or not paid, which is found to be inapplicable or for which exemption may be obtained, is the sole and exclusive property of the *Owner*. The *Contractor* agrees to cooperate with the *Owner* and to cause all *Subcontractors* and *Suppliers* to cooperate with the *Owner* in the application for any refund of any taxes, which cooperation shall include, but not be limited to, making or concurring in the making of an application for any such refund or exemption and providing to the *Owner* copies, or where required, originals of records, invoices, purchase orders and other documentation necessary to support such applications or exemptions or refunds. All such refunds shall either be paid to the *Owner* or shall be a credit to the *Owner* against the *Contract Price*, in the *Owner's* discretion.

10.1.6 Customs duties, penalties or any other penalty, fine or assessment levied against the *Contractor* shall not be treated as a tax or customs duty for purposes of this GC 10.1."

SC 3.39 **GC 10.2 LAWS, NOTICES, PERMITS, AND FEES**

3.39.1 Amend paragraph 10.2.4 by adding the following to the end:

"The *Contractor* shall be present at each site inspection by an inspector or registered code agency."

3.39.2 Amend paragraph 10.2.5 by deleting the word "The" in the first line and replacing it with the words "Subject to paragraph 1.1.12 of GC 1.1 – CONTRACT DOCUMENTS, the".

3.39.3 Amend paragraph 10.2.6 as follows:

(a) delete the words “performs work knowing it to be” and replace them with “performs work when it knew or ought to have known that such work is”; and

(b) delete the words “bear the” in the third line and replace them with “indemnify and save the *Owner* harmless against all”.

3.39.4 Amend paragraph 10.2.7 by adding the following to the end:

“, provided that any claims arising from any delays due to such changes will be dealt with in accordance with GC 6.5 – DELAYS.”

SC 3.40 **GC 11.1 INSURANCE**

3.40.1 Amend paragraph 11.1.1.1 by adding the following sentence to the end:

“To the extent not already described in this paragraph, the *Contractor* shall provide legal liability coverage for compensatory damages because of bodily injury or property damage to third parties arising from all operations of the insured, including premises and operations, *Subcontractors'* contingent liability, personal injury resulting from protection of persons / property, contractual liability (blanket), broad form property damage, employees as named insureds, cross liability clause and voluntary medical payments.”

3.40.2 Add a new paragraph 11.1.1.4A immediately after paragraph 11.1.1.4 as follows:

“11.1.1.4A In addition to the coverages described in CCDC 41, include:

- all risks of direct physical loss including flood;
- full replacement value, as basis for settlement;
- the following deductibles: for flood at $50,000 and other at $50,000.”

3.40.3 Amend paragraph 11.1.2 by adding the following to the end:

“The *Owner's* acceptance or the *Contractor's* delivery of any document evidencing the required policies of insurance does not constitute approval or agreement by the *Owner* that the insurance requirements have been met or that the insurance policies are in compliance with the requirements of this *Contract*. Failure of the *Owner* to demand evidence of full compliance with these insurance requirements or failure of the *Owner* to identify a deficiency from evidence provided will not be construed as a waiver of the *Contractor's* obligation to maintain the insurance policies required by this *Contract*.”

3.40.4 Delete paragraph 11.1.3 and replace it with the following:

“11.1.3 In all of the policies described in paragraph 11.1.1 any deductible shown shall be the responsibility of the *Contractor*.”

3.40.5 Add new paragraphs 11.1.9 through 11.1.12 as follows:

“11.1.9 All occurrences and claims shall be reported immediately in writing to the *Owner* providing at least the following particulars:

.1 date, time and location of occurrence;

.2 cause and description of circumstances;

.3 estimate of loss or damage;

.4 names and telephone numbers of persons to contact.

11.1.10 Except for policies of automobile insurance, all insurance policies in any way related to the *Work* and secured and maintained by the *Contractor* shall include clauses stating each insurer will waive all rights of recovery, under subrogation or otherwise, against the *Owner*.

11.1.11 All insurance policies and coverages required of the *Contractor* will be primary over any other insurance that might be carried by the *Owner*.

11.1.12 By requiring insurance, the *Owner* does not represent that the coverages and limits will necessarily be adequate to protect the *Contractor*. The insurance obtained by the *Contractor* will not reduce or limit the *Contractor's* contractual obligation to indemnify and defend the *Owner* as provided in this *Contract*."

SC 3.41 GC 12.1 READY-FOR-TAKEOVER

3.41.1 Delete paragraphs 12.1.1.4 and 12.1.1.5 and replace them with the following:

"12.1.1.4 The delivery to the *Owner* of guarantees, warranties, certificates, testing and balancing reports and spare parts, distribution system diagrams, *Shop Drawings*, maintenance and operating manuals, instructions, samples, existing reports and correspondence from authorities having jurisdiction, and all other close-out materials or documents specified in the *Contract Documents*.

12.1.1.5 The delivery to the *Owner* of the final as-built drawings acceptable to the *Consultant*."

3.41.2 Add a new paragraph 12.1.1.9 as follows:

"12.1.1.9 Written confirmation from the *Consultant* that the aggregate cost of completing the remaining *Work* and correcting known defects and deficiencies is not more than the lesser of $5,000 and 1% of the *Contract Price*."

3.41.3 Delete paragraph 12.1.2.

3.41.4 Delete paragraphs 12.1.5 and 12.1.6.

SC 3.42 GC 12.2 EARLY OCCUPANCY BY THE OWNER

3.42.1 Delete paragraphs 12.2.1 to 12.2.4 and replace them with the following:

"12.2.1 The *Owner*, its agents and *Other Contractors* shall have the right to enter, occupy, take possession of or use for any intended purpose any portion or all of the undelivered portion of the *Project*, even though *Ready-for-Takeover* may not have been attained, provided that such entry, occupation, taking of possession or use will not interfere, in any material way, with the progress of the *Work*. The entry, occupation, 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 be deemed to be an acknowledgment or acceptance by the *Owner* that such *Work*, or portions of the *Work*, have met the *Ready-for-Takeover* requirements described in the *Contract Documents*, nor shall it entitle the *Contractor* to an adjustment in the *Contract Time* or *Contract Price*.

12.2.2 The entry, occupation, taking of possession or use of any portion of the *Project* by the *Owner*, its agents or *Other Contractors* pursuant to this GC 12.2 – EARLY OCCUPANCY BY THE OWNER shall not relieve the *Contractor* of any of its obligations under the *Contract*, including the *Contractor's* designation and obligations as "constructor" under *OHSA* and the *Contractor's* obligations respecting construction health and safety, and all of the *Contractor's* other obligations, rules, regulations and practices shall continue to apply notwithstanding such entry, occupation, taking of possession or use."

SC 3.43 GC 12.3 WARRANTY

3.43.1 Amend paragraph 12.3.1 by adding the following to the end:

"Notwithstanding the foregoing, if an item of *Work* is not completed at *Ready-for-Takeover*, except for extended warranties as described in paragraph 12.3.6, the warranty period for such item of *Work* shall be one year from the date that such item of *Work* has been completed and accepted in writing by the *Owner*."

3.43.2 Amend paragraph 12.3.2 by adding the following to the end:

"If the *Contractor* has been permitted to make use of permanent equipment or systems, as provided in GC 3.12 – CONTRACTOR'S USE OF PERMANENT EQUIPMENT OR SYSTEMS, such permanent equipment or systems shall be subject to the same warranty as described in this GC 12.3 and shall be judged, for purposes of assessing compliance with the warranty, as though the equipment or system was new, clean and unused by the *Contractor*, except for normal commissioning and startup activities, prior to the date of *Ready-for-Takeover*."

3.43.3 Amend paragraph 12.3.3 by adding the following to the end:

"The *Contractor* shall correct all remedial and warranty work identified in the *Notice in Writing* within 30 days of receipt of such notice, or within such other time as the parties may agree, failing which the *Owner* may engage others to perform the work necessary to complete and rectify such warranty work at the risk and cost of the *Contractor*."

3.43.4 Amend paragraph 12.3.4 by adding the following to the end:

"The *Contractor* shall perform all remedial and warranty work at its own cost and expense and at a time convenient to the *Owner*, which may be outside of normal working hours. Before performing the remedial and warranty work the *Contractor* shall provide, for the *Owner's* review and approval, a proposed schedule for the performance of such work."

SC 3.44 **GC13.1 INDEMNIFICATION**

3.44.1 Delete paragraphs 13.1.1 through 13.1.6 and replace them with the following:

"13.1.1 The *Contractor* shall defend, indemnify, and hold harmless the *Owner*, its agents, employees, trustees, officers, directors and assigns from and against all claims, demands, damages, losses, expenses, costs including legal fees, actions, causes of action, suits, charges or other proceedings (collectively "**Claims**"), by whomsoever made, brought or prosecuted in any manner, arising out of, resulting from or attributable to, directly or indirectly, the *Contractor's* performance or non-performance of the *Work* or the *Contract*, regardless of whether or not caused in part by a party indemnified hereunder. It is expressly understood that the *Contractor* will save harmless the *Owner* from all *Claims* made by any person other than the *Contractor* itself, financial or otherwise, relating to or arising from the *Work*.

13.1.2 The *Owner* shall indemnify and hold harmless the *Contractor* and its agents and employees from and against all *Claims* 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*."

SC 3.45 **GC 13.2 WAIVER OF CLAIMS**

3.45.1 Delete paragraphs 13.2.1 through 13.2.10 and replace them with the following:

"13.2.1 As of the date on which the *Owner* makes final payment to the *Contractor*, the *Owner* expressly waives and releases the *Contractor* from all claims against the *Contractor* including, without limitation, those that might arise from negligence or breach of contract by the *Contractor* except for one or more of the following:

.1 those made in writing prior to the date of the final payment and still unsettled;

.2 those arising from the provisions of GC 13.1 – INDEMNIFICATION or GC 12.3 – WARRANTY;

.3 those arising from GC 9.2 – TOXIC AND HAZARDOUS SUBSTANCES and arising from the *Contractor* bringing or introducing any toxic or hazardous substances to the *Place of the Work* after the *Contractor* commences the *Work*;

.4 those made by *Notice in Writing* within a period of six years from *Ready-for-Takeover*, or within such shorter period as may be prescribed in any limitation statute of the province or territory of the *Place of the Work* and arising from any liability of the *Contractor* for damages resulting from the *Contractor's* performance of the *Contract* or substantial defects or deficiencies in the *Work* for which the *Contractor* is proven responsible. As

used herein, "substantial defects or deficiencies" means those defects or deficiencies in the *Work* where the reasonable cost of repair of such defects or deficiencies, either individually or in the aggregate, exceeds:

(A) if the *Contract Price* is $2,000,000 or less, the sum of $50,000, before *Value Added Taxes*;

(B) if the *Contract Price* is more than $2,000,000, the sum of $100,000, before *Value Added Taxes*.

13.2.2 As of the date of *Ready-for-Takeover*, the *Contractor* expressly waives and releases the *Owner* from all claims which it has or reasonably ought to have knowledge of that could be advanced against the *Owner* including, without limitation, those that might arise from the negligence or breach of contract by the *Owner* except:

.1 those for which *Notice in Writing* was given prior to the *Contractor's* application for *Ready-for-Takeover* and still unsettled; and

.2 claims for payment for *Work* completed after the *Contractor's* application for *Ready-for-Takeover*."

SC 3.46 PART 14 OTHER PROVISIONS

3.46.1 Add a new Part 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 this *Contract* is entered into shall remain the property of the *Owner*. All *Work* and *Products* delivered to the *Place of the Work*, or to a pre-approved off site storage area, shall be the property of the *Owner*. The *Contractor* shall remove all surplus or rejected materials from the *Place of the Work* as its property when notified in writing to do so by the *Consultant*.

GC 14.2 LIENS AND ACTIONS

14.2.1 The *Contractor* shall save and keep the *Owner* and the *Place of the Work* free from all construction liens and all other liens whatsoever arising out of the *Work*. If any lien is claimed, filed or registered or any written notice of a lien is received by reason of any *Work* supplied or claimed to have been supplied by or through a *Subcontractor* or *Supplier*, the *Contractor* shall, at its own expense, within ten (10) *Working Days* of being notified of the lien or written notice of a lien, secure the discharge, release, vacating or withdrawal of such lien or written notice of a lien by payment or by giving security or in such other manner as is or may be required or permitted by law, failing which the *Owner* may, but shall not be required, take such steps as it, in its absolute discretion, may deem necessary to release, vacate or discharge the lien or written notice of a lien.

14.2.2 If a lien action is commenced arising out of a lien described in paragraph 14.2.1, the *Contractor* shall take all reasonable steps to remove the *Owner* from such action, and shall indemnify the *Owner* and hold it harmless in such action.

14.2.3 All amounts, including legal costs on a full indemnity basis, disbursements, interest, borrowing, premium or other bonding costs and/or charges incurred by the *Owner* in releasing, vacating, discharging and/or otherwise dealing with a *Subcontractor* or *Supplier* lien, written notice of a lien and/or defending or otherwise dealing with a lien action, shall be charged to the *Contractor* and shall be set off and deducted from any amount owing to the *Contractor*. If there is no amount owing by the *Owner* to the *Contractor* at that time, then the *Contractor* shall reimburse the *Owner* for all amounts incurred by the *Owner*.

GC 14.3 CONTRACTOR LIABILITY FOR DAMAGES

14.3.1 Notwithstanding any other provision in this *Contract*, if the *Owner*, as a result of the *Contractor's* act or omission or breach of this *Contract*, incurs damages, costs, fees or expenses, including costs of additional services performed by the *Consultant* and including legal fees, whether or not such act, omission or breach results in any lien, lien action or other legal proceeding, and whether or not such act, omission or breach results in the *Owner* taking

any of the steps provided for in GC 7.1, all such damages, costs, fees (including legal fees on a full indemnity basis) and expenses shall be charged to the *Contractor* and the *Owner* shall be entitled to set off and deduct all such damages, costs, fees (including legal fees on a full indemnity basis) and expenses from any amount owing to the *Contractor*. If there is no amount owing by the *Owner* to the *Contractor* at that time, then the *Contractor* shall reimburse the *Owner* for all of the said damages, costs, fees and expenses.

GC 14.4 DAILY REPORTS / DAILY LOGS

14.4.1 The *Contractor* shall cause its supervisor, or such competent person as it may delegate, to prepare and maintain a daily site log or diary recording, at least, the following: (a) daily weather conditions and temperatures at the *Place of the Work*, (b) the number of workers of the *Contractor*, *Subcontractors*, *Suppliers* and any other forces at the *Place of the Work*, (c) the *Construction Equipment* at the *Place of the Work*, (d) the descriptions and quantities of *Products* delivered and utilized, and (e) the general nature of *Project* activities. Such log or diary shall also record any extraordinary or emergency events which may occur and also the identities of any persons who visit the *Place of the Work* who are not part of the day-to-day workforce. The *Contractor* shall also take or arrange for the taking of *Project* photographs to record the progress of the *Work*.

14.4.2 The *Contractor* shall maintain, either at its head office or at the *Project* site, records recording labour and material resourcing on the *Project*, including the records identified in paragraph 14.4.1 and other records which document the activities of the *Contractor*.

14.4.3 Upon request of the *Owner* or the *Consultant*, the *Contractor* shall make available for inspection and copying all of the records generated pursuant to this GC 14.4, along with any other routine *Project* records ordinarily maintained by the *Contractor*.

GC 14.5 PUBLIC STATEMENTS

14.5.1 The *Contractor* shall not publish, issue or make any statements or news release, electronic or otherwise, concerning the *Contract*, the *Work*, or the *Project*, and shall not use the *Owner's* name, logo, etc. without the prior express written consent of the *Owner*. For greater certainty, the *Contractor* shall obtain the prior written approval of the *Owner* for any public advertising, written public sales promotions, press release or other general publicity matter, in which the name or logo of the *Owner* is mentioned or used, or in which words are used from which any connection with the *Owner* may be inferred. The *Contractor* will not erect or permit the erection of any sign or advertising without the prior written approval of the *Owner*.

GC 14.6 AMENDMENTS TO THE CONTRACT

14.6.1 Except for the written or e-mail direction referred to in paragraph 6.1.2 of GC 6.1 – OWNER'S RIGHT TO MAKE CHANGES, no alteration or amendment to this *Contract*, no course of conduct or dealing between the parties, and no express or implied acceptance of alterations or amendments to the *Contract* shall be binding unless it is in writing and signed by each party.

14.6.2 No waiver by or on behalf of a party of any breach of a provision of this *Contract* shall be binding upon the party unless it is expressed in writing and duly executed by the party or signed by its fully authorized representative, and such a waiver shall not operate as a waiver of any future breach, whether of a like or different character. No waiver shall be inferred from or implied by the conduct of any party.

GC 14.7 CONTRACT SECURITY

14.7.1 The *Contractor* shall deliver to the *Owner* a performance bond and a labour and material payment bond in the forms specified in the *Act*, each in the amount of fifty per cent (50%) of the *Contract Price*.

14.7.2 Such bonds shall be issued by a duly licensed surety company authorized to transact the business of suretyship in Ontario and shall be maintained in good standing until the fulfillment of the *Contract*. All premiums and other costs of the bonds are included in the *Contract Price*."

END OF SUPPLEMENTARY CONDITIONS

ARCADIS Design & Consultancy for natural and built assets

Simcoe County District School Board

PRE-RENOVATION DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY

Tecumseth Beeton Elementary School
43 Patterson Street, Beeton, Ontario

June 9, 2022

30136735

Paul Smith, B.Sc., IHT

Senior Industrial Hygienist

PRE-RENOVATION DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY

Tecumseth Beeton Elementary School

43 Patterson Street, Beeton, Ontario

Prepared for:

Mr. Nick Laurin

Project Coordinator, Design and Construction Services

Simcoe County District School Board

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Our Ref.:

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Date:

June 9, 2022

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EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by the Simcoe County District School Board to conduct a pre-renovation designated substances and hazardous materials survey in designated areas of Tecumseth Beeton Elementary School located at 43 Patterson Street in Beeton, Ontario. It is our understanding that there is a proposed interior childcare renovation at the school that will affect Rooms 107, 109, 111 and 113. Renovations will include:

- Creating new openings in the exterior walls for doors and windows;
- Removal of existing door frames in the corridors;
- Removal of existing millwork, sink and accessories near the entrance to Room 111;
- Removal of all existing partition walls;
- Removal of all ceiling tiles; and
- Trenching of existing concrete floors to accommodate new sanitary lines.

In addition, the custodial staff relocation will involve renovations in Rooms 120, 125 and 127. The renovations will include:

- Removal of the walls between Rooms 125 and 127 to make one larger room;
- Removal of the plaster ceilings in Rooms 125 and 127; and
- Removal and replacement of the exterior door in Room 127.

Asbestos-containing materials found to be present in the designated study areas was limited to:

- block filler paint applied to walls in Rooms 107, 109, 111, 113, 125 and 127.

Lead was detected at a level above the *Surface Coating Materials Regulations* concentration of 90 mg/kg in the sample of yellow wall paint collected in Room 113 and the sample of beige ceiling paint collected from Room 127. All paint should be assumed to contain lead.

Fluorescent lights were identified in the designated study areas. Mercury should be assumed to be present as a gas in all fluorescent light tubes and in all paint applications, albeit at low levels. No mercury-containing thermostats were observed.

Materials observed in the designated study areas which should be considered to contain silica included drywall, drywall joint compound, plaster, concrete, concrete block walls, brick and mortar.

Fluorescent lights were observed in the study areas during the course of our site investigation. Light ballasts, such as those associated with the type of fluorescent lights (T8s) observed, are usually an electronic-type which do not contain PCBs, however, this would be confirmed by an electrician at the time of dismantling of the lights.

Equipment potentially containing Ozone-Depleting Substances (ODS) in the designated study areas was limited to a refrigerator in Room 107. It is unlikely to be affected by the renovation project.

No readily-evident mould was observed during the course of the site investigation.

No other designated substances (vinyl chloride, acrylonitrile, benzene, isocyanates, arsenic, ethylene oxide and coke oven emissions) were observed to be present in the designated study areas in a form that would represent an exposure concern.

1 INTRODUCTION

Arcadis Canada Inc. (Arcadis) was retained by the Simcoe County District School Board to conduct a pre-renovation designated substances and hazardous materials survey in Tecumseth Beeton Elementary School located at 43 Patterson Street in Beeton, Ontario.

it is our understanding that there is a proposed interior childcare renovation at the school that will affect Rooms 107, 109, 111 and 113. Renovations will include:

- Creating new openings in the exterior walls for doors and windows;
- Removal of existing door frames in the corridors;
- Removal of existing millwork, sink and accessories near the entrance to Room 111;
- Removal of all existing partition walls;
- Removal of all ceiling tiles; and
- Trenching of existing concrete floors to accommodate new sanitary lines.

In addition, the custodial staff relocation will involve renovations in Rooms 120, 125 and 127. The renovations will include:

- Removal of the walls between Rooms 125 and 127 to make one larger room;
- Removal of the plaster ceilings in Rooms 125 and 127; and
- Removal and replacement of the exterior door in Room 127.

The information in this report is to be provided to all bidders on a project in accordance with the requirements of the *Occupational Health and Safety Act*.

The survey was undertaken to report on the presence or suspected presence of readily observable designated substances and hazardous materials.

1.1 Scope of Work

The scope of work for our investigation included:

- review of existing information;
- investigation of readily-accessible areas in the designated study areas for the presence of designated substances and hazardous materials used in building construction materials;
- obtaining representative bulk samples of materials suspected of containing asbestos;
- laboratory analyses of bulk samples for asbestos content;
- laboratory analyses of paint chip samples for lead content; and

- preparation of a report outlining the findings of the investigation.

Mr. Paul Smith of Arcadis visited the site on May 29, 2022 to conduct the designated substances and hazardous materials survey.

2 REGULATORY DISCUSSION AND METHODOLOGY

Ontario Occupational Health and Safety Act (OHSA)

The Ontario *Occupational Health and Safety Act* (OHSA) sets out, in very general terms, the duties of employers and others to protect workers from health and safety hazards on the job. These duties include, but are not limited to:

- taking all reasonable precautions to protect the health and safety of workers [clause 25(2)(h)];
- ensuring that equipment, materials and protective equipment are maintained in good condition [clause 25(1)(b)];
- providing information, instruction and supervision to protect worker health and safety [clause 25(2)(a)]; and
- acquainting a worker or a person in authority over a worker with any hazard in the work and in the handling, storage, use, disposal and transport of any article, device, equipment or a biological, chemical or physical agent [clause 25(2)(d)].

In addition, Section 30 of the OHSA deals with the presence of designated substances on construction projects. Compliance with the OHSA and its regulations requires action to be taken where there is a designated substance hazard on a construction project.

Section 30 of the OHSA requires the owner of a project to determine if designated substances are present on a project and, if so, to inform all potential contractors as part of the bidding process. Contractors who receive this information are to pass it onto other contractors and subcontractors who are bidding for work on the project.

Regulation for Construction Projects, O.Reg. 213/91

The *Regulation for Construction Projects*, O.Reg. 213/91, applies to all construction projects. The following sections of the regulation would apply to situations where there is the potential for workers to be exposed to designated substances:

Section 14	(5)	A competent person shall perform tests and observations necessary for the detection of hazardous conditions on a project.
Section 21	(1)	A worker shall wear such protective clothing and use such personal protective equipment or devices as are necessary to protect the worker against the hazards to which the worker may be exposed.
	(2)	A worker's employer shall require the worker to comply with subsection (1).

(3) A worker required to wear personal protective clothing or use personal protective equipment or devices shall be adequately instructed and trained in the care and use of the clothing, equipment or device before wearing or using it.

Section 30 Workers who handle or use substances likely to endanger their health shall be provided with washing facilities with clean water, soap and individual towels.

Section 46 (1) A project shall be adequately ventilated by natural or mechanical means,

(a) if a worker may be injured by inhaling a noxious...dust or fume;

(2) If it is not practicable to provide natural or mechanical ventilation in the circumstances described in clause (1)(a), respiratory protective equipment suitable for the hazard shall be provided and be used by the workers.

Section 59 If the dissemination of dust is a hazard to a worker, the dust shall be adequately controlled or each worker who may be exposed to the hazard shall be provided with adequate personal protective equipment.

Regulation for Designated Substances (O.Reg. 490/09)

The *Designated Substance Regulation* (O.Reg. 490/09) specifies occupational exposure limits (OELs) for designated substances and requires an assessment and a control program to ensure compliance with these OELs.

Although, O.Reg. 490/09 and the OELs do not apply to an employer on a construction project, or to their workers at the project, employers still have a responsibility to protect the health of their workers and to comply with the OHSA and other applicable regulations. Section 25(2)(h) of the OHSA requires that employers take "every precaution reasonable in the circumstances for the protection of a worker".

Other regulatory requirements (and guidelines) which apply to control of exposure to designated substances and hazardous materials are referenced in the sections below.

2.1 Asbestos

Asbestos has been widely used in buildings, both in friable applications (materials which can be crumbled, pulverized or powdered by hand pressure, when dry) such as pipe and tank insulation, sprayed-on fireproofing and acoustic texture material and in non-friable manufactured products such as floor tile, gaskets, cement board and so on. The use of asbestos in friable applications was curtailed around the mid-1970s and, as such, most buildings constructed prior to about 1975 contain some form of friable construction material with an asbestos content. The use of asbestos in certain non-friable materials continued beyond the mid-1970s.

Control of exposure to asbestos is governed in Ontario by Regulation 278/05 – *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations*. Disposal of asbestos waste

(friable and non-friable materials) is governed by Ontario Regulation 278/05 and by Ontario Regulation 347, *Waste Management – General*. O.Reg. 278/05 classifies asbestos work operations into three types (Type 1, 2 and 3), as shown in Table C-1 in Appendix C, and specifies procedures to be followed in conducting asbestos abatement work.

2.2 Lead

Lead is a heavy metal that can be found in construction materials such as paints, coatings, mortar, concrete, pipes, solder, packings, sheet metal, caulking, glazed ceramic products and cable splices. Lead has been used historically in exterior and interior paints.

The *Surface Coating Materials Regulations* made under the *Hazardous Products Act* (SOR/2005-109) sets a maximum concentration of total lead of 90 mg/kg (0.009 percent or 90 parts per million) for surface coating materials, including paints, effective 21 October 2010. This criterion level applies to the sale and importation of new surface coating materials.

The *National Plumbing Code* allowed lead as an acceptable material for pipes until 1975 and in solder until 1986.

The Ministry of Labour *Guideline, Lead on Construction Projects*, dated April 2011, provides guidance in the measures and procedures that should be followed when handling lead containing materials during construction projects. In the guideline, lead-containing construction operations are classified into three groups - Type 1 (low risk), Type 2 (medium risk) and Type 3 (high risk) based on presumed airborne concentrations of lead, as shown in Appendix C, Table C-2. Any operation that may expose a worker to lead that is not a Type 1, Type 2, or Type 3b operation, is classified as a Type 3a operation.

2.3 Mercury

Mercury has been used in electrical equipment such as alkaline batteries, fluorescent light bulbs (lamps), high intensity discharge (HID) lights (mercury vapour, high pressure sodium and metal halide), “silent switches” and in instruments such as thermometers, manometers and barometers, pressure gauges, float and level switches and flow meters. Mercury-containing lamps, the bulk of which are 1.22 m (four foot) fluorescent lamps contain between 7 and 40 mg of mercury each. Mercury compounds have also been used historically as additives in latex paint to protect the paint from mildew and bacteria during production and storage.

The intentional addition of mercury to Canadian-produced consumer paints for interior use was prohibited in 1991. Mercury may have remained in paints after 1991, however, as a result of impurities in the paint ingredients or cross-contamination due to other manufacturing processes. The *Surface Coating Materials Regulations* made under the *Hazardous Products Act* set a maximum total mercury concentration of 10 mg/kg (0.001 percent) for surface coating materials (including paint). This criterion level applies to the sale and importation of new surface coating materials.

Mercury-containing thermostats and silent light switches are mercury tilt switches which are small tubes with electrical contacts at one end of the tube. A mercury tilt switch is usually present when no switch is visible. Mercury switches often have the word “TOP” stamped on the upper end of the switch, which is visible after removing the cover plate. If mercury switches are to be removed, the entire switch should be removed and placed into a suitable container for storage and disposal.

Waste light tubes generated during renovations or building demolition and waste mercury from equipment must either be recycled or disposed of in accordance with the requirements of Ont. Reg. 347 - *Waste Management, General*.

Waste mercury in amounts less than 5 kg (per month) are exempt from the generator registration requirements prescribed by O.Reg. 347 – *Waste Management – General*. Waste mercury from mercury switches or gauges should, however, be properly collected and shipped to a recycling facility or disposed of as a hazardous waste. Removal of mercury-containing equipment (e.g., switches, gauges, controls, etc.) should be carried out in a manner which prevents spillage and exposure to workers.

2.4 Silica

Silica exists in several forms of which crystalline silica is of most concern with respect to potential worker exposures. Quartz is the most abundant type of crystalline silica. Some commonly used construction materials containing silica include brick, refractory brick, concrete, concrete block, cement, mortar, rock and stone, sand, fill dirt, topsoil and asphalt containing rock or stone.

The Ministry of Labour *Guideline, Silica on Construction Projects*, dated April 2011, provides guidance in controlling exposure to silica dust during construction activities. In the guideline, silica-containing construction operations are classified into three groups - Type 1 (low risk), Type 2 (medium risk) and Type 3 (high risk) based on presumed airborne concentrations of respirable crystalline silica in the form of cristobalite, tridymite, quartz and tripoli as shown in Appendix C, Table C-3.

2.5 Vinyl Chloride

Vinyl chloride vapours may be released from polyvinyl chloride (PVC) products in the event of heating or as a result of decomposition during fire. PVC is used in numerous materials that may be found in building construction, including, for example, piping, conduits, siding, window and door frames, plastics, garden hoses, flooring and wire and cable protection.

2.6 Acrylonitrile

Acrylonitrile is used to produce nitrile-butadiene rubber, acrylonitrile-butadiene-styrene (ABS) polymers and styrene-acrylonitrile (SAN) polymers. Products made with ABS resins which may be found in buildings include telephones, bottles, packaging, refrigerator door liners, plastic pipe, building panels and shower stalls. Acrylonitrile can be released into the air by combustion of products containing ABS.

2.7 Other Designated Substances

Isocyanates are a class of chemicals used in the manufacture of certain types of plastics, foams, coatings and other products. Isocyanate-based building construction materials may include rigid foam products such as foam-core panels and spray-on insulation and paints, coatings, sealants and adhesives. Isocyanates may be inhaled if they are present in the air in the form of a vapour, a mist or a dust.

Benzene is a clear, highly flammable liquid used mainly in the manufacture of other chemicals. The commercial use of benzene as a solvent has practically been eliminated, however it continues to be used as a solvent and reactant in laboratories.

Arsenic is a heavy metal used historically in pesticides and herbicides. The primary use in building construction materials was its use in the wood preservative chromated copper arsenate (CCA). CCA was used to pressure treat lumber since the 1940s. Pressure-treated wood containing CCA is no longer being produced for use in most residential settings.

Ethylene oxide is a colourless gas at room temperature. it has been used primarily for the manufacture of other chemicals, as a fumigant and fungicide and for sterilization of hospital equipment.

Coke oven emissions are airborne contaminants emitted from coke ovens and are not a potential hazard associated with building construction materials.

2.8 Polychlorinated Biphenyls (PCBs)

The management of equipment classified as waste and containing Polychlorinated Biphenyls (PCBs) at concentrations of 50 parts per million (mg/kg) or greater is regulated by Ontario Regulation 362*, Waste Management – PCBs*. Under this regulation, PCB waste is defined as any waste material containing PCBs in concentrations of 50 mg/kg or greater. Any equipment containing PCBs at or greater than this level, such as transformers, switchgear, light ballasts and capacitors, which is removed from service due to age, failure or as a result of decommissioning, is considered to constitute a PCB waste. Although current federal legislation (effective 1 July 1980) has prohibited the manufacture and sale of new equipment containing PCBs since that time, continued operation of equipment supplied prior to this date and containing PCBs is still permitted. Handling, storage and disposition of such equipment is, however, tightly regulated and must be managed in accordance with provincial and federal government requirements as soon as it is taken out of service or becomes unserviceable.

In most institutional, commercial facilities and in smaller industrial facilities, the primary source of equipment potentially containing PCBs is fluorescent and H.I.D. light ballasts. Small transformers may also be present. In larger industrial facilities, larger transformers and switch gear containing, or potentially containing, PCBs may also be present.

PCBs were also commonly added to industrial paints from the 1940s to the late 1970s. PCBs were added directly to the paint mixture to act as a fungicide, to increase durability and flexibility, to improve resistance to fires and to increase moisture resistance. The use of PCBs in new products was banned in Canada in

the 1970s. PCB amended paints were used in specialty industrial/institutional applications prior to the 1970s including government buildings and equipment such as industrial plants, radar sites, ships as well as non-government rail cars, ships, grain bins, automobiles and appliances.

Removal of in-service equipment containing PCBs, such as fluorescent light ballasts, capacitors and transformers, is subject to the requirements of the federal *PCB Regulations* (discussed below).

The *PCB Regulations*, which came into force on 5 September 2008, were made under the *Canadian Environmental Protection Act*, 1999 (CEPA 1999) with the objective of addressing the risks posed by the use, storage and release to the environment of PCBs, and to accelerate their destruction. The *PCB Regulations* set different end-of-use deadlines for equipment containing PCBs at various concentration levels.

The Regulations Amending the PCB Regulations and Repealing the Federal Mobile PCB Treatment and Destruction Regulations were published on 23 April 2014, in the Canada Gazette, Part II, and came into force on 1 January 2015. The most notable part of the amendments is the addition of an end-of-use deadline date of 31 December 2025 for specific electrical equipment located at electrical generation, transmission and distribution facilities.

When the PCB materials are classified as waste, jurisdiction falls under the Ontario Ministry of the Environment and Climate Change (MOECC) and O.Reg. 362. All remedial and PCB management work must be carried out under the terms of a Director's Instruction issued by an MOECC District Office (for quantities of PCB fluid greater than 50 litres). The PCB waste stream, regardless of quantity, must be registered with the MOECC, in accordance with O.Reg. 347, *General - Waste Management*. O.Reg. 362 applies to any equipment containing greater than 1 kg of PCBs.

2.9 Ozone-Depleting Substances (ODS) and Other Halocarbons

Ontario Regulation 463/10 – *Ozone Depleting Substances and Other Halocarbons*, applies to the use, handling and disposal of Class 1 ozone-depleting substances, including various chlorofluorocarbons (CFCs), halons and other halocarbons, Class 2 ozone-depleting substances, including various hydrochlorofluorocarbons (HCFCs) and halocarbons, and other halocarbons, including fluorocarbons (FCs) and hydrofluorocarbons (CFCs). The most significant requirements for handling of ozone-depleting substances (ODS) and other Halocarbons, which include, for example, refrigerants used in refrigeration equipment and chillers, include the following:

- certification is required for all persons testing, repairing, filling or emptying equipment containing ODS and other halocarbons;
- the discharge of a Class 1 ODS or anything that contains a Class 1 ODS to the natural environment or within a building is prohibited;
- the making, use of, selling of or transferring of a Class 1 ODS is restricted to certain conditions;

- the discharge of a solvent or sterilant that contains a Class 2 ODS is prohibited;
- the making, use of, selling of or transferring of a solvent or sterilant that contains a Class 2 ODS is restricted to certain conditions;
- fire extinguishing equipment that contains a halon may be discharged to fight fires, except fires for firefighting training purposes;
- portable fire extinguishing equipment that contains a halon may be used or stored if the extinguisher was sold for use for the first time before 1 January 1996;
- records of the servicing and repair of equipment containing ODS and other halocarbons must be prepared and maintained by the owner of the equipment; and
- equipment no longer containing ODS and other halocarbons must be posted with a notice completed by a certified person.

Ontario Regulation 347, *General – Waste Management*, has also been amended to provide for more strict control of CFCs. The requirements under the amended regulation apply primarily to the keeping of records for the receipt or recycling of CFC waste.

2.10 Mould

Moulds are forms of fungi that are found everywhere both indoors and outdoors all year round. Outdoors, moulds live in the soil, on plants and on dead and decaying matter. More than 1000 different kinds of indoor moulds have been found in buildings. Moulds spread and reproduce by making spores, which are all small and light-weight, able to travel through air, capable of resisting dry, adverse environmental conditions, and hence capable of surviving a long time. Moulds need moisture and nutrients to grow and their growth is stimulated by warm, damp and humid conditions.

Control of exposure to mould is required under Section 25(2)(h) of the Ontario *Occupational Health and Safety Act*, which states that employers shall take every precaution reasonable in the circumstances for the protection of workers. Recommended work practices are outlined in the following documents:

- *Mould Guidelines for the Canadian Construction Industry.* Standard Construction Document CCA 82 2004. Canadian Construction Association.
- *Environmental Abatement Council of Canada (EACC) Mould Abatement Guideline* Edition 3, 2015.

3 RESULTS AND DISCUSSION

3.1 Asbestos

During the course of our site investigation, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL Canada Inc. for asbestos analyses. The results of bulk sample analysis for asbestos content are provided in Table 3.1. The laboratory report is provided in Appendix B. A floor plan showing the locations of the asbestos-containing materials is provided in Appendix A. Floor plans detailing the proposed work, which were provided by the Board, are also provided in Appendix A.

Table 3.1

Summary of Results of Analyses of Bulk Samples for Asbestos Content

Tecumseth Beeton Elementary School

May 29, 2022

Sample No.	Sample Location	Sample Description	Asbestos Content
1-A	Room 111	(12” x 12”) vinyl floor tile and mastic-vinyl portion	None detected None detected (TEM)
1-A	Room 111	(12” x 12”) vinyl floor tile and mastic-mastic	None detected None detected (TEM)
1-B	Room 113	(12” x 12”) vinyl floor tile and mastic-vinyl portion	None detected
1-B	Room 113	(12” x 12”) vinyl floor tile and mastic-mastic	None detected
1-C	Room 120	(12” x 12”) vinyl floor tile and mastic-vinyl portion	None detected
1-C	Room 120	(12” x 12”) vinyl floor tile and mastic-mastic	None detected
2-A	Room 107	(2’ x 4’) ceiling tile	None detected
2-B	Room 120	(2’ x 4’) ceiling tile	None detected
2-C	Room 127	(2’ x 4’) ceiling tile	None detected
3-A	Corridor at Room 107	block mortar	None detected
3-B	Room 107	block mortar	None detected
3-C	Room 127	block mortar	None detected
4-A	Room 120	block mortar	None detected
4-B	Room 120	block mortar	None detected
4-C	Room 120	block mortar	None detected
5-A	Room 127	smooth ceiling plaster-skim coat	None detected
5-A	Room 127	smooth ceiling plaster-rough coat	None detected

Sample No.	Sample Location	Sample Description	Asbestos Content
5-B	Room 127	smooth ceiling plaster-skim coat	None detected
5-B	Room 127	smooth ceiling plaster-rough coat	None detected
5-C	Room 127	smooth ceiling plaster-skim coat	None detected
5-C	Room 127	smooth ceiling plaster-rough coat	None detected
5-C	Room 127	smooth ceiling plaster-insulation	None detected
6-A	Corridor at Room 107	yellow block filler paint	None detected
6-B	Room 107	yellow block filler paint	<1% chrysotile 0.41% chrysotile (PLM Grav. Reduction) (1)
6-C	Room 127	yellow block filler paint	<1% chrysotile 0.41% chrysotile (PLM Grav. Reduction) (1)
6-D	Room 120	yellow block filler paint	None detected
6-E	Corridor at Room 120	yellow block filler paint	None detected
7-A	Room 109	interior grey window caulking	None detected None detected (TEM)
7-B	Room 109	interior grey window caulking	None detected
7-C	Room 113	interior grey window caulking	None detected
8-A	Exterior	exterior grey window caulking	None detected None detected (TEM)
8-A	Exterior	exterior grey window caulking-foam	None detected
8-B	Exterior	exterior grey window caulking	None detected
8-C	Exterior	exterior grey window caulking	None detected
9-A	Exterior	exterior brick mortar	None detected
9-B	Exterior	exterior brick mortar	None detected
9-C	Exterior	exterior brick mortar	None detected
3A-JC-Corr 1	Corridor 1	drywall joint compound	None detected (2)
3A-JC-Corr 1	Corridor 1	drywall joint compound	None detected (2)
3A-JC-Corr 1	Corridor 1	drywall joint compound	None detected (2)

NOTES:

Bulk samples were analyzed by Polarized Light Microscopy (PLM) analysis, except where "TEM" is noted, in which case Transmission Electron Microscopy analysis was also performed.

< = Less than.

(1) Asbestos-containing material is defined as a material that contains 0.5% or more asbestos by dry weight.

(2) Sample result obtained from Arcadis (DCS) report entitled *"Survey of Asbestos-Containing Materials – Tecumseth Beeton Central Public School"*, dated July 2007.

Based on visual observations and results of laboratory analyses of samples collected by Arcadis and Decommissioning Consulting Services, the following asbestos-containing materials were observed in the designated study areas:

- block filler paint applied to walls in Rooms 107, 109, 111, 113, 125 and 127 (and adjacent corridors in the 1967 original building).

Although asbestos was detected at a level of 0.41% chrysotile in the samples of block filler paint collected from Rooms 107 and 127, it is recommended that this material be treated and handled as an asbestos-containing material.

The block filler paint is a non-friable material. The removal, alteration and/or disturbance of this non-friable asbestos-containing material can be performed as a Type 1 operation as specified in O. Reg. 278/05 if the material is wetted and the work is done only using non-powered, hand-held tools (see Table B-1 in Appendix B). If the removal, alteration and/or disturbance work is done using power tools that are attached to dust-collecting devices equipped with HEPA filters, then the work is classified as Type 2. If the power tools do not have HEPA filtered dust collecting devices, then the work is Type 3.

Asbestos may be present in materials which were not sampled during the course of the designated substances survey carried out by Arcadis, including, but not limited to, components of electrical equipment, for example, electric wiring insulation, non-metallic sheathed cable. Asbestos may also be present in locations that are presently inaccessible (e.g., behind walls). Asbestos may also be present in the form of vermiculite insulation in cavities in concrete or cement block walls (used as in-fill insulation), although none was detected in any of the test locations. Confirmatory testing of any such materials could be undertaken as the need arises (i.e., at the time of renovations) or the materials can be assumed to contain asbestos based on findings in adjacent areas.

If any materials which may contain asbestos and which were not tested during the course of the designated substances and hazardous materials survey are discovered during any construction activities, the work shall not proceed until such time as the required notifications have been made and an appropriate course of action is determined.

3.2 Lead

Two samples of paint were collected by Arcadis during the course of the survey. The samples were submitted to EMSL for analysis of lead content. The results of the analyses are presented in Table 4.2, and the laboratory report is provided in Appendix B.

Table 3.2

Summary of Results of Analyses of Paint Samples for Lead Content

Tecumseth Beeton Elementary School

May 29, 2022

Sample No.	Sample Location	Sample description	Lead Content (mg/kg)
P-1	Room 113	yellow wall paint	**680**
P-2	Room 127	beige ceiling paint on plaster	**700**

NOTES:

mg/kg = milligrams lead per kilogram paint.

1 mg/kg = 1 part per million (ppm).

Lead was detected at a level above the *Surface Coating Materials Regulations* concentration of 90 mg/kg in the sample of yellow wall paint collected in Room 113 and the sample of beige ceiling paint collected from Room 127. All paint should be assumed to contain lead. Information on the classification of work involving lead is provided in Appendix C, Table C-2.

3.3 Mercury

Fluorescent lights were identified in the designated study areas. Mercury should be assumed to be present as a gas in all fluorescent light tubes and in all paint applications, albeit at low levels. No mercury-containing thermostats were observed.

3.4 Silica

Materials observed in the designated study areas which should be considered to contain silica included drywall, drywall joint compound, plaster, concrete, concrete block walls, brick and mortar.

The Ministry of Labour *Guideline, Silica on Construction Projects*, April 2011, provides guidance in controlling exposure to silica dust during construction activities. In the guideline, silica-containing construction operations are classified into three groups - Type 1 (low risk), Type 2 (medium risk) and Type 3 (high risk) based on presumed airborne concentrations of silica, as shown in Appendix C, Table C-3.

Additional precautionary measures should also be implemented for certain types of materials (e.g., concrete block, plaster, etc.). For minor disturbances such as drilling, a HEPA-filtered attachment should be used. For removal of more than a minor amount of material, enclosures should be constructed for dust control and separation of the work area from adjacent areas.

3.5 Vinyl Chloride

As mentioned in Section 2.5 above, vinyl chloride would only be a potential exposure concern in the event of combustion of PVC products.

3.6 Acrylonitrile

As mentioned in Section 2.6 above, acrylonitrile would only be a potential exposure concern in the event of combustion of ABS products.

3.7 Other Designated Substances

No other designated substances (benzene, isocyanates, arsenic, ethylene oxide and coke oven emissions) were observed to be present in the designated study areas, and none would be expected to be encountered in any building materials in a form that would represent an exposure concern. Arsenic may be present at low levels in paint applications. The measures and procedures outlined in the MOL *Guideline, Silica on Construction Projects* for control of potential exposure to silica in cement block walls, parging, and mortar during construction activities will also serve to control potential exposure to any arsenic (or mercury) in paint.

3.8 Polychlorinated Biphenyls (PCBs)

Fluorescent lights were observed in the study areas during the course of our site investigation. Light ballasts, such as those associated with the type of fluorescent lights (T8s) observed, are usually an electronic-type which do not contain PCBs, however, this would be confirmed by an electrician at the time of dismantling of the lights.

3.9 Ozone-Depleting Substances (ODS) and Other Halocarbons

Equipment potentially containing Ozone-Depleting Substances (ODS) in the designated study areas was limited to a refrigerator in Room 107. It is unlikely to be affected by the renovation project.

3.10 Mould

No readily evident mould was observed during the course of the site investigation.

The inspection of mould was limited to visual observations of readily-accessible surfaces and did not include intrusive inspections. During renovations, any mould-impacted materials uncovered/discovered should be remediated following the measures and procedures outlined in the *Canadian Construction Association Standard Construction Document CCA-82 2004 - Mould Guidelines for the Canadian Construction Industry* and the *Environmental Abatement Council of Canada (EACC) Mould Abatement Guideline* Edition 3, 2015.

4 LIMITATIONS AND SERVICE CONSTRAINTS

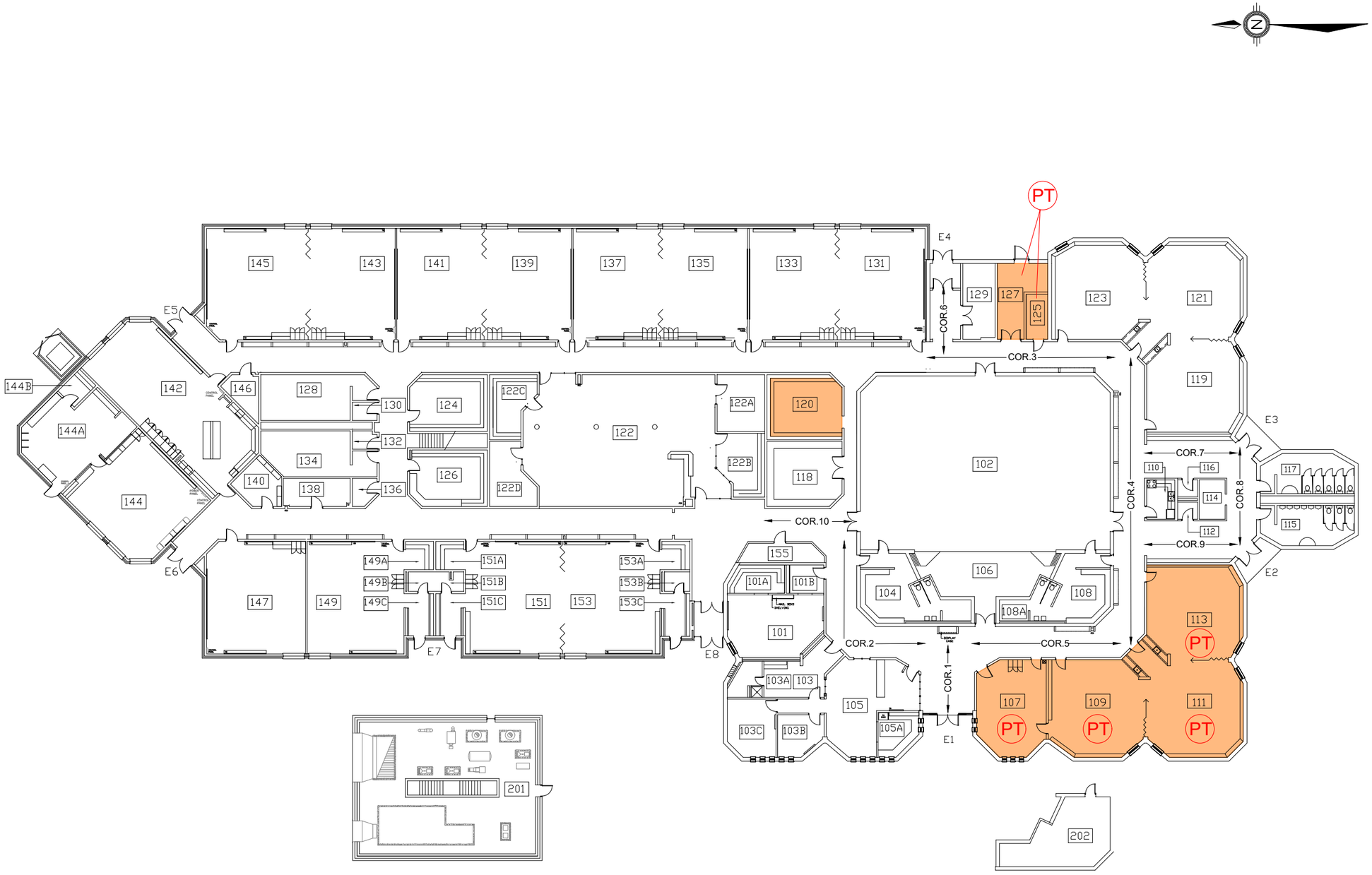
The opinions, conclusions and recommendations presented in this report are limited to the information obtained during the performance of the specific scope of service identified in the report. To the extent that Arcadis relied upon any information prepared by other parties not under direct contract to Arcadis, no representation as to the accuracy or completeness of such information is made. This report is an instrument of professional service and the services described in the report were performed in accordance with generally accepted standards and level of skill and care ordinarily exercised by members of the profession working under similar conditions including comparable budgetary and schedule constraints. No warranty, guarantee or certification express or implied, is intended or given with respect to Arcadis' services, opinions, conclusions or recommendations.

Arcadis' observations, the results of any testing and Arcadis' opinions, conclusions and recommendations apply solely to conditions existing at the specific times when and specific locations where Arcadis' investigative work was performed. Arcadis affirms that data gathered and presented in this report was collected in an appropriate manner in accordance with generally accepted methods and practices. Arcadis cannot be responsible for decisions made by our client solely on the basis of economic factors. Observation and testing activities such as those conducted by Arcadis are inherently limited and do not represent a conclusive or complete characterization. Arcadis analyzed only the substances, conditions and locations described in the report at the time indicated. Conditions in other parts of the project site, building or area may vary from conditions at the specific locations where observations were made and where testing was performed by Arcadis. Additionally, other building material hazards which were not identified by Arcadis, may also be present in un-accessed areas and in walls, ceilings, cavities, and floors.

This report is expressly for the sole and exclusive use of the Simcoe County District School Board for whom this report was originally prepared and for the particular purpose outlined in the report. Reuse of this report or any portion thereof for other than its intended purpose, or if modified, or if used by third parties, shall be at the user's sole risk. This report must be presented in its entirety.

APPENDIX A

Floor Plans



LEGEND:

101	FUNCTIONAL SPACE
◯	THROUGHOUT FUNCTIONAL SPACE
PT	ASBESTOS PAINT
▭	DESIGNATED STUDY AREAS

ARCADIS

SIMCOE COUNTY DISTRICT SCHOOL BOARD

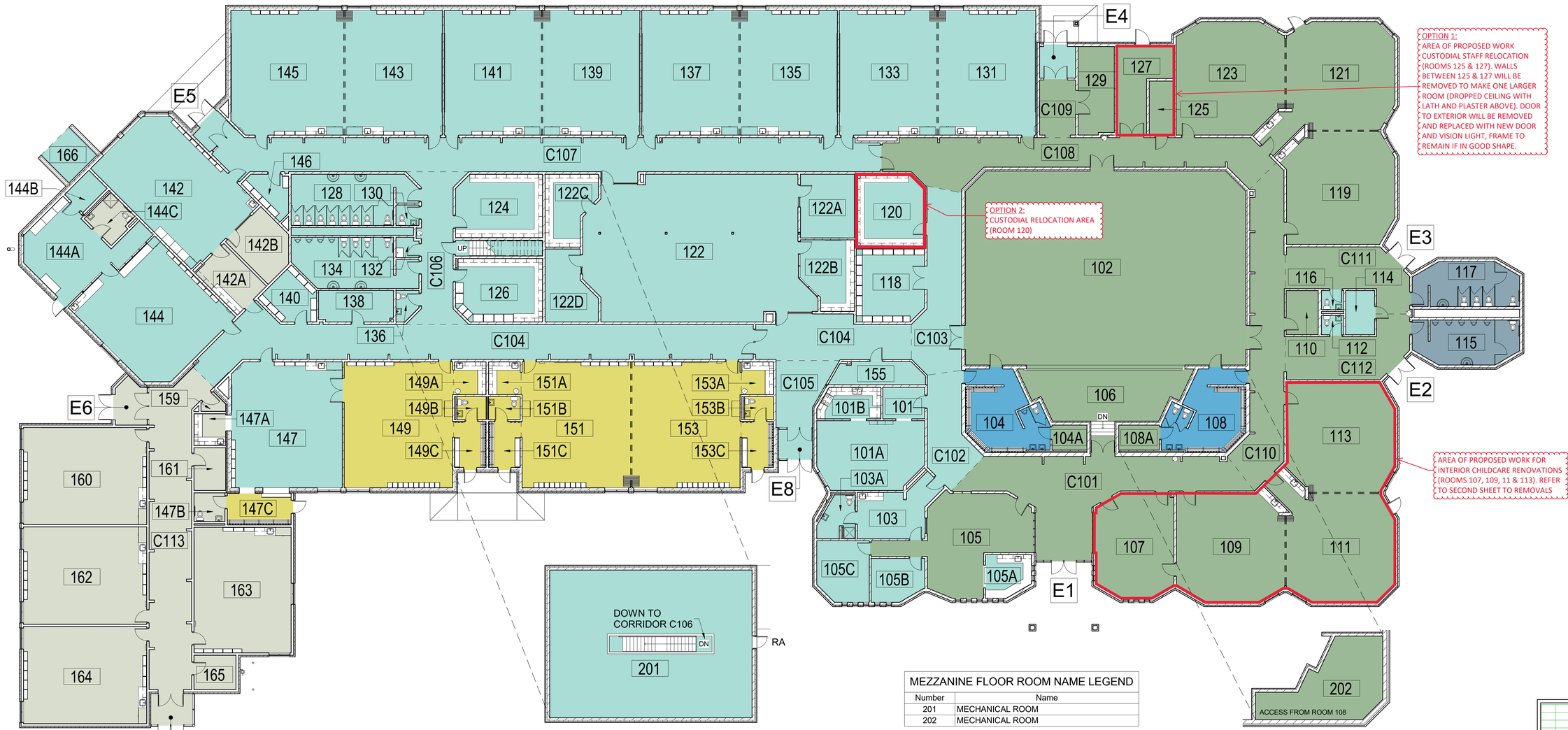
LOCATIONS OF ASBESTOS-CONTAINING MATERIALS

TECUMSETH BEETON ELEMENTARY SCHOOL
43 PATTERSON STREET, BEETON, ONTARIO

GROUND FLOOR PLAN

Drawn By:	I.S.Z.	Approved By:	P.S.	Project No:	30136735
Date:	JUNE 2022	Scale:	N.T.S	Drawing No:	30136735-1

Jun 08, 2022 - 11:24am - USER izba
G:\CADD\SCDSB\DSS\dwg\30136735 Tecumseth Beeton E.S.dwg



1 A2C FIRST FLOOR PLAN
N.T.S.

2 A2C MEZZANINE 201 FLOOR PLAN
N.T.S.

3 A2C MEZZANINE 202 FLOOR PLAN
N.T.S.

MEZZANINE FLOOR ROOM NAME LEGEND	
Number	Name
201	MECHANICAL ROOM
202	MECHANICAL ROOM

FIRST FLOOR ROOM NAME LEGEND	
Number	Name
101	COAT ROOM
101A	STAFF ROOM
101B	KITCHEN
102	GYMNASIUM
103	HEALTH ROOM
103A	SPECIAL NEEDS WASHROOM WITH SHOWER
104	BOYS' CHANGE ROOM
104A	ACADEMIC STORAGE ROOM
105	GENERAL OFFICE
105A	STAFF WORKROOM
105B	VP'S OFFICE
105C	PRINCIPAL'S OFFICE
106	PERMANENT STAGE
107	CUSTODIAL OFFICE
108	GIRLS' CHANGE ROOM
108A	CUSTODIAL STORAGE/SLOP ROOM
109	CLASSROOM
110	KITCHEN
111	CLASSROOM
112	WASHROOM
113	CLASSROOM
114	MECHANICAL ROOM
115	BOYS' WASHROOM
116	WASHROOM

FIRST FLOOR ROOM NAME LEGEND	
Number	Name
117	GIRLS' WASHROOM
118	GYM STORAGE ROOM
119	CLASSROOM
120	STAFF WORKROOM
121	CLASSROOM
122	LIBRARY
122A	LIBRARY WORK ROOM
122B	LIBRARY OFFICE
122C	BOOK ROOM
122D	LIBRARY SEMINAR ROOM
123	CLASSROOM
124	MISC. OFFICE
125	CUSTODIAL STORAGE
126	ACADEMIC STORAGE ROOM
127	PROGRAM RELATED STORAGE
128	GIRLS' WASHROOM
129	ELECTRICAL ROOM
130	WASHROOM
131	CLASSROOM
132	SLOP ROOM
133	CLASSROOM
134	BOYS' WASHROOM
135	CLASSROOM
136	WASHROOM

FIRST FLOOR ROOM NAME LEGEND	
Number	Name
137	CLASSROOM
138	SPRINKLER ROOM
139	CLASSROOM
140	ACADEMIC STORAGE ROOM
141	CLASSROOM
142	LEARNING CENTRE
142A	PROGRAM RELATED STORAGE
142B	BREAKOUT ROOM
143	CLASSROOM
144	LEARNING CENTRE
144A	SENSORY ROOM
144B	CALMING ROOM
144C	SPECIAL NEEDS WASHROOM WITH SHOWER
145	CLASSROOM
146	CUSTODIAL STORAGE
147	CLASSROOM
147A	PROGRAM RELATED STORAGE
147B	WASHROOM
147C	COAT ROOM
149	KINDERGARTEN
149A	PROGRAM RELATED STORAGE
149B	WASHROOM
149C	COAT ROOM
151	KINDERGARTEN

FIRST FLOOR ROOM NAME LEGEND	
Number	Name
151A	PROGRAM RELATED STORAGE
151B	WASHROOM
151C	COAT ROOM
153	KINDERGARTEN
153A	PROGRAM RELATED STORAGE
153B	WASHROOM
153C	COAT ROOM
155	MECHANICAL ROOM
159	PROGRAM RELATED STORAGE
160	CLASSROOM
161	PROGRAM RELATED STORAGE
162	CLASSROOM
163	CLASSROOM
164	CLASSROOM
165	MECHANICAL ROOM
166	OUTDOOR EQUIPMENT STORAGE ROOM

CONSTRUCTION BY YEAR LEGEND

- 1968 ORIGINAL
- 1994 ADDITION
- 2010 ADDITION
- 2013 FDK RENOVATION
- 2020 BATHROOM RENOVATION
- 2021 INTERIOR AND MECHANICAL UPGRADES

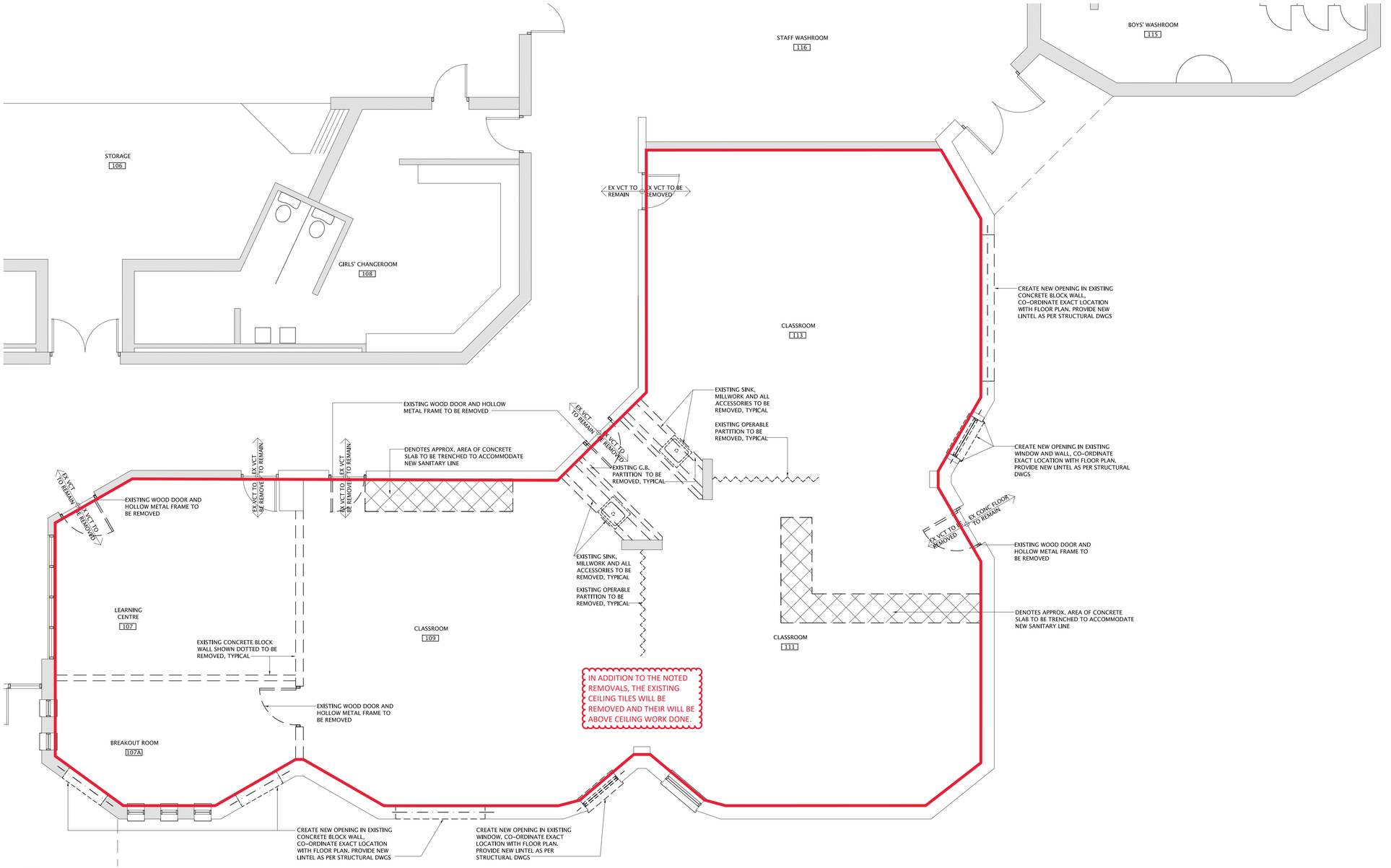
Revision Schedule			
6	06/18/2021	INTERIOR AND MECHANICAL UPGRADES	FORMWORKS INC
5	10/16/2020	BATHROOM RENOVATION	TATHAM ENGINEERING
4	2013	FDK RENOVATION	S.C.D.S.B.
3	2010	ADDITION	FORMWORKS INC
2	1994	ADDITION	W.M. SALTER
1	1968	ORIGINAL	SALTER & ALLISON

PROJECT TITLE:
TECUMSETH BEETON
ELEMENTARY SCHOOL
43 PATTERSON ST. BEETON ON L0G 1A0

DRAWING TITLE:
FIRST FLOOR CONSTRUCTION BY YEAR PLAN

Simcoe County District School Board
Your Future... Our Priority

DRAWN BY: M.J.B./N.L.	REVIEWED BY: S.P.	SCALE: N.T.S.
APPROVED BY: S.C.D.S.B.	COMMISSIONED: 1968	DATE: 01/20/2017
		DWG: A2C



1 A-2.1 DEMOLITION FLOOR PLAN
SCALE: 1:50

LEGEND:

INDICATES EXISTING PARTITION TO REMAIN.

INDICATES EXISTING PARTITION TO BE REMOVED.

DEMOLITION NOTES:

1. REMOVE ALL EXISTING PARTITIONS, SCREENS, DOORS, ETC. SHOWN DOTTED, TYPICAL.
2. DEMOLITION PLAN IS TO BE READ IN CONJUNCTION WITH EXISTING PHOTOGRAPHS LOCATED ON SHEET A-X.
3. ALL MATERIAL NOT DESIGNATED FOR SALVAGE OR RE-USE TO BE DISPOSED OF OFF SITE BY CONTRACTOR.
4. ALL MATERIALS DESIGNATED FOR SALVAGE TO BE STORED BY CONTRACTOR IN A LOCATION ON SITE AS SPECIFIED BY CLIENT.
5. PROVIDE NEW LINTELS FOR ALL NEW OPENINGS AS PER STRUCTURAL DWGS.
6. REMOVE ALL FLOOR MOUNTED DOOR STOPS AT LOCATIONS WHERE DOORS ARE TO BE REMOVED.

No.	Revisions	Date
1	ISSUED FOR REVIEW	29/APR/22

Orientation

PROJECT NORTH

Seal

The Contractor shall check and verify all dimensions and report all errors and omission to the Architect for written direction before proceeding with the work.

A Detail No.
B Sheet No. where detailed

Formworks, Inc. Architects
63 Collier Street Barrie, Ontario L4M 1G7
ph: 705.737.3365 fx: 705.739.1107
www.formworkstudio.ca

Simcoe County District School Board
1170 Highway 26t
Midhurst, Ontario
L0L 1X0
Phone: (705) 728-7570
Fax: (705) 728-2265
www.scdsb.on.ca

Project
TECUMSETH BEETON ELEMENTARY SCHOOL DAYCARE

43 Patterson Street North
Beeton, Ontario

Drawing Title
DEMOLITION FLOOR PLAN

Scale	1:50
Drawn by	DL
Checked by	KC
Approved by	AC
Project No.	XXXXX

Drawing No.
A-2.1

APPENDIX B

Laboratory Reports

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 552208338
Customer ID: 55DCSL97
Customer PO: 30136735
Project ID:

Attn: Paul Smith
ARCADIS Canada Inc.
121 Granton Drive
Unit 12
Richmond Hill, ON L4B 3N4

Proj: Tecumseth Beeton ES

Phone: (905) 882-5984
Fax: (905) 882-8962
Collected:
Received: 5/30/2022
Analyzed: 6/06/2022

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: 1-A-Floor Tile ***Lab Sample ID:*** **552208338-0001**

Sample Description: Room 111/(12" x 12") vinyl floor tile and mastic

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	6/03/2022	Beige	0.0%	100%	None Detected	
TEM Grav. Reduction	6/03/2022	Beige	0.0%	100.0%	None Detected	

Client Sample ID: 1-A-Mastic ***Lab Sample ID:*** **552208338-0001A**

Sample Description: Room 111/(12" x 12") vinyl floor tile and mastic

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	6/03/2022	Black	0.0%	100%	None Detected	
TEM Grav. Reduction	6/03/2022	Black	0.0%	100.0%	None Detected	

Client Sample ID: 1-B-Floor Tile ***Lab Sample ID:*** **552208338-0002**

Sample Description: Room 113/(12" x 12") vinyl floor tile and mastic

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Beige	0.0%	100.0%	None Detected	

Client Sample ID: 1-B-Mastic ***Lab Sample ID:*** **552208338-0002A**

Sample Description: Room 113/(12" x 12") vinyl floor tile and mastic

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Black/Yellow	0.0%	100.0%	None Detected	

Client Sample ID: 1-C-Floor Tile ***Lab Sample ID:*** **552208338-0003**

Sample Description: Room 120/(12" x 12") vinyl floor tile and mastic

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Beige	0.0%	100.0%	None Detected	

Client Sample ID: 1-C-Mastic ***Lab Sample ID:*** **552208338-0003A**

Sample Description: Room 120/(12" x 12") vinyl floor tile and mastic

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Black	0.0%	100.0%	None Detected	

Client Sample ID: 2-A ***Lab Sample ID:*** **552208338-0004**

Sample Description: Room 105/(2' x 4') ceiling tile

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	80.0%	20.0%	None Detected	

EMSL Canada Inc.

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EMSL Canada Order 552208338
Customer ID: 55DCSL97
Customer PO: 30136735
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: 2-B **Lab Sample ID:** **552208338-0005**
Sample Description: Room 120/(2' x 4') ceiling tile

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	80.0%	20.0%	None Detected	

Client Sample ID: 2-C **Lab Sample ID:** **552208338-0006**
Sample Description: Room 127/(2' x 4') ceiling tile

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	80.0%	20.0%	None Detected	

Client Sample ID: 3-A **Lab Sample ID:** **552208338-0007**
Sample Description: Corridor at Room 107/block mortar

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 3-B **Lab Sample ID:** **552208338-0008**
Sample Description: Room 107/block mortar

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 3-C **Lab Sample ID:** **552208338-0009**
Sample Description: Room 127/block mortar

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 4-A **Lab Sample ID:** **552208338-0010**
Sample Description: Room 120/block mortar

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 4-B **Lab Sample ID:** **552208338-0011**
Sample Description: Room 120/block mortar

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 4-C **Lab Sample ID:** **552208338-0012**
Sample Description: Room 120/block mortar

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

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http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 552208338
Customer ID: 55DCSL97
Customer PO: 30136735
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: 5-A-Skim Coat ***Lab Sample ID:*** **552208338-0013**
Sample Description: Room 127/smooth ceiling plaster

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	White	0.0%	100.0%	None Detected	

Client Sample ID: 5-A-Rough Coat ***Lab Sample ID:*** **552208338-0013A**
Sample Description: Room 127/smooth ceiling plaster

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 5-B-Skim Coat ***Lab Sample ID:*** **552208338-0014**
Sample Description: Room 127/smooth ceiling plaster

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	White	0.0%	100.0%	None Detected	

Client Sample ID: 5-B-Rough Coat ***Lab Sample ID:*** **552208338-0014A**
Sample Description: Room 127/smooth ceiling plaster

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 5-C-Skim Coat ***Lab Sample ID:*** **552208338-0015**
Sample Description: Room 127/smooth ceiling plaster

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	White	0.0%	100.0%	None Detected	

Client Sample ID: 5-C-Rough Coat ***Lab Sample ID:*** **552208338-0015A**
Sample Description: Room 127/smooth ceiling plaster

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 5-C-Insulation ***Lab Sample ID:*** **552208338-0015B**
Sample Description: Room 127/smooth ceiling plaster

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	80.0%	20.0%	None Detected	

Client Sample ID: 6-A ***Lab Sample ID:*** **552208338-0016**
Sample Description: Corridor at Room 107/yellow block filler paint

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	White/Yellow	0.0%	100.0%	None Detected	

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http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 552208338
Customer ID: 55DCSL97
Customer PO: 30136735
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: 6-B **Lab Sample ID:** **552208338-0017**

Sample Description: Room 107/yellow block filler paint

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	White/Yellow	0.0%	100.0%	**<1% Chrysotile**	
PLM Grav. Reduction	6/06/2022	White/Yellow	0.0%	99.6%	**0.41% Chrysotile**	

Client Sample ID: 6-C **Lab Sample ID:** **552208338-0018**

Sample Description: Room 127/yellow block filler paint

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	White/Yellow	0.0%	100.0%	**<1% Chrysotile**	
PLM Grav. Reduction	6/06/2022	White/Yellow	0.0%	99.6%	**0.41% Chrysotile**	

Client Sample ID: 6-D **Lab Sample ID:** **552208338-0019**

Sample Description: Room 120/yellow block filler paint

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	White/Yellow	0.0%	100.0%	None Detected	

Client Sample ID: 6-E **Lab Sample ID:** **552208338-0020**

Sample Description: Corridor at Room 120/yellow block filler paint

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	White/Yellow	0.0%	100.0%	None Detected	

Client Sample ID: 7-A **Lab Sample ID:** **552208338-0021**

Sample Description: Room 109/interior grey window caulking

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	6/03/2022	Gray	0.0%	100%	None Detected	
TEM Grav. Reduction	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 7-B **Lab Sample ID:** **552208338-0022**

Sample Description: Room 109/interior grey window caulking

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 7-C **Lab Sample ID:** **552208338-0023**

Sample Description: Room 113/interior grey window caulking

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

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EMSL Canada Order 552208338
Customer ID: 55DCSL97
Customer PO: 30136735
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: 8-A-Caulk ***Lab Sample ID:*** **552208338-0024**

Sample Description: Exterior/exterior grey window caulking

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	6/03/2022	Gray	0.0%	100%	None Detected	
TEM Grav. Reduction	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 8-A-Foam ***Lab Sample ID:*** **552208338-0024A**

Sample Description: Exterior/exterior grey window caulking

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	White/Yellow	0.0%	100.0%	None Detected	

Client Sample ID: 8-B ***Lab Sample ID:*** **552208338-0025**

Sample Description: Exterior/exterior grey window caulking

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 8-C ***Lab Sample ID:*** **552208338-0026**

Sample Description: Exterior/exterior grey window caulking

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 9-A ***Lab Sample ID:*** **552208338-0027**

Sample Description: Exterior/exterior brick mortar

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 9-B ***Lab Sample ID:*** **552208338-0028**

Sample Description: Exterior/exterior brick mortar

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

Client Sample ID: 9-C ***Lab Sample ID:*** **552208338-0029**

Sample Description: Exterior/exterior brick mortar

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	6/03/2022	Gray	0.0%	100.0%	None Detected	

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
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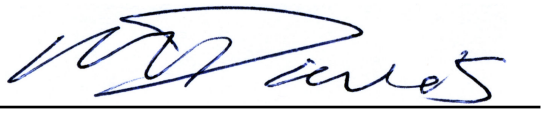
EMSL Canada Order 552208338
Customer ID: 55DCSL97
Customer PO: 30136735
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Analyst(s):

Anne Balayboa	PLM (23)
Delaney Breen	PLM Grav. Reduction (2)
Elizabeth Mierzynski	PLM (10)
Sandy Burany, Ph.D	TEM Grav. Reduction (4)
Vanessa Gallego	PLM Grav. Reduction (4)

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 report 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. Estimation of uncertainty available upon request. This report is a summary of multiple methods of analysis, fully compliant reports are available upon request. A combination of PLM and TEM analysis may be necessary to ensure consistently reliable detection of asbestos. This report must not be used to claim product endorsement by NVLAP of any agency or the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Report amended: 06/06/202210:30:41 Replaces initial report from: 06/06/202210:30:41 Reason Code: Client-Additional Analysis

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http://www.EMSL.com torontolab@emsl.com

EMSL Canada Or	552208456
CustomerID:	55DCSL97
CustomerPO:	Tecumseth
ProjectID:	

Attn: **Paul Smith**
ARCADIS Canada Inc.
121 Granton Drive
Unit 12
Richmond Hill, ON L4B 3N4

Phone:	(905) 882-5984
Fax:	(905) 882-8962
Received:	5/30/2022 02:42 PM
Collected:	

Project: **Tecumseth Beeton ES**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client SampleDescription	*Collected*	*Analyzed*	*Weight*	*RDL*	*Lead Concentration*
P - 1		5/31/2022	0.2500 g	80 ppm	680 ppm
552208456-0001	Site: 113 - Yellow Wall Paint				
P - 2		5/31/2022	0.2530 g	80 ppm	700 ppm
552208456-0002	Site: 127 - Beige Ceiling Paint on Plaster				

Rowena Fanto, Lead Supervisor
or other approved signatory

Initial report from 06/06/2022 09:21:49

APPENDIX C

Summary of Asbestos, Lead and Silica Work Classifications

TABLE C-1
SUMMARY OF CLASSIFICATION OF TYPE 1, 2 AND 3 OPERATIONS (Ont. Reg. 278/05)

TYPE 1 OPERATIONS

- removing less than 7.5 m^2 asbestos-containing ceiling tiles;
- removing non-friable asbestos-containing material other than ceiling tiles, if the material is removed without being broken, cut, drilled, abraded, ground, sanded or vibrated;
- breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if the material is wetted and the work is done only using non-powered, hand-held tools; and
- removing less than 1 m^2 of drywall in which asbestos-containing joint compounds have been used.

TYPE 2 OPERATIONS

- removing all or part of a false ceiling to obtain access to a work area, if asbestos-containing material is likely to be lying on the surface of the false ceiling;
- removal of one square metre or less of friable asbestos-containing material;
- enclosing friable asbestos-containing material;
- applying tape or a sealant or other covering to asbestos-containing pipe or boiler insulation;
- removing 7.5 m^2 or more asbestos-containing ceiling tiles (if removed without being broken, cut, drilled, abraded, ground, sanded or vibrated);
- breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if the material is not wetted and the work is done only using non-powered, hand-held tools;
- removal of one square metre or more of drywall in which asbestos-containing joint compounds have been used;
- breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if the work is done using power tools that are attached to dust-collecting devices equipped with HEPA filters;
- cleaning or removing filters used in air-handling equipment in a building that has asbestos-containing sprayed fireproofing.

TABLE C-1 (Continued)
SUMMARY OF CLASSIFICATION OF TYPE 1, 2 AND 3 OPERATIONS (Ont. Reg. 278/05)

TYPE 3 OPERATIONS

- removal of more than one square metre of friable asbestos-containing material;
- spray application of a sealant to friable asbestos-containing material;
- cleaning or removing air-handling equipment, including rigid ducting but not including filters, in a building that has sprayed asbestos-containing fireproofing;
- repairing or demolishing a kiln, metallurgical furnace or similar structure that is made in part of asbestos-containing refractory materials;
- breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing materials, if the work is done using power tools that are not attached to dust-collecting devices equipped with HEPA filters.

TABLE C-2
SUMMARY OF CLASSIFICATION OF LEAD-CONTAINING CONSTRUCTION TASKS
MOL GUIDELINE – LEAD ON CONSTRUCTION PROJECTS, APRIL 2011

Type 1 Operations	Type 2 Operations		Type 3 Operations	
	Type 2a	Type 2b	Type 3a	Type 3b
<0.05 mg/m^3	>0.05 to 0.50 mg/m^3	>0.50 to 1.25 mg/m^3	>1.25 to 2.50 mg/m^3	>2.50 mg/m^3

Note: The classification of Type 1, 2 and 3 operations is based on presumed airborne concentrations of lead, as shown above.

TYPE 1 OPERATIONS

- application of lead-containing coatings with a brush or roller;
- removal of lead-containing coatings with a chemical gel or paste and fibrous laminated cloth wrap;
- removal of lead-containing coatings or materials using a power tool that has an effective dust collection system equipped with a HEPA filter;
- installation or removal of lead-containing sheet metal;
- installation or removal of lead-containing packing, babbit or similar material;
- removal of lead-containing coatings or materials using non-powered hand tools, other than manual scraping or sanding;
- soldering.

TYPE 2 OPERATIONS

Type 2a Operations

- welding or high temperature cutting of lead-containing coatings or materials outdoors. This operation is considered a Type 2a operation only if it is short-term, not repeated, and if the material has been stripped prior to welding or high temperature cutting. Otherwise, it will be considered a Type 3a operation;
- removal of lead-containing coatings or materials by scraping or sanding using non-powered hand tools;
- manual demolition of lead-painted plaster walls or building components by striking a wall with a sledgehammer or similar tool.

Type 2b Operations

- spray application of lead-containing coatings.

TABLE C-2 (Continued)
SUMMARY OF CLASSIFICATION OF LEAD-CONTAINING CONSTRUCTION TASKS
MOL GUIDELINE – LEAD ON CONSTRUCTION PROJECTS, APRIL 2011

TYPE 3 OPERATIONS

Type 3a Operations

- welding or high temperature cutting of lead-containing coatings or materials indoors or in a confined space;
- burning of a surface containing lead;
- dry removal of lead-containing mortar using an electric or pneumatic cutting device;
- removal of lead-containing coatings or materials using power tools without an effective dust collection system equipped with a HEPA filter;
- removal or repair of a ventilation system used for controlling lead exposure;
- demolition or cleanup of a facility where lead-containing products were manufactured;
- an operation that may expose a worker to lead dust, fume or mist that is not a Type 1, Type 2, or Type 3b operation

Type 3b Operations

- abrasive blasting of lead-containing coatings or materials;
- removal of lead-containing dust using an air mist extraction system.

TABLE C-3
SUMMARY OF CLASSIFICATION OF SILICA-CONTAINING CONSTRUCTION TASKS
MOL GUIDELINE, SILICA ON CONSTRUCTION PROJECTS, APRIL 2011

	Type 1 Operations	Type 2 Operations	Type 3 Operations
Cristobalite and Tridymite	>0.05 to 0.50 mg/m^3	>0.50 to 2.50 mg/m^3	>2.5 mg/m^3
Quartz and Tripoli	>0.10 to 1.0 mg/m^3	>1.0 to 5.0 mg/m^3	>5.0 mg/m^3

Note: The classification of silica-containing construction tasks is based on presumed concentrations of respirable crystalline silica, as shown above.

TYPE 1 OPERATIONS

- The drilling of holes in concrete or rock that is not part of a tunnelling operation or road construction.
- Milling of asphalt from concrete highway pavement.
- Charging mixers and hoppers with silica sand (sand consisting of at least 95 per cent silica) or silica flour (finely ground sand consisting of at least 95 per cent silica).
- Any other operation at a project that requires the handling of silica-containing material in a way that may result in a worker being exposed to airborne silica.
- Entry into a dry mortar removal or abrasive blasting area while airborne dust is visible for less than 15 minutes for inspection and/or sampling.
- Working within 25 metres of an area where compressed air is being used to remove silica-containing dust outdoors.

TYPE 2 OPERATIONS

- Removal of silica containing refractory materials with a jackhammer.
- The drilling of holes in concrete or rock that is part of a tunnelling or road construction.
- The use of a power tool to cut, grind, or polish concrete, masonry, terrazzo or refractory materials.
- The use of a power tool to remove silica containing materials.
- Tunnelling (operation of the tunnel boring machine, tunnel drilling, tunnel mesh installation).
- Tuckpoint and surface grinding.
- Dry mortar removal with an electric or pneumatic cutting device.
- Dry method dust cleanup from abrasive blasting operations.
- The use of compressed air outdoors for removing silica dust.
- Entry into area where abrasive blasting is being carried out for more than 15 minutes.

TABLE C-3 (Continued)
SUMMARY OF CLASSIFICATION OF SILICA-CONTAINING CONSTRUCTION TASKS
MOL GUIDELINE, SILICA ON CONSTRUCTION PROJECTS, APRIL 2011

TYPE 3 OPERATIONS

- Abrasive blasting with an abrasive that contains ≥ 1 per cent silica.
- Abrasive blasting of a material that contains ≥ 1 per cent silica.

Arcadis Canada Inc.

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1 General

1.1 These general requirements shall apply to every section of the work contained in these specifications, and shall apply to all contracts within this tender.

1.2 All tenders, quotes and proposals are subject to the Municipal Freedom of Information and Protection of Privacy Act and will be disclosed where the Board is required to do so for the purposes of complying with an Order of the Information and Privacy Commissioner.

2 Drawings and Specifications

2.1 These Specifications are not intended as a detailed description of installation methods but serve to indicate particular requirements in the completed work.

2.2 The drawings and specifications complement each other and neither is to be considered alone. Hence, any item omitted in one, but mentioned or implied in the other, must be provided.

2.3 Where drawings do not show all the structural and architectural details and accurate dimensions required, these should be obtained by measurements at the building.

2.4 Where words in the Contract Documents occur in the singular number, they shall be taken as plural where applicable in accordance with the quantities required to satisfy the requirements of the Contract.

2.5 In the trade Sections of the Specifications, unless the word "only" suffixes the words "supply" or "install" or other variations of those words, it is the express intent of this Contract that "supply and install is implied". Words such as "provide" or "work includes" shall also mean "supply and install".

2.6 Wherever the words "approved", "satisfactory", "selected", "directed", "required", "submit", or similar words or phrases are used in the Contract Documents, it shall be understood that they mean, unless the text specifies other wise, "approved by Consultant", "satisfactory to Consultant", "selected by Consultant", "directed by Consultant", "required by Consultant", "submit to Consultant".

2.7 Where contract documents do not provide sufficient information for complete installation of item, then as supplement, comply with manufacturer's written instructions for quality workmanship.

2.8 All changes to the contract documents which result in an extra or a credit to the contract amount are not be executed until written instructions have been received and the extra or credit agreed to in writing by all parties to the contract.

2.9 The Contractor shall execute variations, alterations and substitutions which do not affect the contract amount as instructed by the Board or its representative.

2.10 Bidders finding discrepancies or omissions in the drawings or specifications shall at once notify the Board who shall send written instructions to all bidders. Bidders may, during the tender period, be advised by addenda of any additions, alterations or deletions to the specifications and drawings. All such changes shall be covered by the tender and become part of the document.

3 Co-ordination and Co-operation

3.1 Co-ordinate work of each Section as required for satisfactory and expeditious completion of Work. Take field dimensions required. Take into account existing installations to assure best arrangements of components in available space. Consult before commencing Work in critical locations. Fabricate and erect Work to suit field dimensions and field conditions.

3.2 The Contractor shall co-ordinate the work of various trades to assure the best arrangement of pipes, conduits, ducts, equipment and other items in the available space. Under no circumstances will any claim for extra cost be allowed due to the failure by the Contractor to co-ordinate work. If required, in critical locations prepare interference or installation drawings, showing the work of various trades and submit drawings to Consultant for approval before commencing work.

3.3 The Contractor and all sub-contractors shall co-operate with and co-ordinate their work with each other in proper sequence and as required for the satisfactory and expeditious completion of the work. **Take field dimensions relative to this work. Fabricate and erect work to suit field dimensions and field conditions.** Provide all forms, templates, anchors, sleeves, inserts and accessories required to be fixed to or inserted in the work and set in place or instruct the related trades as to their location. Pay the cost of extra work caused by and make up time lost as the result of failure to provide the necessary co-operation, information or items to be fixed to or built in, in adequate time.

3.4 Check all dimensions at the site before commencing fabrication and installation and report all discrepancies, in writing, to Consultant. Where dimensions are not available before work is commenced, the dimensions required shall be agreed upon by the various trades concerned and approved by the Consultant.

4 Documents Required

4.1 Maintain at job site, one copy each of follow:
.1 Contract Drawings.
.2 Specifications.
.3 Addenda.

.4 Reviewed shop drawings.
.5 Change Orders.
.6 Other modifications to Contract.
.7 Field test reports.

4.2 If requested provide copy on Site of Standards listed in Part 1 of various Specification Sections, under the heading Reference Standards.

4.3 Permits and Inspection

4.3.1 The Contractor shall obtain all permits, licences, notices and certificates of inspection and approval required to carry out work and provide proof of same to Plant Services.

5 Work Schedule and Progress Reports

5.1 Within (10) working days after Contract award, in form acceptable to the Board, provide a complete plan or layout of their work schedule, showing anticipated progress stages and final completion of work within time period required by contract documents, prior to commencing any work on board property. All work scheduled shall be approved by the Plant Services Department.

5.2 Interim weekly reviews of work progress based on schedule submitted by Contractor will be conducted as agreed by Consultant and schedule updated by Contractor in conjunction.

5.3 The Contractor shall keep a permanent written report of the daily progress of the Work on site. This report shall be open to Consultant's inspection at all reasonable times. Provide a copy to the Consultant upon request.

5.4 The report shall show the dates of commencement and completion of the different trades and parts of the work required under the Contract and shall include particulars regarding daily weather conditions and temperatures, excavation work, erection and removal of forms, concrete pour, finishing floors, starting and completion of masonry, roofing, etc., and daily number of employees of the various trades engaged on the various Sections of Work.

5.5 Submit a summary of the daily reports to the Consultant at weekly intervals, or when requested by the Consultant.

5.6 The Contractor shall take all possible steps to minimize interference with school operations and schedule their work, etc., in such a manner as to accomplish this end.

5.7 While school is operational, the Contractor shall not perform work that will adversely affect the school, staff and students. Demolition and all noisy or disruptive work that will adversely affect the school, staff and students shall take

place after school hours, weekends, PA days, Christmas Break, March Break and during Summer months etc. These hours should be confirmed with the Facility Services Department and confirmed with the School prior to completing any work schedule. The Contractor will be given a FOB and key to access the school.

5.8 The Contractor must report to the school office before proceeding elsewhere on board property.

5.9 The Contractor shall provide the Board with a complete plan or layout of their work schedule prior to commencing any work on Board property. All work scheduled shall be approved by the Facility Services Department.

6 Examination

6.1 The Contractor shall visit the premises and be satisfied as to conditions affecting the work before submitting a tender. Misinterpretation of any requirements of these specifications shall not relieve the Contractor of responsibility. No allowance will be made for any extra expense incurred by the Contractor through failure to do so. The Contractor shall make an appointment with the school prior to examining the site if required to do so after the Mandatory Site Visit.

6.2 The Board will not entertain any claim for extra work and/or expense incurred by the Contractor or his sub-contractors resulting from failure to examine surfaces and previous work and conditions upon which any work depends for its satisfactory execution. All unsatisfactory conditions, defects and deficiencies shall be reported, in writing, to the Consultant, and shall have been corrected before proceeding with the work.

6.3 Commencement of work shall imply acceptance of surfaces, previous work and conditions.

6.4 Drawings are, in part, diagrammatic and are intended to convey scope of Work and indicate general and approximate location, arrangement and sizes of fixtures, equipment, ducts, piping, conduit and outlets and similar items. Obtain more accurate information about locations, arrangement and sizes from study and co-ordination of Drawings, including shop drawings and manufacturer's literature and become familiar with conditions and spaces affecting these matters before proceeding with Work. Where minor discrepancies occur between architectural, mechanical, electrical and structural drawings Contractor to verify locations with Consultant prior to proceeding with the Work.

6.5 **Where job conditions require reasonable changes in indicated locations and arrangements, make such changes with approval of the Consultant at no additional cost to the Board** Similarly, where existing conditions interfere with new installation and require relocation, such relocation is included in work.

6.6 Install and arrange fixtures, equipment, ducts, piping and conduit to conserve as much headroom and space as possible, and avoid interference and obstruction of access. Observe good installation practice for safety, access, maintenance and follow manufacturer's recommendations. Make changes requested to comply with these requirements at no additional cost to the Board.

6.7 If requested by the Consultant, and before their installation, relocate equipment, services, doors, openings, furring and other work at no additional cost to the Board; provided such relocation involves only reasonable minor adjustments and reasonable advance notice is given in writing.

7 Materials, Plant and Equipment

7.1 Materials, plant and equipment specified shall form basis of Bid and Contract. Where more than 1 brand or manufacturer is named in Specifications, or on Drawings, choice is Bidders/Contractor's provided requirements of Drawings and Specifications are met.

7.2 Unless explicit statement is made in Bid/Contract Documents to say no substitutions will be permitted; then words "or approved equal" are hereby deemed to apply to material, plant and equipment specified by brand or manufacturer, subject to following conditions:

7.2.1 Request for substitution is made after Contract award and proposed substitution satisfies indicated or specified requirements and conditions to the approval of the Consultant, his Consultants and the Board. The Contractor shall be responsible that the size and locations of proposed substitution shall not affect the finished work and that the equipment shall not be affected by substitution or relocation.

7.2.2 The Contractor shall be responsible for all additional expenses incurred by the Board, himself and other Contractors due to his use of the proposed substitute and adjacent work affected by the substitution.

7.3 Materials, plant and equipment shall not be damaged or defective and shall be of quality compatible with Specifications for purpose intended. If requested provide evidence as to type, source and quality. Remove and replace defective products, at own expense, regardless of previous inspections, and be responsible for delays and expenses caused thereby.

7.4 All materials and equipment supplied for the work shall be new, of the best quality, and in accordance with the latest applicable specifications of the Canadian Standards Association.

7.5 The particular method, material, procedure or equipment specified in this tender shall be used as a standard.

7.6 A bidder may submit an alternative method, material, procedure or equipment to that specified in the tender specifications. All alternatives shall be equal or superior to the standard specified in these tender documents.

7.7 The bidder who furnishes an alternative method, material, procedure or equipment in place of the standard item specified shall furnish complete documented data including such information as chemical content and performance under laboratory tests which proves the quality and equality of the proposed alternative. This information shall accompany the bid.

7.8 In all cases where alternative methods, materials, procedures or equipment are offered in response to this tender, the Board shall make the final ruling on their acceptability.

7.9 During and upon completion of the work, the Contractor shall remove from the premises all surplus materials, equipment and debris.

8 Contractor's Use of Site

8.1 Do not unreasonably encumber site with materials or equipment.

8.2 Move and protect stored products or equipment which interfere with operations of Consultant or other contractors.

8.3 Temporary storage of materials and equipment may be provided for the Contractor as agreed to by the Board. However, the board will not assume any responsibility or liability for these materials and equipment stored on board property.

8.4 Should the work be suspended for any cause, the Contractor must assume all responsibility for the protection during the period of suspension.

8.5 Contractor is responsible for maintaining fire route and shall not encumber this route with materials, equipment or hoarding.

9 Setting Out of Work

9.1 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

9.2 Employ competent person to lay out work in accordance with control lines and grades.

9.3 Prior to commencement of construction have building location, layout lines and levels checked and verified for accuracy by an independent, registered Ontario Land Surveyor.

9.4 The Contractor shall provide all subcontractors with, and be responsible for, all levels and dimensions which sub-contractors may require to relate their work to the work of the Contractor or other subcontractors. Subcontractors must be notified that all such levels and dimensions are to be obtained from the Contractor.

9.5 Maintain a complete, accurate log of control and survey work as it progresses.

9.6 Existing Services

9.6.1 Before commencing Work, establish location and extent of existing services in area of Work and notify Consultant of findings.

9.6.2 Whenever it is necessary to cut, interfere with, or connect to existing services or facility do so at hours and times recommended by the Board, Governing Authorities and approved by Consultant and give ample notice to the School, the Board, Governing Authorities and Consultant; and with minimum disturbance to students, pedestrian and vehicular traffic and public and private property.

9.6.3 If unknown services are encountered, immediately notify Consultant and confirm findings in writing and/or on Drawings. Obtain Consultant's written direction if such services require cutting, capping or relocation to do Work.

9.6.4 Submit schedule and obtain approval from the Board for each proposed shut-down of active service or facility. Adhere to approved schedule and provide notice to affected parties.

10 Project Meetings

10.1 Refer to Section 01 31 19 – Project Meetings.

11 Quality Control

11.1 Inspection

11.1.1 The Board and Consultant shall have access to the Work and be entitled to review the work at any time and the Contractor shall provide access to the Work with proper facilities for such inspection.

11.1.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Consultant instructions, or law of Place of the Work.

11.1.3 Where any work is covered up without the Consultant's approval or consent, or if Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, Contractor shall uncover the Work at his expense if so instructed by the Consultant; following examination of the Work, the Contractor shall reinstate the examined area at his

expense. If upon examination by the Consultant, the uncovered work is found not in accordance with the contract, the Contractor shall pay all costs of testing, correcting, re-examining and reinstating the Work.

11.1.4 The Contractor shall promptly remove any defective work which has been rejected by the Consultant for not conforming with the Contract. The Contractor shall, at his expense promptly reinstate the Work in accordance with the Contract and shall pay the cost of making good any other Contractor's work destroyed or damaged by the reinstatement.

11.1.5 The Board may deduct from the Contract sum the difference in value between the defective work and that called for by the Contract if, in the opinion of the Consultant, it is not expedient to correct the defective work. The Consultant shall determine the amount of such deduction.

12 Project Closeout

12.1 Final Cleaning

12.1.1 When the Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

12.1.2 Remove waste materials and debris from site at regularly scheduled times. Do not burn waste materials on site.

12.1.3 The building shall be left in condition to meet the **approval of the Consultant**. The final cleaning shall not commence until **authorized by the Consultant**. The Contractor is responsible for notifying the Consultant when final cleaning is to take place.

12.1.4 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

12.1.5 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, and walls.

12.1.6 Vacuum clean and dust building interiors, behind grilles, louvers and screens.

12.1.7 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

12.1.8 Broom clean and wash exterior walks, steps and paved surfaces.

12.1.9 Remove dirt and other disfigurations from exterior surfaces.

12.1.10 Use experienced workmen or professional cleaners for final cleaning. Use only cleaning materials recommended by manufacturer of surface to be cleaned. Contractor to take full responsibility for proper cleaning measures and protection of surfaces.

12.2 Documents

12.2.1 Collect reviewed submittals and assemble documents executed by Subcontractors, suppliers, and manufacturers.

12.2.2 Submit material prior to final Application for Payment.

12.2.3 Submit operation and maintenance data, record (as-built) drawings.

12.2.4 Provide warranties and bonds fully executed and notarized.

12.2.5 Execute transition of Performance and Labour and Materials Payment Bond to warranty period requirements.

12.2.6 Submit a final statement of accounting giving total adjusted Contract Price, previous payments, and monies remaining due.

12.2.7 Consultant will issue a final change order reflecting approved adjustments to Contract Price not previously made.

12.3 Inspection/Takeover Procedures

12.3.1 Prior to application for certificate of Substantial Performance, carefully inspect the Work and ensure it is complete, that major and minor construction deficiencies are complete, defects are corrected and building is clean and in condition for occupancy. Notify Consultant in writing, of satisfactory completion of the Work and request an inspection.

12.3.2 During Consultant inspection, a list of deficiencies and defects will be tabulated. Correct same.

12.3.3 When Consultant considers deficiencies and defects have been corrected and it appears requirements of Contract have been performed, make application for certificate of Substantial Performance.

12.4 Restoration of Site

12.4.1 Where site has been disturbed beyond the limits of Work, due to construction vehicle traffic or other causes or where grade has been altered with new surfaces. The contractor is responsible for restoration of site to ensure that disturbed areas are compacted with appropriate fill material and sodded, and grades blended such that there are no variations in grade and do not pose a

safety hazard to pedestrians and to the approval of the Board and at no additional expense to the Board.

12.4.2 Where areas outside of the limits of Work have been damaged or disturbed due to demolition or installation methods, storage and movement of materials, failure to adequately protect existing surfaces or classrooms, use of powder actuated fastening devices or other causes; the Contractor shall restore, patch and paint surfaces where damage has occurred to the satisfaction of the Board and at no additional expense to the Board.

13 Health and Safety Requirements

13.1 Refer to Section 01 35 10 – Health and Safety Requirements.

14 Toxic and Hazardous Substances and Materials

14.1 Refer to the Designated Substance Report for known hazardous substances and protocols for working with such materials to remain in situ.

If the contractor locates asbestos containing materials or other known toxic and hazardous substances and materials during the project, outside of those identified in the report then the contractor shall case work and seal off the area and immediately contact the Consultant.

14.2 The Board shall arrange to remove the asbestos or other toxic and hazardous substance or material.

14.3 The Contractor shall comply with all regulations relating to asbestos. The removal and disposal of asbestos shall be in accordance with the Ministry of the Environment Regulation 347.

14.4 The Contractor shall indemnify and hold harmless the Board, Consultant, other consultants, Sub-contractors, Suppliers and their agents and employees, from and against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of or resulting from exposure to, or the presence of, toxic or hazardous substances or materials which were brought onto or made at the Place of Work by the Contractor or any party for which the Contractor is responsible by law.

15 Changes to the Work

15.1 The Contractor, when notified by the Consultant of proposed changes in the Work which result in an extra or a credit to the contract amount, shall within 14 days, submit for the Consultant's approval, a fully itemized estimate of the costs of the proposed changes, such estimate to be in a form approved by the Consultant, who in turn shall submit the proposed changes for the Board's approval.

15.2 All changes to the Contract Documents which result in an extra or a credit to the contract amount are not to be executed until written instructions have been received and the extra or credit agreed to in writing by all parties to the contract.

15.3 The Contractor shall execute variations, alterations and substitutions which do not affect the contract amount as instructed by the Board or its representatives.

16 Damages

16.1 The Contractor shall be responsible for all or any damages to the building and/or contents, caused by their forces for whatever cause and shall indemnify and save the Simcoe Country District School Board harmless from injury to all pupils and employees when working within and around buildings, while under contract with the Simcoe Country District School Board.

17 Inspection and Invoicing

17.1 The Contractor may submit invoices to the Project Coordinator of the Simcoe Country District School Board, 1170 Hwy. 26, Midhurst, Ontario L9X 1N6, Attention: Accounting Department for progress payments as the work proceeds and significant portions of the contract are completed and ready for inspection. Submit invoices in accordance with the Supplementary Conditions of the CCDC 2-2020 contract.

18 Correction after Completion

18.1 Without restricting any warranty or guarantee implied or imposed by law or contained in the Contract Documents, the Contractor shall, at his own expense, rectify and make good any defects due to faulty materials or workmanship that appear in the Work or that comes to the attention of the Board within twelve (12) months from the date of the Certificate of Substantial Performance.

18.2 The Board may direct the Contractor to rectify and make good any defect or fault referred to herein or covered by any other expressed or implied warranty or guarantee.

18.3 Such a direction to the Contractor shall be in writing and may include a stipulation in respect of the time within which a defect or fault is required to be rectified and made good by the Contractor.

18.4 Within the time stipulated therein, the Contractor shall at his own expense rectify and make good any defect or fault described in such a direction and correct or pay for all damage resulting from the corrections made under this Section.

18.5 Neither the Certificate of Total Performance nor payment thereunder shall relieve the Contractor of responsibility under this Section.

**********END**********

1 CASH ALLOWANCES

1.1 Expend each allowance as directed.

1.2 Refer to CCDC 2, GC 4.1

1.3 Cash allowances, unless otherwise specified, cover net cost to Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage installation and other authorized expenses incurred in performing Work.

1.4 Contract Price, and not cash allowance, includes Contractor's overhead and profit in connection with such cash allowance.

1.5 Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.

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

1.7 Include progress payments on accounts of work authorized under cash allowances in Consultant's monthly certificate for payment.

1.8 Include the following cash allowances in Bid Price.

.1	General Allowance	$10,000.00
.2	Inspection & Testing	$ 8,000.00
.3	Data	$ 2,000.00
.4	Door Security Hardware	$11,000.00
.5	PA Speakers, Equipment and Phones	$ 3,500.00
.6	Childcare Building Signage	$ 2,000.00

**********END**********

Part 1 General

1.1 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work at the call of the Owner.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to Owner's schedule.

.4 Meetings for this project will be a combination of online and in-person, to be determined prior to the meeting and availability of attendees, ongoing situation with COVID (as may be applicable) and phase of project and items to discuss.

.5 Preside at meetings.

.6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Distribute electronic copy of minutes within 24 hours after meetings and transmit to meeting participants, Owner, Consultant, and affected parties not in attendance.

.8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

.1 After award of Contract, the Owner will request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities and will prepare and issue an agenda.

.2 Consultant, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

1.3 PROGRESS MEETINGS

.1 During course of Work prior to project completion, scheduled progress meetings will take place every two weeks or at intervals as determined by the Owner.

.2 Contractor, major Subcontractors involved Work, and Consultant are to be in attendance.

.3 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 24 hours after meeting.

.4 Agenda to include the following:

.1 Report on COVID Protocols (as may be applicable).

.2 Review, approval of minutes of previous meeting.

.3 Review of Work progress since previous meeting.

.4 Field observations, problems, conflicts.

.5 Problems which impede construction schedule.

.6 Review of off-site fabrication delivery schedules.

.7 Corrective measures and procedures to regain projected schedule.

.8 Revision to construction schedule.

.9 Progress schedule, during succeeding work period.

.10 Review submittal schedules: expedite as required.

.11 Maintenance of quality standards.

.12 Review proposed changes for affect on construction schedule and on completion date.

.13 Other business.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 Administrative

1.1 Submit to Consultant submittals listed for review. Submit with reasonable promptness and in an orderly sequence so as to not cause delay in the Work.

1.2 Work affected by submittal shall not proceed until review is complete.

1.3 **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 the Work and Contract Documents.**

1.4 **Verify field measurements and affected adjacent Work are co-ordinated.**

1.5 The Contractor shall be responsible for:

1.5.1 Notifying the Consultant in writing of changes made to shop drawings from Drawings and Specifications;

1.5.2 Changes made from Drawings and Specifications not covered by written notification to the Consultant;

1.5.3 Making any changes in the shop drawings which the Consultant may require consistent with the Contract Documents;

1.5.4 Submitting copies of revised shop drawings to the Consultant;

1.5.5 Errors and omissions in the shop drawings;

1.5.6 Meeting requirements of the Contract Documents;

1.5.7 Confirmation of dimension and correlation at the job site;

1.5.8 Co-ordination of dimension and correlation at the job site;

1.5.9 Any conflicts between Subcontractors as a result of lack of comparison and co-ordination of shop drawings of the work affected trades;

1.5.10 Signifying, checking and approving of all submissions, by stamping with company stamp and signature by responsible company official.

1.6 The Consultant shall review the shop drawings for the sole purpose of ascertaining conformity with the general design concept and for general arrangement.

1.7 This review shall not mean that the Consultant approves the detail design inherent

in the shop drawings and shall not relieve the Contractor of his responsibilities.

1.8 Review of the shop drawings by the Consultant does not authorize changes in cost or time.

2 Shop Drawings and Product Data

2.1 "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 the Work.

2.2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connection, explanatory notes and other information necessary for completion of Work.

2.3 Adjustments made on shop drawings by Consultant are not intended to change Contract Price.

2.4 Make changes in shop drawings as consultant may require.

2.5 Submit electronic copies of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.

2.6 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as Consultant may reasonably request where shop drawings will not be prepared due to standardized manufacture of product.

*****END*****

Part 1 General

1.1 COVID 19 PROTOCOLS

.1 Comply with Canadian Construction Association, COVID-19- Standardized Protocols for All Canadian Construction Sites.

.2 Comply with current Provincial, Local and Facility requirements in regards to the ongoing situation with COVID-19.

.3 Refer to the Construction Site Health and Safety During COVID-19 Chief Prevention Officer Guideline available at: whttps://www.ontario.ca/page/construction-site-health-and-safety-during-covid-19

.4 The Infrastructure Health and Safety Association (IHSA) is Ontario's trusted health and safety resource who's mandate is to improve the lives of Ontario workers. The following are documents that pertain to the Construction Sector and procedures outlined are recommendations to protect the GC's workforce, Consultants and Facility Staff and Students, all people accessing Site - Suppliers and delivery people, Municipal building officials and other personnel from Authorities having Jurisdiction.

HSA	Sector	Resource	URL
IHSA	Construction	Guidance on Worker Procedures Handling Paperwork	https://www.ihsa.ca/pdfs/alerts/COVID19/guidance-on-worker-procedures-handling-paperwork-during-covid-19.pdf
IHSA	Construction	Guidance on Worker Responsibilities with COVID-19	https://www.ihsa.ca/pdfs/alerts/COVID19/guidance-on-workers-responsibilities-with-covid-19.pdf
IHSA	Construction	Guidance on Construction Facility Hygiene During COVID-19	https://www.ihsa.ca/pdfs/alerts/COVID19/guidance-on-construc facility-hygiene-during-covid-19.pdf
IHSA	Construction	Guidance on Construction Supervisor Responsibilities (COVID-19 Symptoms or Exposure)	https://www.ihsa.ca/pdfs/alerts/COVID19/guidance-on-construc facility-hygiene-during-covid-19.pdf

IHSA	Construction	Best Practices for the Employer- Responding to a Suspected COVID-19 Exposure	https://www.ihsa.ca/pdfs/alerts/COVID19/best-practices-workpl responsibilities-employer-in-construction-industry.pdf
IHSA	Construction	Best Practices for the Constructor – Responding to a Suspected COVID-19 Exposure	https://www.ihsa.ca/pdfs/alerts/COVID19/best-practices-workpl responsibilities-constructor-in-construction-industry.pdf
IHSA	Construction	Guidance on Tool Sharing (Hand Tools) Constructor/Employer Procedure During COVID-19	https://www.ihsa.ca/pdfs/alerts/COVID19/guidance-on-tool-shar constructor-employer-procedure-during-covid-19.pdf
IHSA	Construction	Guidance on PPE (Cleaning Respirators) During COVID-19	https://www.ihsa.ca/pdfs/alerts/COVID19/guidance-on-ppe-clea respirators-during-covid-19.pdf

.5 A COVID- 19 Safety Plan to be provided to the Owner. A template is available from the IHSA website.

.6 Refer to The Ministry of Labour, Training and Skills Development, Construction: Guidance for Health and Safety for Employer Responsibilities and Worker Rights https://files.ontario.ca/mltsd_0/mltsd-construction-covid-tip-sheet-en-2020-06-22.pdf

1.2 PURPOSE

.1 The purpose of this section is to define the procedure to be followed in the administration of the Health and Safety procedure and to outline the functions of this procedure.

1.3 SCOPE

.1 This procedure applies to all contractors and sub-sub-contractors. Each person is responsible for implementing the safety goals of this procedure.

.2 WHMIS procedures, as required by Provincial Law, shall be adhered to and although each province has implemented standard Occupational Health and Safety Acts, the requirements of these Acts are only a minimum. An employee's common sense must be further utilized in applying on/off-the-job safety.

1.4 RESPONSIBILITIES

.1 The project "Constructor" shall file Notice of Project with Provincial authorities prior to commencement of work

.2 The Contractor is responsible for ensuring that:

.1 it's employees, sub-contractors and sub-contractor's employees follow these guidelines;

.2 training is provided to all it's employees, sub-contractors and sub-contractors employees;

.3 work is carried out in the manner and with protective devices, measures and procedures required;

.4 new employees or sub-contractors are provided with timely notice of the measures and procedures to follow for their protection while on the job site;

.5 protection for the public is maximized and inconvenience from the work is minimized;

.6 current WHMIS inventory is on site and kept current by the person in charge of the site;

.7 any employee injured receives the necessary medical attention required to ensure a speedy, safe return to gainful employment;

.8 when an accident occurs, appropriate reports are prepared and submitted to the appropriate Provincial authority;

.9 the accident is thoroughly investigated;

.10 Submit all Ministry of Labour safety inspections or direction to comply to the Consultant and to the Owner, as soon as possible after any occurrence;

.11 a copy of the Ministry of Labour report is submitted to the Consultant as well as notification of attention for any follow-up as required.

.3 The Contractor's worker's responsibilities include:

.1 knowing and following the Health and Safety procedures;

.2 using or wearing the equipment, protective devices or clothing that is required to be used or worn;

.3 checking all equipment and tools prior to using them;

.4 reporting any defects in equipment, devices, breaches of the Act and hazards to their supervisor;

.5 avoiding "horseplay" that could result in an accident;

.6 abiding by all Federal and Provincial Operational Health and Safety Acts and Regulations;

.7 abiding by all site rules and regulations imposed by an owner, general contractor or industrial establishment.

1.5 ACCIDENT / INCIDENT INVESTIGATION

.1 Accident investigations are conducted solely to determine what caused the accident and what steps can be taken to avoid an occurrence. The Contractor is responsible for ensuring that all accidents and incidents occurring during the performance of the work or at the work site are investigated. However, the level of the investigation is dependent on the severity of the accident. First aid cases do not require investigating but should be analyzed in sufficient depth to ensure that no learning experience is missed.

.2 Investigations should be conducted promptly and without bias. It is essential that all facts concerning the accident are covered, therefore the following procedure is recommended:

.1 physically check the conditions at the site of the accident including any equipment, materials, tools or environmental condition that could have contributed to the cause;

.2 establish factually what happened by interviewing the injured person, witnesses and supervisor responsible and, where possible have the witnesses and the injured person(s) return to the positions they were in when the accident occurred;

.3 determine the conditions or actions that led to and caused the accident;

.4 prepare a list of recommendations for preventing a similar accident.

.3 In the case of a fatality or critically injured person, the Contractor and employer must conform to all requirements as described in the Provincial Occupational Health and Safety Acts.

.4 The Contractor superintendent, or appointed delegate, must inform their home office of any work-related injury or illness requiring treatment beyond the first-aid level *on the same day as the accident occurred*.

1.6 ACCIDENT REPORTING

.1 The Contractor shall provide reports to the Provincial Workplace Safety and Insurance Board (WSIB), the Ministry of Labour, the Health and Safety Representative and the Trade Union, as the Act requires.

.2 The Contractor's Responsibilities

.1 Reporting to the WSIB:

.1 Telephone the Consultant and Owner to give a detailed verbal report stating job number, employee's name, name of the doctor or hospital referred to, and the description of the accident. This activity is in addition to the report given to the Contractor's Head Office.

.2 Fill in the WSIB Treatment Memorandum form at the job site and give it to the injured employee for presentation to the doctor or hospital.

.3 The Contractor shall act promptly as the WSIB must have the reports within 24 hours of the accident occurring. *A substantial fine is levied by the WSIB for each late claim filed*.

.2 Reporting occupational illness:

.1 Should an employee discover a case of such illness, the Superintendent shall be advised immediately.

.3 Reporting accidents, including explosions, floods, failure of any equipment, device, supports, etc.

.4 Reporting unsafe conditions:

.1 If the risk is serious, put up a temporary barrier, attach a "danger" tag, or take other appropriate steps to prevent possible personal injury or other accident, before you report unsafe conditions.

.3 The Worker's Responsibilities

.1 The worker shall report an accident immediately to the supervisor and be available to the supervisor to record details of the accident. The worker shall follow instructions provided by the Supervisor. The following situations shall be reported:

.1 Death or critical injury:

.1 The injured person should not be moved except to save the injured person's life; wait for a St. John's, or other, trained person;

.2 Equipment and/or materials should not be moved or disturbed except to prevent further damage or injury;

.3 Wait for instructions.

.2 Other personal injury:

.1 Depending on the circumstances, if there are any doubts about moving an injured person, send someone for a St. John's Ambulance certificate holder;

.2 If the injured person can move readily, accompany the injured person to the site safety office.

.4 All personal injuries (Workplace Safety Insurance) are to be reported, including any occasion on which the worker (a) loses time, (b) receives medical aid, (c) goes to the doctor's office and/or (d) goes to a hospital emergency ward.

.5 Falls, with or without safety belts, unconsciousness and complaints of sprains or back strain must also be reported. These injuries are to be reported to the worker's immediate supervisor.

1.7 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit site-specific Health and Safety Plan and COVID-19 Safety Plan: Within 7 days after 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 found in work plan.

.3 Submit WHMIS Safety Data Sheets (SDS) in accordance with Sections requiring their submission.

1.8 SAFETY ASSESSMENT

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

.2 It is recognized that good site conditions reduce the risk of injury to all persons present at the worksite and contribute greatly to the overall profitability of the project. When required by the Jurisdictional Authority, the Contractor shall provide a safety plan to the Consultant and Owner for review prior to commencement of work. Each person should be on the lookout for unsafe acts and conditions in the workplace and take immediate action to correct any potentially unsafe or hazardous situation.

1.9 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain,

and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

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

1.10 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Consultant verbally and in writing.

1.11 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 Province having jurisdiction.

1.12 CORRECTION OF NON-COMPLIANCE

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

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

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

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.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

1 General

1.1 Schedule and co-ordinate work to minimize cutting and patching.

1.2 Cut, patch and make good to accommodate Work and to leave Work in finished condition. Cutting in this sense shall mean actual cutting of components to allow new components to pass through or to provide new openings. Cutting shall not mean mere drilling of holes to accommodate screws, anchors, bolts or other fasteners as such. Such drilling is part of Section's installation function.

1.3 Use tradesmen qualified in work being cut and patched to ensure that it is correctly done.

1.4 Do not cut, drill or sleeve load-bearing members without obtaining written approval for each condition.

1.5 Cut holes carefully, leaving clean holes no larger than required, after they are located by Sections requiring them.

1.6 Make cuts with clean, true, smooth edges to tolerances required and in conformance with industry practice for applicable class of work. Make patches undetectable in finished work.

2 Responsibility for Cutting and Patching

2.1 Responsibility for various categories of cutting and patching shall be as follows:

2.1.1 Cutting and patching of architectural and structural work required for installation of work of Divisions 15 and 16:

.1 Holes and openings up to 200 mm (8") in diameter and related patching by applicable Sections of Divisions 15 and 16;

.2 Holes and openings larger than 200 mm (8") in diameter, chases, removal of existing bulkheads and furring (if any) and related patching by Contractor.

2.2 Cutting and patching of architectural and structural work required by Sections other than those of Divisions 15 and 16 is responsibility of Section whose work is to be cut or patched.

*****END****

1 Maintenance

1.1 Use all means necessary to maintain construction facilities and controls in proper and safe condition throughout progress of the Work.

1.2 In the event of loss or damage, immediately make all repairs and replacements necessary to Consultant's approval and at no additional cost to the Board.

2 Access Roads, Parking and Traffic Control

2.1 Provide access roads as may be necessary to provide safe and adequate access for materials, products and other supplies. Provide and maintain access sidewalks, roadways, and similar facilities as may be required for access to the Work. Do not block public roads, or impede traffic during work of this Project and if required to temporary block traffic then provide flag person to direct traffic acceptable to Municipal authorities. Remove accumulations of ice and snow from areas providing access to Site. Ensure that access is available for emergency vehicles. Comply with fire plan for vehicular traffic.

2.2 Provide roads, walks, ramps stairs and other such means of access as necessary. Maintain temporary entrances to building(s) including enclosed hoarding as required. Maintain access to existing service entrance(s) at all times, including ready access for fuel oil trucks and delivery vehicles. Bridge excavations with construction to safely support any load that could be imposed or provide personnel to assist in deliveries to building(s) as required.

2.3 A limited number of parking spaces are available on site. This space shall be used as directed by the Board and School Principal particularly while school is in session. The Board will not be responsible for parking fines incurred by Contractor, Sub-Contractors or their employees.

2.4 Do not be nuisance to public traffic any time. Manage construction traffic by using designated roads and by providing trained flag persons to direct public traffic as appropriate

3 Dust Tight Screens

3.1 Provide dust tight screens or partitions to localize dust generating activities, and for the continuing operation of school when in operation, protection of workers, finished areas of work and the public. Separate areas of work from occupied portions of building with dust-tight screens. Screens shall consist of plywood min 6mm (1/4") thick on wood stud supports, or equivalent. Seal edges and joints to achieve positive protection. Provide lockable door(s) in screen(s) as may be required to provide security to area of work on Drawings and extra key to Board

or School Principal Remove screens promptly when no longer required and make good adjacent surfaces

3.1 Maintain and relocate protection until such work is complete.

4 **Hoarding**

4.1 Erect and maintain hoarding to restrict access to area of work where indicated or required to safeguard the school yard to the satisfaction of the Board and Consultant.

4.2 Materials for framing, shall be CLA (No. 2) Grade Eastern Spruce or No. 3 White Pine. Plywood shall be solid 1S, CSA 0121-M, exterior grade fir plywood.

4.3 Apply plywood panels vertically as indicated flush and butt jointed.

4.4 Provide hoarding complete with lockable pedestrian door(s) for access to Site by workers. Provide door(s) and equip door(s) with locks and keys.

5 Site Storage/Loading

5.1 Provide and maintain storage sheds and workshops if required by the work throughout the construction period. Remove temporary buildings upon completion of the Work.

5.2 Confine the Work and the operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the premises with products.

5.3 Do not load or permit to be loaded any part of the Work with a weight or force that will endanger the Work.

6 Field Office and Sheds

6.1 Establish on the site of the Work and keep open at all times during the prosecution of the Work, an office of size to accommodate site meetings and where all letters, orders, notices and other communications may be received or acknowledged, either by the Contractor or his authorized representative.

6.2 Provide Site office of sufficient size, in location as directed. Maintain office, dry, clean, well lighted, properly ventilated and heated to 20 deg C (68 deg F) complete with telephones and facsimile. Furnish office tables, chairs, racks for drawings, filing cabinets and shelves. Install electrical lighting system to provide approved lighted environment.

6.3 Verify with the Board, the proposed location of the Field Office to be located on the property within the Hoarding Area. Ensure safe pedestrian access, vehicle access and parking is maintained as required by the occupants for their operations as may be required.

6.4 Field Office may be removed from Site when Work has progressed to permit use as Site Office to approval of the Board.

6.5 Provide in approved locations as required, lockable weather tight storage sheds with floors raised above ground, for storage of materials, tools, equipment, which may be damaged by weather. Provide separate shed located where directed for paints and volatile materials. Provide fire extinguisher in each location and do not store combustible or hazardous materials in Building.

7 Sanitary Facilities

7.1 Provide and maintain temporary facilities in compliance with The Occupational Health and Safety Act, applicable codes and by-laws, sanitary facilities for use of workers. Provide portable, heated and weatherproof toilets, serviced at least weekly.

7.2 Post notices and take such precautions as required by local health authorities. Maintain in clean condition.

7.3 In light of COVID-19, provide hand washing facilities and hand sanitizing stations for use by all workers in compliance to all current regulatory entities such as COVID-19 Standardized Protocols for All Canadian Construction Sites.

7.4 Existing facilities may be used during summer break provided they are maintained in clean condition.

7.5 Have washroom facilities used by GC and their subcontractors professionally cleaned upon completion of work.

8 Water Supply

8.1 The Board shall provide a continuous supply of potable water for construction use.

9 Temporary Heating

9.1 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress, unless indicated otherwise in specifications. Maintain temperatures in occupied areas of the building to ensure comfort of the building occupants.

9.2 Ensure that in all areas of work where finishes are being installed that the minimum temperatures are established as required for the proper installation of Work. Be responsible for damage to the Work due to failure in providing adequate heat and protection during construction

10 Temporary Power and Light

10.1 The Board will pay for temporary power required during construction for temporary lighting and the operating of power tools.

11 Protection for Off-Site & Public Property

11.1 Protect surrounding private and public property from damage during performance of Work.

11.2 Be responsible for damage incurred.

11.3 Be responsible for damage incurred by Work Force where property has been damaged from vehicular traffic or parking on private or School Board property.

12 Fire Protection

12.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.

12.2 Open fires and burning of rubbish are not permitted on the site.

13 Protection of Building Finishes & Equipment

13.1 Provide adequate protection of the existing building to prevent migration of dust and other contaminants.

13.2 Provide protection for finished and partially finished building finishes and equipment during performance of Work from damage and staining and protect adjacent materials and/or work to prevent damage whether they have been or have not yet been installed. The responsible party shall make good any and/or all damage to the satisfaction of the Simcoe Country District School Board. Contractors shall be responsible for all work and materials pertaining to their work.

13.3 Provide necessary screens, covers, hoardings as required to protect new and existing work.

13.4 Be responsible for damage incurred and cleaning due to lack of or improper protection.

13.5 Should the work be suspended for any cause, the Contractor must assume all responsibility for the protection during the period of suspension.

14 Project Cleanliness

14.1 Maintain the Work in tidy condition, free from the accumulation of waste products and debris, other than that caused by the Board or other Contractors.

14.2 Remove waste material and debris from the site at the end of each working day.

14.3 Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.

14.4 Clean adjacent classrooms and corridors to the satisfaction of the Consultant where dust and other contaminants have infiltrated due to improper protection.

15 First Aid

15.1 Provide, at the work site, such equipment and medical facilities as required by Workmen's Compensation Act, to supply first-aid service to anyone who may be injured on the work site. In case of serious injury or death, report the accident immediately, to the proper authorities and to the Board and Consultant.\

16 Removal of Construction Facilities

16.1 Remove all temporary facilities from site when directed by Consultant.

**********END**********

1 Requirements Included

.1 Reference standards.
.2 Product quality, availability, storage, handling, protection, transportation.
.3 Manufacturer's instructions.
.4 Workmanship, co-ordination, cutting, fastenings.
.5 Existing facilities.

2 Reference Standards

2.1 Within the text of the specifications, reference may be made to the following standards:

ACI - American Concrete Institute
AISC - American Institute of Steel Construction
ANSI - American National Standards Institute
ASTM - American Society of Testing and Materials
CEC - Canadian Electrical Code (published by CSA)
CEMA - Canadian Electrical Manufacturer's Association
CGSB - Canadian General Standards Board
CISC - Canadian Institute of Steel Construction
CLA - Canadian Lumberman's Association
CPCA - Canadian Painting Contractors' Association
CPCI - Canadian Pre-stressed Concrete Institute
CRCA - Canadian Roofing Construction Association
CSA - Canadian Standards Association
FM - Factory Mutual Engineering Corporation
IEEE - Institute of Electrical and Electronic Engineers
IPCEA - Insulated Power Cable Engineers Association
NAAMM - National Association of Architectural Metal Manufacturers
NBC - National Building Code
NEMA - National Electrical Manufacturers' Association
TTMAC - Terrazzo, Tile and Marble Association of Canada
ULC - Underwriters' Laboratories of Canada

Conform to these standards, in whole or in part as specifically requested in the specifications.

2.2 Conform to latest date of issue of reference standards and amendments effect on date of submission of bids except where a specific date or issue is specifically noted.

2.3 Where Drawings and/or specifications exceed code or standard requirements, provide such additional requirements.

2.4 Where codes or standards or this specification does not provide all information necessary for complete installation of an item, then strictly comply with the manufacturer's instructions for first quality workmanship. In cases of

discrepancies consult the Architect for clarification.

2.5 In the event of conflict between any provisions of relevant codes and standards, the requirement of authority having jurisdiction shall apply.

3 Products and Materials

3.1 Quality

3.1.1 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.

3.1.2 Defective Products, whenever identified prior to the completion of Work, 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 rejection.

3.1.3 Should any dispute arise as to the quality or fitness of Products, the decision rests strictly with the Consultant based upon the requirements of the Contract Documents.

3.1.4 Unless otherwise indicated in the specifications, maintain uniformity of manufacture for any particular or like item throughout the building.

3.1.5 Permanent labels, trademarks and nameplates on Products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

3.2 Availability

3.2.1 Immediately upon signing Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of Products are foreseeable, notify the Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

3.2.2 In the event of failure to notify the Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Consultant reserves the right to substitute more readily available products of similar character, at no increase in Contract Price.

3.2.3 Storage, Handling and Protection

.1 Handle and store products in a manner to prevent damage, adulteration,

deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled Products in original and undamaged condition with manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in the Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, i.e. lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in a heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged Products at own expense and to the satisfaction of the Consultant.

4 Manufacturer's Instructions

4.1 Unless otherwise indicated in the specifications, install 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.

4.2 Notify the Consultant, in writing, of conflicts between the specifications and manufacturer's instructions, so that the Consultant may establish the course of action.

4.3 Improper installation or erection of Products, due to failure in complying with these requirements, authorizes the Consultant to require removal and re-installation at no increase in Contract Price.

5 Workmanship

5.1 General

5.1.1 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.

5.1.2 Do not employ any unfit person or anyone unskilled in their required duties. Where required by code or other by-laws and regulations, trades people shall be licensed in their trade. The Consultant reserves the right to require the dismissal from the site, workers deemed incompetent, careless, insubordinate or otherwise objectionable.

5.1.3 Any work not acceptable to the Owner, the Consultant or local authorities shall be removed and replaced when and as directed by them. The cost of re-executing such work shall be borne by the Contractor.

5.1.4 Where not otherwise specified or shown, all work must conform to the local governing codes and by-laws and to the Ontario and National Building Codes. All codes, standards, regulations and by-laws shall be of the latest date or amendment prior to tender issue.

5.2 Co-ordination

5.2.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

5.2.2 Be responsible for co-ordination and placement of openings, sleeves and accessories.

5.3 Concealment

5.3.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

5.3.2 Before installation, if any doubt arises as to means of concealment, or the intention of the Contract Documents in this regard, inform the Consultant before proceeding with the portion of work in question.

5.3.3 Make arrangements to have mechanical and electrical work and all structural components laid out well in advance of concrete placement and furring installation so that provision may be made for proper concealment. All such work shall be tested, inspected, pipe and duct covering applied where applicable, and approved before being concealed.

5.3.4 The Contractor takes full responsibility for informing the Consultant in advance of concealment, and shall notify the Consultant and arrange with the Consultant a time when a site review can take place prior to concealment. Failure to do so and any consequent opening up of finishes and structure is the sole responsibility of the Contractor.

5.4 Cutting and Remedial Work

5.4.1 Perform cutting and remedial work required to make the parts of the Work come together. Co-ordinate the Work to ensure this requirement is maintained.

5.4.2 Should work performed outside this contract necessitate cutting and/or remedial work to be performed, the cost of such work will be valued by the Consultant.

5.4.3 Perform cutting and remedial work by specialists familiar with the materials affected. Perform in a manner to neither damage nor endanger any portion of Work.

5.5 Location of Equipment & Fixtures

5.5.1 Obtain manufacturer's literature for roughing-in and hook-up of equipment, fixtures and appliances.

5.5.2 Submit field drawings to indicate relative position of various services and equipment when required by Consultant.

5.6 Fastenings

5.6.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

5.6.2 Prevent electrolytic action between dissimilar metals and materials.

5.6.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in the affected specification Section.

5.6.4 Space anchors within their load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

5.6.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

5.6.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

5.7 Protection of Work in Progress

5.7.1 Adequately protect Work completed or in progress. Work damaged or defaced due to failure in providing such protection is to be removed and replaced, or repaired, as directed by the Consultant, at no increase in Contract Price.

5.7.2 Adequately protect troweled concrete floors and finished flooring from damage. Take special measures when moving heavy loads or equipment on them.

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

6 Protection of Existing Utilities and Services

6.1 Where work involves breaking into or connecting to existing utilities and services, carry out work at times directed by Consultant and governing authorities, with minimum of disturbance to occupants.

6.2 Before commencing work, and during work, establish location and extent of existing utilities and service lines in area of Work and notify Consultant of findings. In particular take care and hand dig around existing utilities and service lines to establish levels affected by new work and relocation.

6.3 Contact appropriate Authorities having Jurisdiction to arrange meeting on site to review particular requirements when and notify Board and Consultant of any special requirements.

6.4 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

6.5 Record locations of maintained, re-routed and abandoned utilities and service lines.

**********END**********

Part 1 General

1.1 Section Includes

.1 Administrative procedures preceding preliminary and final inspections of Work.

1.2 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

.2 Supplementary Conditions

1.3 INSPECTION AND DECLARATION

.1 Contractor’s Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Consultant in writing of satisfactory completion of Contractor’s Inspection and that corrections from that inspection have been made.

.2 Request Consultant Inspection.

.2 Consultant's Inspection: Consultant and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested, adjusted and balanced and are fully operational.

.4 Certificates required by Boiler Inspection Branch, Fire Commissioner, Utility companies have been submitted.

.5 Operation of systems have been demonstrated to Owner's personnel.

.6 Work is complete and ready for final inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Board, Consultant and Contractor. If Work is deemed incomplete by Board and Consultant, complete outstanding items and request reinspection.

.5 Declaration of Substantial Performance: when Board and Consultant consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance. Refer to CCDC 2, General Conditions Article and Supplementary Conditions for specifics to application.

.6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty

period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment: when Board and Consultant consider final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. Refer to CCDC 2 and Supplementary Conditions. If Work is deemed incomplete by Board and Consultant, complete outstanding items and request re-inspection.

.8 Payment of Holdback: after issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount in accordance with CCDC 2 and Supplementary Conditions.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

************END**********

Part 1 General

1.1 RELATED SECTIONS

.1 Close Out Procedures Section 01 70 00

1.2 SUBMITTALS

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Copy will be returned after final inspection with Consultant's comments.

.3 Revise content of documents as required prior to final submittal.

.4 Two weeks prior to Substantial Performance of the Work, submit to the Consultant three 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 Furnish evidence, if requested, for 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.

1.3 FORMAT

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by divisions under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.4 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project; Date of submission; names.

.1 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

1.5 AS-BUILTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at site for Consultant and Owner one record copy of:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Change Orders and other modifications to Contract.
.5 Reviewed shop drawings, product data, and samples. Field test records.
.6 Inspection certificates.
.7 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Consultant.

1.6 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of black line opaque drawings.

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.2 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.3 Field changes of dimension and detail.

.4 Changes made by change orders.

.5 Details not on original Contract Drawings.

.6 References to related shop drawings and modifications.

.5 Specifications: 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 manufacturer's certifications, inspection certifications, and field test records, required by individual specifications sections.

.7 Prior to date of Substantial Performance, allowing sufficient time for review, clearly, neatly and accurately transfer information from marked-up white prints to digital format. Print lettering and numbers in size to match original. Lines may be drawn free hand, provided they are neat and accurate. Add **"AS-BUILT RECORD"** at each drawing title block. Should extensive changes and deviations to a drawing make information illegible, re-draft changed areas as required.

.8 Submit one (1) copy containing as-built record information for review, as for shop drawings.

.9 Prior to inspection for Total Completion, submit one (1) set, hard copy of as-builts, one (1) hard copy of the O&M Manual and one (1) USB flashdrive with scans of as-builts and O&M material to the Consultant. The Consultant will submit final PDF and DWG or RFT file of record drawings to the Board.

1.7 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.

.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.3 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.4 Include installed colour coded wiring diagrams.

.5 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.

.6 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.7 Provide servicing and lubrication schedule, and list of lubricants required.

.8 Include manufacturer's printed operation and maintenance instructions.

.9 Include sequence of operation by controls manufacturer.

.10 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.11 Provide installed control diagrams by controls manufacturer.

.12 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.

.13 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.14 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.15 Include test and balancing reports as specified in Division 15 and 16.

.16 Additional requirements: as specified in individual specification sections.

1.8 MATERIALS AND FINISHES

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

.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 Additional Requirements: as specified in individual specifications sections.

1.9 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 Deliver to location as directed; place and store.

.4 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.10 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 Deliver to location as directed; place and store.

.4 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

1.11 SPECIAL TOOLS

.1 Provide special tools, in quantities specified in individual specification section.

.2 Deliver to location as directed; place and store.

.3 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

1.12 STORAGE, HANDLING AND PROTECTION

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Consultant.

1.13 WARRANTIES AND BONDS

.1 Assemble in binder and submit upon acceptance of work. Organize binder as follows:

.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 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

.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 submittal.

.2 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.3 Respond in a timely manner to oral or written notification of required construction warranty repair work.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.1 Conform to Sections of Division 1 as applicable.

1.2 References

CSA S350-M80(1998)	Code of Practice for Safety in Demolition of Structures
CEPA, 1988	Canadian Environmental Protection Act
CEAA, 1995	Canadian Environmental Assessment Act
TDGA, 1992	Transportation of Dangerous Goods Act
MVSA, 1995	Motor Vehicle Safety Act
OPSS 510, Nov 2006	Construction Specification for Removal
OPSS 1010, Apr 2004	Aggregates – Base, Subbase, Select Subgrade and Backfill Material

1.3 Definitions

Hand Demolition: systematic demolition of structures by workers using hand-held tools.

Mechanical Demolition: systematic demolition of structures using powered equipment.

Systematic Demolition: methodical dismantling of structure piece by piece, usually carried out in reverse order of construction.

Rapid Progressive Failure: method of demolition where key elements of structure are removed causing rapid and complete collapse of whole or part of structure.

1.4 Quality Assurance

1.4.1 Requirements:

Conform to The Occupational Health and Safety Act, Ontario Regulation 213/91, Amended to O.Reg. 85/04: Construction Projects.

Conform to Occupational Health and Safety Act Revised Regulation of Ontario, Regulation 838, Amended to O.Reg 104/04, Designated Substance - Asbestos on Construction Projects and in Building and Repair Operations;

Conform to OBC, especially Article 2.3.2.3 as applicable.

Conform to Fire Code, Regulation under the Fire Marshals Act especially Part 8.

1.4.2 Qualifications:

Employ for this work demolition company having 5 years Canadian experience in this type of work. If requested, submit proof of experience and list of projects.

1.5 Project Conditions

1.5.1 Existing Conditions:

1.5.1.1 Remove all structures, walls, flooring, ceilings, wall mounted material, trenching in existing slabs, doors, windows, window sills etc.

1.5.1.2 **Remove chalkboards and salvage for modification for exterior playground equipment. Remove and salvage millwork designated for reuse at Custodian Office for modification.**

1.5.1.3 Remove items noted on drawings for salvage, protect and store for re-installation.

1.5.1.4 Remove all building components at exterior affected by construction of new Work.

Carefully remove face brick at new openings and salvage for toothing into jambs where new windows, doors and screens are being installed.

1.5.1.5 Remove asphalt and concrete pavers in area of new work in preparation of excavation. **Salvage any interlocking pavers for re-installation as may be required.**

1.5.1.6 Remove sod, topsoil and subsurface material as may be required in preparation of proposed new playground and playground surfaces and as noted on drawings.

1.5.1.7 Maintain road and fire access to the building at all times.

1.5.1.8 Schedule noisy operations with consideration for ongoing school operations. Do not schedule noisy work before 7:00 am or after 8:00 pm. Schedule noisy operations during the school year at off-hours or weekends.

1.5.1.9 Do not disturb existing paving intended to remain. Repair all damage which is the result of Work of this Contract.

1.5.1.10 Protect the public and staff in the area of work during the removals and upon completion of components of work at end of each work day.

1.5.2 Maintaining Traffic:

1.6.2.1 Do not close or obstruct streets, sidewalks, alleys, passageways without permits. Do not place or store materials in streets, alleys or passageways.

1.5.2.2 Conduct operations with minimum interference with roads, streets, driveways, alleys, passageways.

2 PRODUCTS – Not applicable

3 EXECUTION

3.1 Preparation

3.1.1 Preliminary Survey:

3.1.1.1 Before commencing demolition/removal operations, examine Site to determine type of construction, condition of structure and Site conditions.

3.1.1.2 Assess potential effect of removal of any part or parts on the remainder of structure before such part(s) are removed.

3.1.1.3 **Assess effects of removals on existing structure and consider need for underpinning, shoring and/or bracing as well as performing locates to determine location of all services in area of work.**

3.1.1.4 **Contractor is responsible for scanning and x-raying existing slabs to ensure no lines and services are running below the slab before undertaking any slab cutting.**

3.1.1.5 Contact municipal authorities or utility companies for assistance in locating and marking services passing under, through, overhead or adjacent to structure to be altered. Such services include:

- electrical power lines
- gas mains
- oil pipelines
- communication cables
- water mains
- drainage piping (storm and sanitary)

3.1.1.5 After determining demolition methods, determine area of possible vibration. Carefully inspect beyond those adjacent areas. List potential damage areas and photograph each for record purposes before starting work.

3.1.2 Protection:

3.1.2.1 Provide, erect and maintain required hoarding, lights as may be required and other protection around Site before commencing work, particularly before removal of parts of exterior wall. Confirm with the Board all security measures required to be maintained prior to erecting the hoarding. Maintain such areas free of snow, ice, mud, water and debris.

3.1.2.2 Provide flagmen where necessary or appropriate to provide effective and safe access to Site to vehicular traffic and protection to pedestrian traffic.

3.1.3.3 Ensure scaffolds, ladders, equipment and other such equipments are not accessible to public. Protect with adequate fencing or remove and dismantle at end of each day or when no longer required.

3.1.3.4 Protect existing adjacent work against damages which might occur from falling debris or other causes due to work of this Section.

3.1.3.5 Where necessary to seal fire exits of adjoining or adjacent buildings, provide other exits in compliance with applicable fire safety and building regulations.

3.1.3.6 Where demolition operations prevent normal access to adjacent properties, provide and maintain suitable alternative access.

3.1.3.7 Maintain existing fire routes on Site.

3.2 Performance

3.2.1 General:

3.2.1.1 Ensure demolition work is supervised by competent foreman at all times.

3.2.1.2 Materials and debris shall not be stacked in building to extent that overloading of any part of structure will occur.

3.2.1.3 At end of each day's work leave work in safe condition ensuring that no parts of structure are in danger of collapsing.

3.2.1.4 Carry out demolition in accordance with requirements of CSA S350-M. Demolish structure and remove materials from Site.

3.2.1.5 Demolish masonry and concrete walls in small sections. Remove and lower structural members and other heavy objects with safe and suitable equipment.

3.2.1.6 At end of each day's work leave work in safe condition ensuring that no parts of structure are in danger of collapsing.

3.2.1.7 Until acceptance, maintain and preserve active utilities traversing premises.

3.2.1.8 Keep work wetted down to minimize dust.

3.2.1.9 Minimize noise. Avoid use of noisy machinery outside working hours.

3.2.1.10 Protect from weather parts of adjoining structures not previously exposed.

3.2.1.11 **Firestopping and Smoke Seal:** In event that work of this Section impacts on integrity of fire separations, ensure that trade performing firestopping is notified.

3.2.2 Demolition:

3.2.2.1 Demolish components of structure where indicated on drawing, and remove materials from Site.

3.2.2.2 Demolish and remove sections of masonry where new windows and entrances will be located, interior partitions, screens, walls, ceilings, flooring down to concrete substrate, except those specified and/or indicated to remain. Store materials designated to be re-installed.

3.2.2.3 Remove all mechanical and electrical items indicated to be removed.

3.2.3 Methods:

3.2.3.1 Hand and mechanical demolition shall be acceptable methods for work of this Section. Verify with Consultant and Board whether proposed methods of demolition are acceptable.

3.3.3.2 Following methods of demolition will not be permitted in work of this Contract:

- Use of rapid progress failure methods.

- Mechanical method of demolition whereby wrecking is accomplished by smashing walls or floors with heavy weight suspended by cable from boom or hoist

3.3 Disposal Of Waste Materials

3.3.1 Selling or burning of materials on Site is not permitted.

3.3.2 Conform to requirements of municipality's Works Department regarding disposal of waste materials.

3.3.2.1 Materials prohibited from municipality waste management facilities shall be removed from Site and dispose of at recycling companies specializing in recyclable materials.

End of Section.

1 GENERAL

1.1 General Requirements

1.1.1 Conform to Sections of Division 1 as applicable.

1.2 Related Work Specified Elsewhere

1.2.1 Installation of Services: As noted on Electrical Drawings

1.3 Source Quality Control

1.3.1 Conform to CSA/CAN-A23.2 for testing methods and procedures.

1.4 Reference Standards

1.4.1 Do cast-in-place concrete work in accordance with CSA-A23.1, A23.2, except where specified otherwise.

1.4.2 CAN/CSA-S269.3, Concrete Formwork, National Standard of Canada

1.5 Product Delivery, Storage & Handling

1.5.1 Handle and store reinforcement and accessories to ensure that contamination by bond reducing or foreign matter, and damage to its fabricated form does not occur.

1.6 Environmental Requirements

1.6.1 Place concrete in cold and hot weather as specified in CSA/CAN-A23.1.

2 PRODUCTS

2.1 Materials

2.1.1 Concrete materials as specified in CSA/CAN-A23.1, A23.3

.1 Cement: Type 10, normal.

.2 Water: to CAN/CSA-A23.1.

.3 Aggregates: to CSA-A23.1/A23.2. Coarse aggregates to be normal density.

.4 Air entraining admixture: to CSA C266.1

.5 Chemical admixtures: to CSA C266.2 and CSA A266.4, Type A . Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.

.6 Curing and Sealing Compound to be SUPER DIAMOND CLEAR by Euclid Chemical Company or an equal product by BASF

2.1.2 Premoulded joint fillers: Bituminous impregnated fiber board: to ASTM D1751.

2.1.3 Synthetic Macro-Fiber: Synthetic (Polyolefin) macro-fibers shall comply with ASTM C1116/C116M, Type III and ASTM D 7508. Synthetic macro-fiber shall be a minimumof 38mm length, a minimum aspect ratio of 70, and shall provide a minimum tensile strength of 483 MPa (70ksi).

.1 Synthetic macro-fibers are to be Tuf-Strand SF by Euclid Chemical Company ora comparable and equivalent product by Sika Corporation or BASF (subject to Consultant approval).

2.1.4 Formwork materials:

.1 For concrete without special architectural features, use exterior grade plywood,resin-coated on the side in contact with concrete. Use sound undamaged plywood with clean true edges.

.2 Rigid insulation board: to CAN/ULC-S701.

.3 Concrete form tube (outdoor play equipment) – diameter to be 2X size of post, refer to drawings – for ArtWall Chalkboard - 12” diameter x 48” length by Sonotube, Sakrete or equal.

2.1.5 Form Ties: For concrete not designated 'Architectural', use removable or snap-off metal ties,fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.

2.2 READY MIX CONCRETE

.1 Proportion normal density concrete in accordance with CSA-A23.1, to achieve concrete properties as stated in the structural notes.

.2 Concrete shall be proportioned by the water-cement ratio, and to provide a plastic and workable mix without the formation of free lime on the surface.

.3 Mix shall be designed for both strength and durability. Submit to the Inspection and Testing Agency the mix design for the different classes of concrete specified.

.4 The amount of free moisture in the aggregate shall be deducted from the amount of mixing water being added.

.5 Specified slumps shall be maintained and checked periodically with slump tests. For placement of concrete for slabs, the contractor may utilize mid-range plasticizer to achieve increased slumps, upon approval of the Engineer, and no additional cost to the contract.

.6 **Concrete Mix for Slab Repair**

.1 Extend ready to use, CPD Rapidcrete with equal weight (or loose volume) of clean 10 mm (3/8”) pea gravel for patching. Use only

enough water to achieve the desired consistency. Do not exceed 5 L (1.32 US gal) of water per 25 kg (55 lb.) bag.

.2 Follow manufacturer's written instructions for use, surface preparation, application, limitations and curing of concrete mix.

2.3 CLASSES OF CONCRETE

.1 Interior Slabs on Grade (heated spaces): C; Strength 25 MPa; Slump 75 mm (+/-25); Air (percent) up to 3%

.2 Exterior Slabs on Grade (unreinforced) (unheated): F, Exposure Class C-2; Strength 32 MPa; Slump (mm) 75 (+/-25);Air (percent) 5 – 8%

3 EXECUTION

3.1 Examination

3.1.1 Verify lines, and levels and column centres before proceeding with formwork and ensure dimensions agree with drawings.

3.1.2 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

3.1.3 Examine formwork to ensure that it has been completed and adequately braced in place before commencing to place reinforcement.

3.1.4 Ensure that no water is present and no flooding water is permitted on foundation beds and skim coats where footings and other concrete work are to be placed. Place concrete only on frost-free ground. Remove previously frozen bearing surfaces.

3.1.5 Ensure that compacted fill has been placed to meet specified requirements; and that under-slab services have been installed, inspected, tested and approved.

3.2 Formwork

3.2.1 Construct forms to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA/CAN-A23.1/

3.3 Reinforcement

3.3.1 Place reinforcement as specified in accordance with requirements in CSA/CAN-A23.1-M90 and of sizes, at spacing, and in locations as shown on Drawings.

3.3.2 Support reinforcement by positive means which ensures cover for steel in accordance with CSA/CAN-A23.1-M90, or as otherwise shown on Drawings. Install non-marring and approved supports at exposed concrete surfaces.

3.3.3 Do not cut reinforcement, either before or after concrete is placed, to permit incorporation of other Work.

3.3.4 **For Concrete Slab Repair**:

In locations where new concrete is dowelled to existing work,.

.1 Place steel dowels of deformed steel reinforcing bars and pack solidly withshrinkage compensating grout to anchor and hold dowels in positions as indicated.

.2 Cut slab on either side of trench to insert 10M bars every 400 mm o.c. centre of existing slab to bridge trench to provide reinforcement.

3.4 **Placing Concrete**

3.4.1 Place concrete as specified in CSA/CAN-A23.1/A23.2

3.4.2 Inform Architect least 48 hours before each concrete placing operation.

3.4.3 Maximum time between adding mix water and complete discharge of concrete into formsshall be ninety minutes

3.4.4 Do not permit vertical free fall of concrete mix to exceed 1500 mm.

3.4.5 Do not use concrete mixed more than 1 hour after introduction of mixing water during hot weather conditions or 1-1/2 hours during other periods or concrete contaminated by foreign materials. Do not deposit concrete which has partially set or hardened. Remove hardened or partially hardened concrete which has accumulated on forms or reinforcement. Do not place concrete on previously deposited concrete which has hardened sufficiently to causeformation of seams or planes of weakness within respective members or sections.

3.4.6 Do not deposit concrete which has partially set or hardened. Remove hardened or partially hardened concrete which has accumulated on forms or reinforcement. Do not place concrete on previously deposited concrete which has hardened sufficiently to causeformation of seams or planes of weakness within respective members or sections.

3.4.7 Thoroughly compact concrete during and after depositing by spacing and

vibration to work the concrete around reinforcement and inserts so that finished concrete is dense, uniform and free of air holes or honeycombs.

3.4.8 Joint fillers.

.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Consultant.

.2 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

3.5 **Defective Materials and Workmanship**

3.5.1 Materials or workmanship which fail to meet specified requirements may be rejected by Architect whenever found at any time prior to final acceptance of the work, regardless of previous inspection. If rejected, defective materials or work incorporating defective materials or workmanship shall be removed and replaced or repaired to satisfaction of Architect promptly, at no expense to Client.

3.6 Finishing and curing:

.1 Finish and cure concrete to CSA A23.1/A23.2.

.2 Use procedures as reviewed by Consultant to remove excess bleed water. Ensuresurface is not damaged.

.3 Finish concrete floor to architectural requirements.

.1 Exposed Surfaces:

.1 Cut off projecting fins, cut out and fill all honeycombed areas and fill all holes left by form separators using a 1:2 cement-sandmix and a bonding agent.

.2 Non-Exposed Surfaces:

.1 Honeycombing shall be cut out and filled and any fins which interfere with strapping, etc. shall be cut back. Holes left by formseparators shall be filled.

.4 Exposed sharp edges of concrete to have 3 mm minimum radius edges unlessotherwise indicated.

.5 Where shown on the Architectural Contract Drawings, floor slabs to be “sealed”shall be sealed with an approved sealing compound.

.1 Consolidate and screed concrete slabs-on-grade by use of vibratory screed of size toallow construction joint pattern as indicated on the Contract Drawings.

.2 Excessive honeycomb or embedded debris in concrete is not acceptable. NotifyConsultant immediately and await written instructions before proceeding.

3.7 Cold Weather Protection Requirements

3.7.1 Conform to the requirements for CSA A23 as well as the following requirements.

3.7.2 Protection against early frost damage:

.1 Effective means shall be provided for maintaining the temperature of the concrete in place above the minimum limits shown in Table 14 in CSA A23.1 for a minimum period of 3 days or until sufficient hydration has occurred to protect the concrete from frost damage.

3.7.3 Protection for structural safety:

.1 If subsequent to the above period or protection, the ambient conditions are not likely to be favourable for continuous strength development, the protection period shall be extended until the concrete has achieved sufficient strength for structural safety.

3.7.4 Protection for strength and durability:

.1 When subsequent ambient conditions are not conducive to continued curing and strength development, the protection period shall be extended until a total period of 7 days at temperatures above 10 degrees C.

3.7.5 Equipment and materials capable of maintaining adequate temperature, humidity and protection shall be available on site and be ready for operation when any concrete is placed.

3.8 Hot Weather Protection Requirements

3.8.1 Conform to the requirements for CSA A23 as well as the following requirements.

3.8.2 Job Preparation:

.1 Facilities shall be provided for the protection of the concrete in place from the effects of hot and/or drying weather conditions. In extremely hot weather, the formwork, reinforcement and concreting equipment shall be protected from the direct rays of the sun or cooled by fogging and evaporation.

3.8.3 Concrete Temperature:

.1 When the air temperature is at or above 25 degrees C or when there is a probability of it rising to this during the placing, a special effort shall be made to maintain the temperature of the concrete as low as practicable and in no case more than that stipulated in Table 14 in CSA A23.1.

3.9 Slab-On-Grade

3.9.1 Slab-on-grade shall not be cast in sections exceeding 950m2. Contractor shall take necessary measures to prevent excessive cracking if pour size is increased and shall be responsible for repairing cracked concrete resulting from exceeding the recommended maximum pour size. Each pour shall be bounded by a vertical bulkhead or abutting construction joint.\

3.9.2 Synthetic Macro-Fiber reinforcement to be provided in all slabs on grade. Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of 3.0 lb/cu. yd. (1.78 kg/cu. m) for concrete slabs. Finish fiber reinforced concrete so as to minimize visible fibers at the surface of the concrete.

3.9.3 Provide saw-cut control joints as soon as possible after slab is poured as shown on the Contract Drawings.

3.9.4 Where floor depressions occur, maintain the slab thickness specified.

3.9.5 Do not use frozen material containing ice or snow. Do not place concrete on frozen subgrade or on sub-grade containing frozen material.

3.9.6 Grind smooth, sand, torch or otherwise remove any surface defects or exposed fibers that would telegraph through applied coatings or floor coverings.

3.9.7 Apply Curing and Sealing Compound as specified above: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during minimum 3-day curing period. Remove curing compound (if required for floor finishes) only after minimum 3-day curing period has finished.

END OF SECTION

1 General

.1 Conform to Sections of Division 1 as applicable.

1.1 RELATED WORK

.1 Section 03 32 00 – Concrete Reinforcing.

.2 Section 03 33 00 – Cast-in-Place Concrete.

.3 Related Work may also be found in other Sections not directly referenced.

1.2 REFERENCES

.1 CSA A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.8 CAN/CSA-S269.3-M92(R2013), Concrete Formwork.

1.3 DESIGN

.1 The design of formwork, shoring, etc. shall be the responsibility of the Contractor, who shall engage competent personnel to do so.

.2 Design shall be in conformance with regulations of the Ministry of Labour for the Province of Ontario.

.3 Formwork shall be of sufficient strength and rigidity to support all concrete, construction loads and wind, taking into account the proposed rate and methods of pouring concrete, so that the resulting finished concrete conforms to shapes, lines and dimensions that the members show in detail.

2 Products

2.1 MATERIALS

.1 Formwork materials:
- .1 For concrete without special architectural features, use plywood and wood formwork materials.
- .2 to conform to CAN/CSA A23.1
- .3 12” diameter concrete forming tubes – Quikrete, SonoTube, Sakrete or equal

.2 Form ties:
- .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surface.

.3 Form release agent: chemically active release agents containing compounds that react with free lime in concrete resulting in water insoluble soaps.

.4 Form stripping agent: colourless mineral oil, free of kerosene, with viscosity between 70 and 110 s Saybolt Universal at 40°C, flashpoint minimum 150°C, open cup.

3 Execution

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork, and ensure dimensions agree with drawings.

.2 Obtain Engineer's approval for use of earth forms framing openings not indicated on drawings.

.3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

.4 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA A23.1.

.5 Keep form joints to minimum.

.6 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated. Follow manufacturer’s instructions for installation of expansion joint filler.

.7 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.8 Clean formwork in accordance with CSA A23.1, before placing concrete.

3.2 INSERTS

.1 Set openings and sleeves, ties, anchor bolts, dowels to masonry walls and other inserts in concrete floors and walls, as required by other trades and in accordance with their placing drawings.

.2 All sleeves, openings, etc. shown on structural drawings must be checked with architectural, mechanical and electrical drawings. Sleeves, openings, etc. not shown must be approved by the Consultant.

3.3 JOINTS IN CONCRETE

.1 Neatly form construction and expansion joints along straight line, level or plumb, and in accordance with details and locations shown on drawings.

END OF SECTION

1 GENERAL

1.1 General Requirements

1.1.1 Conform to Sections of Division 1 as applicable.

1.2 Special Protection

1.2.1 During construction, protect finished surfaces from abrasion by foot and wheel traffic. Ensure that work of this Section and other Sections incorporating the use of oils and other deleterious materials, are not performed on finished areas, unless finished areas are fully protected by approved covers. Co-operate with other trades to ensure finished work will not be damaged.

1.3 Qualifications of Applicator

1.3.1 Work of this Section shall be performed by an approved, established floor finishing company having a proven record of satisfactory workmanship for a period of at least 5 years.

1.3.2 Have representative of the manufacturer present during the application of the floor finishing materials to ensure proper procedure is adhered to.

1.4 Maintenance Data

1.4.1 Provide instruction manuals for proper procedures to be taken in the cleaning maintenance of concrete floors which are to be left exposed in the finished Work, for incorporation into Maintenance Manual specified in Section 01 78 00 – Close Out Submittals.

2 PRODUCTS

2.1 Materials

2.1.1 Concrete materials to Section 03 33 00 - Cast-In Place Concrete.

2.1.2 Curing compound: white pigmented curing compound:
“1100 Clear” as manufactured by W.R. Meadows or equal.

2.1.4 Water: potable water

2.1.5 Cleaners, thinners and accessories: type recommended by manufacturer for purpose intended.

3 EXECUTION

3.1 General

3.1.1 Work in close co-operation with Section 03 33 00 during casting of concrete. Immediately after floor slabs and decks have been cast, begin finishing by screeding slabs to proper shape and elevation, bull and machine float, and steel trowel to produce smooth, dense surfaces free from ridges, voids and machine marks in accordance with applicable requirements of CSA-A23.1-09.

3.1.2 Float surfaces and avoid bringing water and fines to surfaces by over floating. Repeat operation after time interval necessary for any sheen to disappear and concrete to set further.

3.2 Workmanship

3.2.1 Steel trowel concrete slab to be left exposed or to receive resilient flooring, carpeting, floor hardeners.

3.2.2 Screed off new concrete slabs to receive ceramic and quarry tile, to true lines and levels shown and leave ready to receive finish. Depress slabs to accommodate finish.

3.2.3 Where floor drains occur, finish floors straight and level at walls and provide minimum 5 mm per m (1/16" per foot) uniform pitch to drains, unless indicated otherwise.

3.2.4 Provide shelf type dividing strips at junction of exposed concrete floors and ceramic tile. Centre dividing strips under centerline of doors where this condition occurs, unless indicated otherwise. Install dividing strips in true, straight lines and flush with finished floor and shelf set at correct depth to receive ceramic tile floor finish.

3.2.5 Completed surfaces shall not vary more than 6 mm in 3,000 mm (1/4" in 10'-0") from dead level except where slopes, and slopes to drains are required.

3.2.6 Float surface with wood or metal floats or with power finishing machine and bring surface to true grade.

3.2.7 Unless otherwise specified, steel trowel to smooth and even surface to within 3 mm (1/8") tolerance when measured in any direction using 3 m (10 ft.) straight edge.

3.2.8 Provide additional steel trowelling where concrete slab is to be left exposed.

3.2.9 Apply wood float finish to areas to be covered with ceramic tile.

3.3 Floor Finish - General

3.3.1 Finish concrete in accordance with CSA A23.1-09, Class A.

3.3.2 Do not sprinkle dry cement or dry cement and sand mixture over concrete surfaces.

3.4 Curing

3.4.1 Commence curing operations immediately after finishing has been completed.

3.4.2 Cure concrete in accordance with CSA-A23.1-09 except where specified otherwise.

3.4.3 Unless otherwise specified cure concrete surfaces by covering with burlap, geotextile fabric, or 4 mil polyethylene sheeting, lapped and sealed with tape at joints, and firmly anchored in place; leave covering in place for at least 7 days. Ensure concrete is kept continuously moist during curing period.

3.4.4 Apply curing compound to concrete surfaces as recommended by manufacturer. .

3.5 Crack Repair

3.5.1 Prior to completion of the project and in any case not sooner than 28 days after concrete has been placed, examine concrete floor surfaces and repair all major cracks in them. Rout cracks out with mechanical router. Leave cracks clean.

3.6 Schedule

Following curing methods and finishes shall be applied to the corresponding surfaces:

SURFACE	CURING METHOD	CONCRETE FINISH
Exposed concrete floors, Classrooms, corridors other ancillary rooms	Wet Cure Single application Curing compound	steel trowel

Concrete to accept VCT or sheet flooring	Wet cure	steel trowel
Concrete sidewalk and curbs	Curing compound	coarse bristle brush

********** END **********

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 60 00 – Material and Equipment

.2 Section 03 30 00 Cast-in-Place Concrete

.3 Section 04 20 00 – Unit Masonry

.4 Section 05 50 00 – Miscellaneous Metals.

.5 Section 07 92 00 - Sealants.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).

- .1 CSA-A165 Series-04 (R2014), Standards on Concrete Masonry Units.
- .2 CSA A179-04, Mortar and Grout for Unit Masonry.
- .3 CSA-A371-04 (R2014), Masonry Construction for Buildings.
- .4 CSA S304.1-04, Design of Masonry Structures

1.3 QUALITY ASSURANCE

.1 Mock-ups.

- .1 Construct mock-up panel of exterior masonry where face brick is being toothed in at new windows.
- .2 Mock-up will be used:
  - .1 To judge workmanship, substrate preparation, operation of equipment and material application.
  - .2 For testing to determine compliance with performance requirements. Perform following tests.
    - .1 For clay units, in addition to requirements set out in referenced CSA and ASTM Standards include data indicating initial rate of absorption.
- .3 Construct mock-up where directed.
- .4 Allow 24 hours for inspection of mock-up by Consultant before proceeding with work.
- .5 When accepted by Consultant, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, handle and protect materials in accordance with Section 01 60 00 – Material and Equipment.

.2 Deliver materials to job site in dry condition.

.3 Storage and Protection.

- .1 Keep materials dry until use.
- .2 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

1.5 SITE CONDITIONS

.1 Site Environmental Requirements.

.1 Cold weather requirements.

.1 Supplement Clause 5.15.2 of CSA-A371 with following requirements.

.1 Maintain temperature of mortar between 5 degrees C and 50 degrees C until batch is used or becomes stable.

.2 Maintain ambient temperature between 5 degrees C and 50 degrees C and protect site from windchill.

.2 Hot weather requirements.

.1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

.2 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.

Part 2 Products

2.1 MATERIALS

.1 Masonry materials are specified in Related Sections.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 PREPARATION

.1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

3.3 INSTALLATION

.1 Do 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 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

.4 For sections of concrete block walls, as at door frames, and including short nibs which are less than 600 mm wide, fill cores of block units with mortar. Consolidate mortar with proper sized vibrators

3.4 CONSTRUCTION

.1 Exposed masonry.

.1 Remove chipped, cracked, and otherwise damaged units, in accordance with CSA A-165, Clause 82.1, in exposed masonry and replace with undamaged units.

.2 Where masonry is generally the finish in the building, bond must not be broken and patching of areas will not be acceptable

.2 Jointing.(Raked)

.1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, joints true to line, compressed, uniformly concave joints where concave joints are indicated.

.3 Cutting.

.1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.

.2 Make cuts straight, clean, and free from uneven edges.

.4 Provisions for Other Trades.

.1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.

.2 Provide openings in masonry walls where required or indicated for work of other trades.

.3 Co-operate with other trades and accurately locate chases and openings and neatly finish to required sizes.

.4 Where masonry encloses conduit or piping, bring to proper level as directed. Do not cover any pipe or conduit chases or enclosures until advised that work has been inspected, tested and approved.

.5 Building-In.

.1 Build in items required to be built into masonry.

.2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.

.3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.

.4 For exterior frames, completely fill frame voids with loose glass fibre insulation.

.5 Where required, fill cores of concrete block units with mortar for anchoring built-in items.

.6 Wetting of bricks.

.1 Except in cold weather, wet bricks having an initial rate of absorption exceeding 1 g/minute/1000 mm^2: wet to uniform degree of saturation, 3 to 24 hours before laying, and do not lay until surface dry.

.2 Wet tops of walls built of bricks qualifying for wetting, when recommencing work on such walls.

.7 Support of loads.

.1 Use Table 5 to CSA A179 where grout is used in lieu of solid units.

.2 Install building paper below voids to be filled with grout; keep paper 25 mm back from faces of units.

.8 Provision for movement.

.1 Leave 6 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.

.2 Built masonry to tie in with stabilizers, with provision for vertical movement.

.9 Loose steel lintels.

.1 Install loose steel lintels. Centre over opening width.

.10 Control joints.

.1 Construct continuous control joints as indicated on structural drawings.

3.5 SITE TOLERANCES

.1 Tolerances in notes to Clause 5.3 of CSA-A371 apply.

3.6 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.7 PROTECTION

.1 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

END OF SECTION

1 GENERAL:

1.1 General Requirements:

1.1.1 Conform to Sections of Division 1 as applicable.

1.2 Related Work

1.2.1	Demolition:	Section 02 41 00
1.2.2	Cast-In-Place Concrete:	Section 03 30 00
1.2.2	Loose steel lintels:	Section 05 50 00
1.2.3	Sealant:	Section 07 92 00

1.3 Quality Assurance

1.3.1 Unless otherwise specified, do masonry work in accordance with CSA S304.1-04(R2010), Masonry Design and Construction for Buildings; CSA A370-14 (R2018), Connectors for Masonry; and to CSA A371-04 (R2014), Masonry Construction for Buildings, and to publication "Recommended Practices & Guide Specifications for Cold Weather Masonry Construction issued by the Canada Masonry Centre.

1.3.2 Do masonry mortar work to CSA A179-04(R2014), except where specified otherwise.

1.3.3 Build mock-up to demonstrate masonry repair where mechanical convectors are being removed to ensure wall assembly is integrated into existing adjacent assembly

1.4 References

.1 CSA S304.1-04(R2010), Masonry Design and Construction for Buildings
.2 CSA A370-14 (R2018), Connectors for Masonry
.3 CSA A371-04 (R2014), Masonry Construction for Buildings
.4 CSA A165 Series-14 (R2019) CSA Standard on Concrete Masonry Units
.5 CSA A179-14 (R2019) Mortar and Grout for Unit Masonry
.6 CAN/CSA A3000-18∗ Cementitious Materials Compendium

1.4 Product Delivery, Storage, and Handling

1.4.1 Deliver materials dry, in sequence to meet construction schedule.

1.4.2 Do not use materials which have been damaged by exposure to moisture or by any other cause.

1.4.3 Store sand on platforms to avoid inclusion of foreign materials.

1.4.4 Store masonry units on pallets or plank platforms held off above ground and protect with waterproof covers.

1.4.5 Protect stored sand and masonry units with weatherproof covers.

1.5 Cold Weather Requirements

1.5.1 Supplement Clause 5.16.2 of CSA A371 with following requirements:

1.5.2 Maintain temperature of mortar between 5°C and 50°C until used.

1.6 Hot Weather Requirements

1.6.1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

1.7 Protection

1.7.1 Keep masonry dry using waterproof, non- staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.

1.7.2 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

1.7.3 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

2 PRODUCTS

2.1 Materials

2.1.1 Face Brick: Salvaged brick for toothing in brick at new openings.

2.1.2 Concrete Block:

.1 Concrete block shall be autoclaved, modular size with uniform medium texture. Provide headers, jambs, bullnosed corners, lintels, bond beams, halves, piano, sash block and other special units as may be required to complete the work. Block in the various thicknesses and sizes shall have a solids content in all cases to provide the fire rating required where fire rated walls are indicated. **Provide square block corners at first course of interior walls and at top course at ceilings to allow base and ceiling trim to be installed.**

.2 Hollow load bearing and non-load bearing concrete block masonry units: Type H/7.5/A/M and, Type H/7.5/C/M autoclaved to CSA A165 Series.

.3 Light Weight Concrete Units; Hollow in modular sizes shown, Type H/7.5/A/M and, non-load bearing, autoclaved to CSA A165 Series.

.4 Special shapes: provide bull-nosed units for exposed corners. Provide purpose-made shapes for lintels and bond beams. Provide additional special shapes as indicated.

.5 Solid load bearing and non-load bearing concrete block masonry units: to CSA A165 Series, Type S/12.5/A/M and Type S/12.5/C/M.

2.1.2 Masonry Reinforcement:

.1 DA 3100 Truss by Dur-O-Wal Ltd., or Block-Trus BL30 by Block-Lok Ltd. or equal, 3.8 mm nominal diameter (No.9 Steel ga.) deformed wire for single block wythes hot dipped galvanized; sized 50 mm (2") narrower than wall.

2.1.3 Foam filler strips: of thickness required to provide 25% compression when in place. Filler strips shall be dry foam "RESCOR" as manufactured by W.R. Meadows, or approved equal.

2.1.4 Masonry Anchors to tie new masonry units to existing walls: Use 8 mm Spira-Lok Helical 304, stainless steel tie for block to block at the mortar joint, using 5.00 entry hole as recommended by manufacture.

2.2 Mortar and Grout Materials:

.1 General: CSA A179.

.2 Aggregate: to CSA A82 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.

.3 Water: potable, to CSA A179

.4 Masonry cement: Type H to CAN/CSA A3000, Federal White.

2.3 Mortar Types

2.3.1 Use same brands of materials and source of aggregate for entire project.

2.3.2 Mortar for exterior masonry above grade:

.1 Structural Loadbearing: Type S

.2 Non-loadbearing, Partitions and Veneer: Type N

2.3.3 Following applies regardless of mortar types and uses specified above:

.1 Mortar for grouted reinforced masonry: Type S

.2 Mortar for pointing: prehydrated Type N

.3 Grout shall be of pourable consistency and shall be fine grout on the basis of proportion specifications, in accordance with Table 3 of CSA A179.

2.4 Mixes:

2.4.1 Mix mortar ingredients thoroughly in quantities needed for immediate use.

2.4.2 Mix mortar in mechanical mixer, operated until materials are homogeneously blended, but not less than 3 minutes after all materials are in mixer.

2.4.3 Clean mixer after each batch.

2.4.4 Mix mortar in proportions specified in CSA A179.

3 EXECUTION

3.1 Workmanship

3.1.1 Build masonry work true-to-line, plumb, square and level, with vertical joints in proper alignment. Lay work from face of coursing to maximum plumb tolerance of 6 mm in 2.4 m and to maximum tolerance of 3 mm in 2.4 m in the plane.

3.1.2 Assume complete responsibility for dimensions, plumb and levels of this work and constantly check same with graduated rod.

3.1.3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.1.4 Construct masonry work so that both vertical and horizontal joints are of equal and uniform thickness.

3.1.5 Maintain a 25 mm deflection space between underside of structure above and top of non-load bearing walls. Other than at fire separations, fill deflection space with glass fibre board compressed to 50% of its original thickness or with foam filler strips. Leave space for caulking deflection space on both sides of wall.

3.1.6 Buttering corners of units, throwing mortar into joints, deep or excessive furrowing of bed joints not permitted. Do not shift nor tap units after

mortar has taken initial set. Where adjustments must be made after mortar has started to set, remove mortar and replace with fresh supply.

3.1.7 Beam fill to top of beams, joists, around items passing through masonry walls after items have been installed.

3.1.8 Where new masonry abuts old or fully set masonry, clean existing surfaces and dampen if necessary to obtain bond.

3.1.9 Keep exposed faces free from stains, chips and cracks. Chipped or blemished units may be used where they are concealed; defective and broken units will be rejected.

3.1.10 Where masonry is generally the finish in the building, bond must not be broken and patching of areas will not be acceptable.

3.1.11 Where necessary to temporarily stop horizontal runs of masonry, and building corners, step back masonry diagonally to lowest course previously laid. Do not "tooth" new masonry. Fill in adjacent courses before heights of stepped masonry reach 1200 mm.

3.1.12 No efflorescence will be allowed on masonry work.

3.2 Tolerances

3.2.1 Tolerances in notes to Clause 5.3 of CSA A371 apply.

3.3 Installation

3.3.1 Lay specially-shaped masonry units required or shown on drawings. The corners of concrete masonry units projecting into habitable areas and exposed or painted in the finished work shall be single or double bullnosed as required to suit the particular location.

3.3.2 Lay joints 10 mm thick unless otherwise specified or indicated on Drawings. All joints shall be full of mortar except where specifically designated to be left open.

3.3.3 Reinforce masonry as required, to support wall mounted equipment, building components and fixtures provided under other Sections. Verify loads to be supported and the arrangement and type of fastenings with the appropriate Section.

3.3.4 Bond:
Block: Running

3.3.5 Minimize cutting block. Cut out neatly for electrical switches, outlet boxes, and other recessed or built-in objects accurately using carborundum saw. Make cuts straight, clean, and free from uneven edges, leaving 3 mm maximum clearance.

3.3.6 Do not wet concrete masonry before or during laying in wall.

3.3.7 Locate corners accurately.

3.3.8 Use full bed of mortar for first course. For remaining courses bed face shells and cross and end webs and vertical end joints fully in mortar. Compress end joint mortar.

3.3.9 Stagger end joints in every course. Align joints plumb over each other in every other course.

3.3.10 Fully support existing masonry load bearing walls by means of shoring and pinning prior to any demolition of openings required for renovation.

3.3.11 Where infilling new brick or block into existing block walls, tooth in new brick or block into existing block courses. Ensure that new block is the same width as existing.

3.3.12 Ensure salvaged brick is clean and in good condition for toothing in at new openings.

3.4 Provisions for Other Trades

3.4.1 Provide openings in masonry walls where required or indicated for work of other trades.

3.4.2 Co-operate with other trades and accurately locate chases and openings and neatly finish to required sizes.

3.4.3 Where masonry encloses conduit or piping, bring to proper level as directed. Do not cover any pipe or conduit chases or enclosures until advised that work has been inspected, tested and approved.

3.4.4 Cut out neatly for electrical switches, outlet boxes, and other recessed or built-in objects.

3.4.5 Make cuts straight, clean, and free from uneven edges.

3.5 Mortar and Pointing:

3.5.1 Make all joints uniform in thickness, straight, in line, with mortar tooled to a smooth dense finish to form concave joints, except where specified otherwise. Use a non-staining jointing tool, which shall be clean and free of rust, salts and any other harmful materials.

3.5.2 On face of walls to which rigid insulation, resilient base, gypsum wallboard and other similar finishes will be applied directly, strike joint faces flush.

3.5.3 Rake out joint at juncture of intersecting masonry walls, control joints and elsewhere indicated where caulking is required.

3.5.4 Take particular care in preventing mortar splashes. Where they occur carefully remove them after mortar has hardened.

3.5.5 For sections of concrete block walls, as at door frames, and including short nibs which are less than 600 mm wide, fill cores of block units with mortar. Consolidate mortar with proper sized vibrators.

3.5.6 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, compressed, uniformly concave joints where concave joints are indicated.

3.5.7 Allow joints to set just enough to remove excess water, then rake joints uniformly to 6 mm depth and compress with square tool to provide smooth, compressed, raked joints of uniform depth where raked joints are indicated.

3.5.8 Strike flush all joints concealed in walls and joints in walls to receive gypsum board, tile, insulation, or other applied material except paint or similar thin finish coating.

3.6 Grouting

3.6.1 Mix grout to pourable consistency.

3.6.2 Prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for not less than 1 h nor more than 2 h then remix with sufficient water to produce mortar of proper consistency for pointing.

3.6.3 Grout under all steel bearing plates bearing on masonry as required for structural members with non-shrink grout, in accordance with manufacturer's printed instructions.

3.6.4 Ensure complete filling of voids between top of masonry and underside of plates.

3.7 Building-In

3.7.1 Build in items required to be built into masonry.

3.7.2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.

3.7.3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.

3.7.4 For exterior frames, completely fill frame voids with loose glass fibre insulation.

3.7.5 Where required, fill cores of concrete block units with mortar for anchoring built-in items.

3.8 Anchors, Reinforcement, Bonding

3.8.1 Bond masonry walls at corners by laying, in true bond, 50% of each of the units of each wall when walls are built up together.

3.8.2 Reinforce all walls single wythe exterior and interior walls, constructed of masonry units with horizontal truss type reinforcement placed at 400 mm vertical centres, typically and in bed joint of the top course. Lap reinforcement minimum 150 mm and stop reinforcing 50 mm from edge of joints or openings.

3.8.3 Additionally, place mesh reinforcement in first and second bed joints above and below openings greater than 150 mm wide. Reinforcing in first bed joint shall be continuous. Extend reinforcing minimum 600 mm beyond each side of opening in second bed joint.

3.8.4 For sections of concrete block walls, as at door frames, and including short nibs which are less than 600 mm wide, reinforce such sections with 6 mm diameter tie bars in each block course and with minimum three 15M continuous vertical reinforcing bars set in block cells full height.

3.8.5 Install horizontal lateral support steel angles at top of non-load bearing masonry partitions, anchored to structure above. Angles supplied under work of Section 05 50 00, Miscellaneous Metals.

3.8.6 Install masonry anchor assembly at connection of new to existing walls. Provide joint reinforcement at every 16” vertical spacing as recommended by manufacturer’s written instructions.

3.9 Control Joints

3.9.1 Install continuous control joint fillers in control joints at intersection of new and existing perimeter walls.

3.10 Cleaning

3.10.1 Allow mortar droppings on concrete masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block and finally by brushing.

3.10.2 Point or replace defective mortar as required or directed.

3.10.3 Scrub surfaces to be cleaned using a non-acid cleaning solution of type which will not harm constructed masonry. Check with masonry unit manufacturer for acceptable solution. Clean a trial test area and obtain approval to proceed.

3.11 Provision for Movement

3.11.1 Leave 3 mm space below shelf angles.

3.11.2 Leave 6 mm minimum or L/240 space where L is span of structural elements between top of partitions and structural elements. Do not use wedges.

3.12 Loose Steel Lintels

3.12.1 Install loose steel lintels. Centre over opening width.

3.13 Fire Separation

3.13.1 Construct walls, which provide required fire separation, of masonry units which are approved by Authorities having Jurisdiction for material and thickness.

3.13.2 Construct fire rated walls to within 25 mm of structure above, unless otherwise indicated. On both sides of walls, solidly fill 25 mm space with firestopping, compressed minimum 25% at time of installation. Install firestopping in accordance with manufacturer's instructions and ULC test requirements. Butt succeeding sections of firestopping against the preceding, leaving no voids.

3.13.3 Construct fire separations without any openings or voids which would violate the integrity of their separation. Cut and fit masonry work as required.

3.13.4 Unless otherwise approved by authorities having jurisdiction, in no case shall unplastered fire separation walls of masonry construction be reduced in any part to thickness less than the actual dimensions for separation ratings and materials required.

**********END**********

1. **GENERAL**

1.1. Conform to Sections of Division 1 as applicable.

1.2. **RELATED SECTIONS**

1.2.1. Firestopping and smoke seals: Section 07 84 00, Penetration Firestopping.

1.2.2. Finish painting: Section 09 91 00, Painting.

1.3. **REFERENCES**

ASTM A53/A53M-12	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A123/A123M-17	Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M-16a	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A269/A269M-15a(2019)	Standard Specification for Seamless and Welded Austenitic Stainless steel Tubing for General Service
ASTM A307-14e1	Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength
ASTM A325-14	Specification for Structural Bolts, Steel, Heat-treated 120/105ksi Minimum Tensile Strength.
ASTM A1008/A1008M-18	Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
ASTM A1011/A1011M-18a	Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy and High-Strength Low Alloy with Improved Formability
ASTM A 653/A653M-19a	Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
CAN/CGSB-1.40-97	Anticorrosive Structural Steel Alkyd Primer
CAN/CGSB-1.181-99	Ready Mixed Organic Zinc Rich Coating
CAN/CSA-G40.20/G40.21-98	General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels
CAN/CSA-G164-M92 (R1998)	Hot Dip Galvanizing of Irregularly Shaped Articles
CAN/CSA-S16.01	Limit States Design of Steel Structures
CSA W47.01	Certification of Companies for Fusion Welding of Steel Structures
CSA W48.01	Filler Materials and Allied Materials for Metal Arc Welding
CSA W59-M1989 (R2001)	Welded Steel Construction (Metal Arc Welding)
CAN/CSA-W117.2-01	Safety in Welding, Cutting and Allied Processes
SSPC	Steel Structures Painting Council, "Steel Structures Painting Manual Vol. 2"

1.4. **SYSTEM DESCRIPTION**

1.4.1. **Design Requirements**

1.4.1.1. Generally, Drawings give information on specific shape and dimensions required and in certain cases, load imposed. For items where load information is only indicated, provide steel supports and anchorage for general design indicated, sized to suit specified loads. Provide bracing as may be required to counter lateral loads and dynamic stresses where vibration of support equipment may occur.

1.4.1.2. Comply with OBC, for design of all stressed members.

1.5. **SUBMITTALS**

1.5.1. **Shop Drawings**:

1.5.1.1. Submit shop drawings in accordance with Section 01 33 00 Submittal Procedures.

1.5.1.2. Show and describe in detail work of this Section including large scale detail of members and materials, of connection and jointing details, and of anchorage devices, dimensions, gauges, thicknesses, description of materials, metal finishing, as well as other pertinent data and information.

1.5.1.3. Shop drawings indicating structural components for custom fabricated or pre-fabricated components shall bear professional stamp and signature of professional engineer licensed to design structures and registered in Province of Ontario.

1.5.2. **Certification**:

1.5.2.1. Submit certification from registered professional structural Engineer registered in province of Ontario, who shall affix his/her seal and signature to certificate, stating structure is capable of supporting its own weight and specified live loads.

1.6. **QUALITY ASSURANCE**

1.6.1. **Welder Qualifications**:

1.6.2. Execute welding by firm certified in accordance with CSA W47.1 Division 1 or 2.1.

1.6.3. Operators employed on Work shall be qualified per CSA W47.1 for work as specified herein.

2. **PRODUCTS**

2.1. **MATERIALS**

2.1.1. **Steel, Structural Quality, WWF, W-Shapes, HSS Sections and Structural Tees**: CAN/CSA-G40.20/G40.21, Grade 350W.

2.1.2. **Steel, Structural Quality, Plates, Angles and C-channels**: CAN/CSA-G40.20/G40.21, Grade 300W.

2.1.3. **Sheet Steel**: ASTM A 653/A653M,

2.1.4. **Sheet Steel**: Commercial Quality ASTM A1008, stretcher levelled or temper rolled.

2.1.5. **Galvanized Sheet Steel**: Galvanizing as specified ASTM A 653/A653M, structural and commercial quality sheets. Must be specially treated by phosphate conversion process if steel is to be exposed and finish painted.

2.1.6. **Steel Pipe**: ASTM A53/A53M (standard weight) (extra strong) (double extra strong), (black) (galvanized) finish.

2.1.7. **Welding Materials**: Conform to CSA W48.1-M and CSA W59-M.

2.1.8. **Fasteners (Concrete Anchors, Toggle Bolts, and Hammer Driver Bolts**) to ASTM A307, Star Expansion, Hilti (Canada) Ltd. or Ucan Fastening Products.

2.1.9. **Metal Filler**: Polyester based, White 'Lightning' by Marson Canada Inc. or Combo or First choice by Dura Chemicals Ltd.

2.1.10. Conform to following requirements: CAN/CGSB-1.40-M.

2.2. **FABRICATION**

2.2.1. Fit and assemble work in shop where possible. Execute work according to details and reviewed shop drawings. Where full shop assembly is not possible, make trial assembly in shop.

2.2.2. Do welding to CSA W59-M. File or grind welds smooth and flush where exposed to view and where specifically indicated on Drawings.

2.2.3. Fit joints and intersecting members accurately. Make work in true planes with adequate fastening.

2.2.4. Supply fastenings, anchors, accessories required for fabrication of work of this Section. Such items occurring on or in exterior wall or slab shall be hot dip galvanized.

2.2.5. Fastenings include without being limited to anchor bolts, machine bolts, toggle bolts, self drilling anchor, lag screws, expansion shields, sleeves, brackets, washers and nuts.

2.2.6. Provide bolts with all washers and nuts required for complete installation. Provide lock washers where vibrations may occur.

2.2.7. Make exposed metal fastenings and accessories of same material, texture, colour and finish as base metal on which they occur unless otherwise indicated or specified.

2.2.8. Keep exposed fastenings to an absolute minimum evenly spaced and neatly laid out.

2.2.9. Make fastenings of permanent type unless otherwise indicated.

2.3. **Shop Welding**:

2.3.1. Execute welding to avoid damage or distortion to Work. Should there be, in opinion of Consultant or Inspection and Testing Company, doubt as to adequacy of welds, they shall be tested for efficiency and any work not meeting Standards shall be removed and replaced with new work satisfactory to Consultant. Carry out welding in accordance with following Standards:

CSA W48-M: for electrodes (If rods are used, only coated rods are allowed)
CSA W59-M: for design of connections and workmanship
CAN/CSA-W117.2-M: for safety

2.3.2. Clean welded joints and steel exposed for sufficient space to properly perform welding operation. Neatly finish welds. Welds which will be exposed to view and finish painted shall be continuous and ground smooth.

2.4. **Shop Painting**:

2.4.1. Do not prime non-ferrous metals.

2.4.2. After fabrication, blast clean ferrous metals exposed in finished work, SSPC SP6. (Clean, brush, scrape and remove oil, grease and extraneous matter from other surfaces, solvent clean to SSPC SP1).

2.4.3. After cleaning mask edges with duct tape to be field welded.

2.4.4. Prime Finish: After cleaning, except where specified otherwise, apply full, smooth priming coat in shop. Work paint into corners and open spaces and deliver to Site with primer undamaged and to satisfaction of Consultant. (Commercial blast cleaned surfaces are to be primed immediately).

3. EXECUTION

3.1. INSTALLATION

3.1.1. Build and erect work plumb, true, square, straight, level and accurate to sizes detailed, to reviewed shop drawings, free from distortion or defects detrimental to appearance and performance.

3.1.2. Insulate metals where necessary to prevent corrosion due to contact between dissimilar metals and between metals and masonry, concrete or plaster. Use bituminous paint, butyl tape, building paper or other approved means.

3.1.3. Supply instructions, templates, and, if necessary, supervise installation of fastenings or accessories requiring to be built-in by other Sections of Work.

3.1.4. After erection and installation, clean work and apply field touch of same formula as shop coat primer to damaged or unpainted surface of shop primed material. Work primer into joints, crevices, interstices and open spaces.

3.1.5. Weld as specified herein.

3.2. **CONNECTIONS**

3.2.1. Main member connections shall be welded or bolted with high tensile strength bolts and double angle connections as listed in CISC Code of Standard Practice for Structural Steel.

3.2.2. **Bolted Connections**

3.2.3. High strength bolted connections shall be bearing type using M20 (3/4") bolts conforming to ASTM A325M. Secondary members may be bolted with machine bolts.

3.2.4. Perform high tensile bolted connections in accordance with CAN/CSA-S16.1-M and be field tested.

3.2.5. Accurately space holes of size 1.6 mm (1/16") larger than nominal diameter of bolt. High tensile bolt connections shall be bearing (friction) type unless noted otherwise.

3.2.6. Provide compressor or electrical equipment capable of supplying and maintaining required pressure at wrench.

3.2.7. Make connections without use of erection bolts, some high tensile bolts will serve that purpose.

3.2.8. Nuts or bolts, except high tensile bolts, shall be prevented from becoming loose by burring bolt thread, by welding or by lock washers or lock nuts.

3.3. Fasteners

3.3.1. Supply fasteners, anchors and accessories required for erection of work of this Section. Ensure items occurring on or in exterior wall or slab are hot dipped galvanized.

3.3.2. In concrete and masonry, use epoxy injection anchor for vibration and heavy loads, and where anchors may be close to edge or close to adjacent anchors.

3.3.3. Use sleeve anchors in hollow block and brick for light static loads.

3.3.4. Use ULC approved drop-in anchors for pipe and sprinkler systems suspended from concrete ceiling.

3.3.5. Use wedge anchors for light to medium static loads in concrete.

3.3.6. Use concrete screws for light static loads in concrete, block and masonry.

3.3.7. Use heavy load expansion anchors for heavy static, vibratory or impact loading in concrete.

3.4. **Welding**

3.4.1. Welds on exterior work shall be continuous to provide proper weathering.

3.4.2. Take necessary safety precautions in accordance with CSA Standards when we

3.4.3. lding is carried out in cold weather.

3.4.4. No welding of galvanized products is allowed.

3.5. **SCHEDULES**

3.5.1. **General**: Provide miscellaneous metal work indicated on Drawings and not included in work of other Sections in addition to items listed below.

3.5.2. Where items are required to be built into masonry, concrete or other work provide such items to respective Sections with all anchors and accessories for building in.

3.5.3. **Itemized List**: Provide following metal work unless specifically designated to be supplied only. List supplied herein is not necessarily complete and shall be augmented by thorough inspection of Drawings and all other requirements to complete Work. Each item shall be as indicated on Drawings and as detailed on reviewed shop drawings:

3.5.4. **Lateral Supports for Masonry Partitions**: Steel angles 100 mm x 100 mm x 150 mm long (4" x 4" x 6") to underside of structure to provide lateral support for masonry partitions where they are carried up to underside of structures above finished ceilings and are not braced laterally by wedge and grout.

- Place angle each side of partition and secure to structure above at 1800 mm (6'-0") oc.

3.5.5. **Support Framing Systems**: Provide fabricated steel support for roof mounted safety anchors, kindergarten bench supports, shelving, counter and other framing systems indicated, complete with anchors, brackets, sleeves, screws and incidentals required to complete installations.

- Secure to wall and/or floor in semi concealed manner to support vanities greater than 2 m (6') in length or where end of vanity is not supported by abutting wall.

3.5.6. Provide steel sections which are:

3.5.7. Not indicated and identified on Structural Drawings, unless noted to be supplied by another Section of Specifications.
OR

Not noted on Drawings to be supplied by another Section of Specifications.
OR

Not specified under another Section of Specifications.

3.5.8. Provide such items complete with anchors, brackets, bearing plates and other accessories required for installation.

3.5.9. Where steel sections are required to be built into masonry or concrete, supply such members to respective trades for building in.

3.5.10. Work shall include, without being limited to:

3.5.11. **Steel lintels (loose),** including those required over masonry openings and recesses for mechanical or electrical services.

3.5.12. Where lintels cannot be supported on masonry, provide plates anchored flush into column or wall and weld lintel thereto to satisfaction of Consultant.

3.5.13. Miscellaneous Items: Provide items complete with anchors, brackets, sleeves, screws and other incidentals required and as detailed.

- Where steel items or supports are required to be built into masonry or concrete, supply such members to respective trades.

End of Section

1 GENERAL

1.1 Conform to Sections of Division 1 as applicable.

1.2 REFERENCES

ASTM E84-09b	Standard Test Method for Surface Burning Characteristics of Building Materials
CAN/CSA G164-M92 (R2003)	Hot Dip Galvanizing of Irregularly Shaped Articles
CAN/CSA O80 Series-08	Wood Preservation
CSA O86-01	Engineering Design in Wood
CSA O121-08	Douglas Fir Plywood
CSA O151-04	Canadian Softwood Plywood
CAN/ULC-S102-03	Surface Burning Characteristics of Building Materials and Assemblies
NLGA	National Lumber Grades Authority, Standard Grading Rules for Canadian Lumber, 2003
ULC	Underwriters' Laboratories of Canada

1.3 SHOP DRAWINGS

1.3.1 Submit shop drawings in accordance with Section 01 33 00 Submittals.

1.3.2 Shop drawings shall clearly indicate material being supplied and shall show all connections, attachments, reinforcing, anchorage and location of exposed fastenings.

2 PRODUCTS

2.1 MATERIALS

2.1.1 **Framing Lumber**: Lumber for each type of structural component shall be of same species and grade, equally seasoned and shall be processed and stamped at same mill. Lumber identification shall conform to requirements of Standard Grading Rules for Canadian Lumber of National Lumber Grades Authority (NLGA).

2.1.2 **Grading**: 120, National Grading Rule for Dimension Lumber.

2.1.3 **Studs**: Spruce, 122b "Construction" light framing.

2.1.4 **Joists and Other Framing Members**: Spruce 124b. "No. 1" Structural Joists and Planks, except as otherwise specified.

2.1.5 **Members Other Than Studs and Less Than 89 mm (4") Wide**: Spruce, 122c. "Standard" light framing, except as otherwise specified.

2.1.6 **Nailing Strips, Blocking, Furring and Strapping**: Spruce, 122c. "Standard" light framing.

2.1.7 **Softwood Plywood, Douglas Fir, CSA O121-M of Following Grades**:

2.1.7.1 Good One Side (G1S).

2.1.8 Canadian Softwood Plywood: CSA O151 of following grades:

2.1.9 **Pressure Treated Lumber for Playground Equipment/Stage & Pergola: Coordinate work with Section 11 38 16 Playground Equipment.** MicroPro Sienna® treated wood using a waterborne, micronized copper azole (MCA) system developed to provide long-term protection for wood exposed in exterior applications from fungal decay and termite attack, or equal.

2.1.10 **Wood Preservative**

2.1.10.1 For use with MicroPro Sienna® treated wood, Cut-N-Seal® for use on cut, sawn, drilled wood deck boards, post tops, railings, etc.

2.1.10.2 For painted surfaces use Pentox Conservat'r (clear) by Osmose-Pentox Inc. or Super Solignum-10-10 Paintable Penta by Solignum Inc.

2.1.10.3 For concealed surfaces use Pentox Green by Osmose-Pentox Inc. or Preserv-Green 1-42 by Solignum Inc.

2.1.11 **Rough Hardware**: Nails, screws, bolts, lag screws, anchors, special fastening devices and supports required for erection of carpentry components. Use galvanized components if exposed to exterior atmosphere. Galvanize in accordance with requirements of CAN/CSA-G164.

3 EXECUTION

3.1 INSTALLATION

3.1.1 Construct and install work as indicated on Drawings.

3.1.2 Machine dressed work shall be slow fed using sharp cutters and finished members shall be free from drag, feathers, slivers or roughness of any kind.

3.1.3 Frame materials with tight joints rigidly held in place.

3.1.4 Design construction methods for expansion and contraction of materials.

3.1.5 Erect work plumb, level, square and to required lines.

3.1.6 Be responsible for methods of construction and for ensuring that materials are rigidly and securely attached and will not be loosened by work of other trades.

3.1.7 Fasten wood nailers, blocking, framing and strapping solidly to adjacent materials in true planes.

3.1.8 **Furring, Bearing Plates and Rough Framing**: Provide and install where indicated on Drawings or required.

3.1.9 **Strips and Blocking**

3.1.9.1 Where wood is to be fastened to masonry, supply metal nailing plugs to Section 04 20 00, Masonry for building into masonry joints.

3.1.9.2 Provide and install wood strips required for attaching work of other Sections.

3.1.9.3 Provide and install all wood blocking required.

3.1.10 **Wood Preservative Treatment**

3.1.10.1 Treat all surfaces of exterior blocking, curbs, cants and other concealed exterior woodwork, with wood preservative; apply in accordance with manufacturer's directions.

3.1.11 **Rough Hardware**

3.1.11.1 Supply and install all rough hardware.

3.1.11.2 Fasten to hollow units with toggle bolts and to solid masonry or concrete with lead expansion shields and lag screws. No organic fibre or wood plugs shall be used.

3.1.12 **Miscellaneous Carpentry Work**: Supply and install all other carpentry indicated on Drawings or as required for completion of work. Co-operate with other trades in installing items supplied by other Sections, cut openings in woodwork when so required and make good disturbed surfaces.

End of Section

1. GENERAL:

1.1 General Requirements

1.1.1 Conform to Sections of Division 1, as applicable.

1.2 Related Work Specified Elsewhere:

1.2.1	Finish Hardware:	Section 08 71 00
1.2.2	Painting:	Section 09 91 00
1.2.3	Rubber bases to casework:	Section 09 65 00

1.2.4 Mechanical and electrical work: Refer to M & E specification sections

1.3 Warranty:

1.3.1 Warrant work of this Section against delamination of plastic laminate work and warpage of millwork for a period of two (2) years from date Work is certified as substantially performed. Promptly make good defects and deficiencies which become apparent within warranty period including making good any work damaged by this work satisfactory to Consultant and at no expense to Owner. Defects shall include but shall not be limited to delamination of plastic laminate work and warpage of millwork.

1.4 Reference Standards

1.4.1 Do finish carpentry to Millwork Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC) latest edition, except where specified otherwise.

1.5 Qualifications of Fabricator

1.5.1 Casework shall be fabricated by skilled craftsmen employed by a firm having not less than five years of experience in the manufacturing of quality casework.

1.5.2 Assign a full time qualified supervisor or foreman during work of this Section. Such person shall have minimum three years experience in this particular field.

1.6 Submittals

1.6.1 Shop Drawings:

1.6.1.1 Submit shop drawings in accordance with Section 01 33 00.

1.6.1.2 Shop drawings shall clearly indicate the material being supplied and shall show connections, thicknesses, finishes, hardware, attachments, reinforcing, anchorage and location of exposed fastenings. Indicate details of construction, profiles, jointing and other related details.

1.6.1.3 Clearly indicate method of installation.

1.6.2 Samples:

1.6.2.1 Submit three (3) 300 mm x 300 mm (12"x 12") samples of plastic laminates laminated to substrate and melamine as specifed for review as specified in Section 01 33 00: Submittals, before proceeding with work. Samples shall show colours and details of edging forming and construction.

1.7 Product Delivery, Storage and Handling:

1.7.1 Provide protective coverings of suitable material for plastic laminated surfaces, take special precautions at corners.

1.7.2 Deliver millwork items when area is ready to receive work.

1.7.3 Protect materials against dampness during and after delivery.

1.7.4 Store materials in ventilated areas, protected from extreme changes of temperature or humidity. Do not store or install materials in areas where relative humidity is less than 25% or greater than 60% at 22 deg C.

1.8 Co-operation

1.8.1 Co-operate with Mechanical and Electrical divisions for connection of services to casework from in-room rough-in points to final termination point.

2 PRODUCTS

2.1 Materials:

2.1.1 <u>All wood shall be kiln dried.</u>

2.1.2 Miscellaneous lumber for concealed framing of casework and finish carpentry items: Comply with NLGA, requirements, with maximum moisture

content of 7% for interior work. Pine, spruce or fir species, to AWMAC economy grade.

2.1.3 Core: Plywood to CSA O115-M (G/SO) or CSA O121-M Grade "B" or Core material must be low VOC, low formaldehyde particleboard, Skyblend as manufactured by Roseburg Forest Products, Novopan Industrial-Grade particleboard or equal. Particleboard for use with laminated plastic, fine, smooth faces, to CAN3-0188.1-M78 Particleboard to CAN3-O188.1-M, Grade R.

2.1.4 Plywood for casework, cabinet doors, countertops and elsewhere specified: same as 2.1.3

2.1.5 Cabinet doors & boxes, exposed ends and faces exposed to view, gables: Thermofused melamine & Plastic Laminate where indicated on drawings, P.Lam1 - Classroom – Hardrock Maple

Provide PVC Dura-Edge edge banding to match melamine/laminate as manufactured by Dura Edge - Hardrock Maple on all exposed edges of cabinet doors and drawers and face of gables.

2.1.6 Countertops: postforming grade, nominal thickness 0.039”/1.0 mm (NEMA HGP) for all countertops with built-in sinks must be constructed with Plywood, all other countertops to be General Purpose Grade, nominal thickness 0.048”/1.2, mm (NEMA HGS) as manufactured by Pionite, Wilsonart, Arborite or Nevamar.
Colour:
Custodian Countertop– P.LAM 2: Wilsonart, Standard Laminate: Pinball 4937-38
Classroom & Control Panel Face – PLAM3: Wilsonart, standard laminate: Pressed Linen 4991-38
Window Sills – P.LAM 4: Wilsonart, Solicor: Dove Grey D92-60

as manufactured by Wilsonart and as approved by Consultant & Board.

.1 **Stainless Steel countertops and backsplashes at Kitchen:** 20 ga. Type 304 finish, mounted on 20 mm (3/4”) plywood. Stainless Steel Backsplash where noted shall have exposed edges trimmed with stainless steel. Caulk all edges.

2.1.7 Laminated plastic for flatwork: to CSA A172Type 1b, 0.062" (1.6 mm) thick;
Manufacturer: Arborite, Nevamar, Pionite, or Wilsonart
Colour: as specified or to be select by consultant
Finish: Suede

2.1.8 Adhesive for use with laminated plastic sheets: of types recommended by laminated plastic manufacturer.

2.1.9 Sealer: water resistant sealer or glue acceptable to laminated plastic manufacturer.

2.1.10 Fasteners:
Nails, spikes and staples: to CSA B111; galvanized for decking Table 22, galvanized finish; sizes as recommended in CSA 086-1976. Supply 200 mm spiral spikes for lateral nailing, galvanized for interior highly humid areas and for treated lumber; plain finish elsewhere.

2.1.11 Box Drawer Slide: Model No. C2037 as manufactured by Accuride or equal

2.1.12 Cabinet Hinges: Blum Clip Top, 170˚ opening angle, all metal hinge, nickel plated for 19 mm cabinet sides, type best suited for location and intended purpose as distributed by Richelieu Hardware Ltd., (905) 672-1500.

2.1.13 Disc Tumbler Cam Lock: 5L Series Deadbolt, rim mounting, left/right/vertical hand, 626 finish, 7 pin size, **where indicated**, as manufactured by Best Access Systems. All cabinet door and drawer locks to be provided under this Section. Refer Hardware Schedule.

2.1.14 Hardwood lumber at tops of part masonry walls and where noted on drawings, to National Hardwood Lumber Association (NHLA) requirements, moisture content of maximum 7% for interior. Unless otherwise specified, Maple as detailed, to AWMAC premium grade and selected for matching colour and texture.

2.1.15 Drawers: full box plywood construction. Front shall be 19 mm (3/4") thick; sides and back shall be 12.7 mm (1/2") thick. Fit sides to front and back with dovetailed joints. Provide 6.4 mm (1/4") thick plywood bottom, grooved into sides and front and nailed to underside of drawer back. Install box drawer slides to manufacturer's instructions.

2.1.16 Steel Pilaster shelf standards and Supports: No. 255 Pilaster Standard with 256 ZC Steel shelf supports, surface mounted by Knape & Vogt Canada Inc., or equal. House all intersecting gables, sides, bottoms and fixed shelves. Set adjustable shelves on clips on metal pilaster strips housed into gables and sides. Offset pilaster strips where they occur on both sides of a gable.

2.1.17 Cabinet/Drawer Pulls: 100 mm (4”) nickel plated wire ‘D’ door pull as manufactured by Häfele or equal. Provide one drawer Pull for each drawer and cabinet door, refer to drawings.

2.1.18 Coat Hooks at Cubbies: GSH 343 Coat Hook (Double) as supplied by Gallery Specialty Hardware Ltd. Refer to Drawings for quantities.

2.1.19 Coat Rod at Closet locations: Provide 1” Closet Rod and 1” Flange (2 per

rod). Provide intermediate rod support at centre point to support coat rod. R-80 and R83, bright stainless steel finish as manufactured by Standard Metal Hardware Manufacturing Ltd. or equal. at all closet locations.

2.1.20 Benches: Beech as detailed, to AWMAC premium grade and selected for matching colour and texture.
Bench legs/frame/support: Refer to Miscellaneous Metals, painted under Section 09 91 00 Painting.
Rubber Pad – Provide square rubber table leg cap cover for each bench leg, to fit legs, supplied and installed under this section.

2.2 Fabrication and Manufacture:

2.2.1 General Workmanship

2.2.1.1 Fabricate and install work in accordance with the best practice by skilled craftsmen of companies specializing in the work specified and to the requirements of other trades. Each item shall be as shown on Drawings and as detailed on Shop Drawings.

2.2.1.2 Lay out work carefully and to accommodate work of other trades. Accurately cut and fit. Join work only over solid backing.

2.2.1.3 Dress all exposed surfaces of casework and finished carpentry members.

2.2.1.4 Make running members in longest lengths obtainable.

2.2.1.5 Properly frame members with tight joints. Use glue blocks where necessary.

2.2.1.6 As far as practicable shop assemble work in size easily handled and to ensure passage through building openings. Deliver to site ready for installation. Leave adequate allowance for fitting and scribing on site.

2.2.1.7 Conceal joints and connections where ever possible. Locate prominent joints where directed by Architect. Intermediate joints between supports will not be permitted. Glue and pin mortise and tenon joints. Construct joints made on site for equal quality and workmanship as joints made in shop.

2.2.1.8 Unless otherwise specified, glue work and blind screw or nail. Set nail heads occurring in exposed work. Countersink all screw and bolt heads below finished surfaces. Do not drive screws and bolts. Fill all fastening depressions in exposed work with wood filler.

2.2.1.9 Accurately scribe, cope and mitre members where required.

2.2.1.10 Ensure that finished woodwork is free from bruises, mineral marks, knots, shakes and other defects. Select materials to ensure acceptance for colour, grain and texture.

2.2.1.11 Provide a sandpaper fine finish to remove machine marks, scratches and other marks from exposed or partially exposed wood surfaces. Finish to an even, smooth surface and leave work ready for an applied finish.

2.2.1.12 Provide 9.5 mm (3/8") thick solid, matching hardwood strip by thickness of plywood, less face veneers, on all plywood edges, exposed in the final assembly. Ensure face veneers completely overlap wood strips. Secure strips to edges with bonding adhesive. No exposed fasteners permitted. Apply strips to edges of adjustable shelves.

2.3 Fabrication - Cabinet Work

2.3.1 Unit bodies shall be 19 mm (3/4") thick plywood, plastic laminate where indicated. All bodies shall have backs.

2.3.2 Unless otherwise indicated or specified, fabricate all casework in accordance with AWMAC standards for diversified construction, custom grade.

2.3.3 Provide all counters, cabinets, closets, shelving units, and all other units.

2.3.4 Refer to drawings for locations, details, number of units required and location of fittings.

2.3.5 Where indicated, provide thermo-fused melamine or plastic laminate finish.

2.3.6 Where indicated, provide splashbacks and unless otherwise noted, make splashbacks 100 mm (4") high. Return splashbacks on side walls.

2.3.7 Obtain all miscellaneous metal items from Section 05 50 00 which are required to be installed by this Section for the construction and completion of wood casework.

2.3.8 Mechanical and electrical items are specified under work of Mechanical and Electrical Divisions. Co-ordinate work of those trades; make provisions to accommodate their work. Provide cutouts required. Provide wood bearers for support, particularly at sink openings.

2.4 Laminated Plastic

2.4.1 Apply laminate backing sheet to reverse side of core of all plastic laminate work.

2.4.2 Ensure adjacent parts of continuous laminate work match in colour and pattern.

2.4.3 Apply laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface.

2.4.4 Form shaped profiles and bends as indicated, using postforming grade and cold bending laminate to laminate manufacturer's instructions.

2.4.5 Form shaped profiles and bends as indicated, using postforming grade and cold bending laminate to laminate manufacturer's instructions.

2.4.6 Use straight self-edging laminate strip for flatwork to cover exposed edges uniformly at approximately 20 deg.. Do not mitre laminate edges.

2.4.7 Use full size sheets. Make joints only where approved and make such joints to hairline.

2.4.8 Make allowances around perimeter where items pass through or project into laminated plastic work to permit movement without restriction.

2.4.9 Provide cutouts for grilles, fixtures, services and other similar items. Keep free of chips; round and file smooth all internal corners and edges and seal exposed core. Provide sufficient clearances to avoid stress in laminated plastic.

3 EXECUTION

3.1 Installation

3.1.1 Construct and install Work as shown on Drawings. Take measurements at site for finish carpentry work and casework to be built-in or attached to building structure, before commencing work of this Section.

3.2 Casework

3.2.1 Unless otherwise indicated or specified, fabricate casework units using the following materials and sizes. Factory assemble units carefully machined. Securely glue joints with bonding adhesive.

.1 Frame for floor mounted units: Thermo-fused melamine on particleboard core, not less than 1-1/2" x 3/4" full frame assembly.

.2 Countertops: 3/4" thick plywood. Fabricate countertops of both post-formed and square-edge construction as indicated. Provide drip grooves at underside of overhang on countertops with built-in sinks. Provide sealer at underside of countertop where sink or lavatory is specified.

.3 Sides, gables, tops, bottoms, shelves: unless otherwise indicated, 3/4" thick thermo-fused melamine on particleboard core.

.4 House intersecting gables, sides, bottoms and fixed shelves. Set adjustable shelves on clips on metal pilaster strips housed into gables and sides. Offset pilaster strips where they occur on both sides of a gable.

3.1.3 Unless otherwise indicated, block up bottom of floor mounted units to form a 100 mm high x 75 mm (4" x 3") deep toe space.

3.1.4 Where indicated, provide laminated plastic finish.

3.1.5 Where indicated, provide splashbacks and unless otherwise noted, make splashbacks 100 mm (4") high. Return splashbacks on side walls.

3.1.6 Provide fillers of same material as casework, where necessary to fill voids between casework and between casework and walls or ceilings.

3.2 Storage Cabinets and shelving

3.2.1 Construct cabinets and shelving as noted.

3.2.2 Round corners, edges and ends. House all intersecting gables, sides, bottoms and fixed shelves. Set adjustable shelves on clips on metal pilaster strips housed into gables and sides. Offset pilaster strips where they occur on both sides of a gable.

3.3 Finish Hardware

3.3.1 Take delivery of finish hardware and install, except hardware specified as part of work of another Section or specified under this Section. Check each item as received.

3.3.2 Set, fit and adjust hardware according to manufacturer's directions at heights later directed by Consultant. Hardware shall operate freely. Protect installed hardware from damage and paint spotting.

3.3.3 Install hardware for steel doors except hinges.

3.3.4 Prepare wood doors for installation with required bevels, clearances and mortises for hardware. Install wood doors, grilles and applicable hardware, including hinges.

3.3.5 Fit, hang and trim wood doors. Leave 2 mm (1/16") clearance at head and jambs and 10 mm (3/8") bottom rails in areas to be carpeted. Install doors so that face on opening side is kept 2 mm (1/16") shy (recessed) from rebate even after bumpers installed. After trimming door have painter seal top and

bottom edges of door and transom under Section 09 91 00, Painting and Finishing.

3.3.6 Pre-drill kick plates and doors before attachment of plates. Apply with water resistant adhesive and countersunk stainless steel screws.

3.4 Adjusting and Cleaning - Hardware

3.4.1 Check and adjust each operating hardware item to ensure proper operation and function of unit.

3.4.2 Lubricate moving parts as recommended by hardware manufacturer. Use graphite type lubricant if no other is recommended.

3.4.3 Repair or replace defective materials and units which cannot be adjusted and lubricated to operate freely and smoothly. Re-install items found improperly installed.

3.5 Hardware Mounting Heights

3.5.1 Mortise lock strike: 990 mm (39") from centre of knob to finished floor.

3.5.2 Deadlock strike: 1270 mm (50") from centre of cylinder to finished floor.

3.5.3 Mortised night latches: 1270 mm (50") from centre of cross bar to finished floor.

3.5.4 Panic sets: 1020 mm (40") from centre to finished floor.

3.5.5 Door pulls: 1020 mm (40") from centre to finished floor.

3.5.6 Push plates: 1120 mm (44") from centre to finished floor.

3.5.7 Blank strikes: 1270 mm (50") from centre to finished floor.

3.5.8 Blank fronts: 1270 mm (50") from centre to finished floor.

3.5.9 Door closer arms: to allow maximum degree of swing.

3.5.10 Floor stops: to allow maximum degree of swing.

3.6 Door Seals, Weatherstripping and Thresholds

3.6.1 Obtain door seals, weatherstripping and thresholds from Finish Hardware Sections.

3.6.2 Install door seal to doors to tightly seal entire perimeter of doors leading into where indicated. Secure in place with non-ferrous screws, in accurate alignment.

3.6.3 Adapt door seals as required to achieve specified performance and provide any necessary accessories.

**********END**********

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 Conform to Sections of Division 1 as applicable.

1.2 RELATED SECTIONS

.1 Section 08 11 00 – Steel Doors and Frames

.2 Section 08 51 00 – Aluminum Windows

1.3 REFERENCES

.1 Canadian Urethane Foam Contractors' Association Inc. (CUFCA)

.2 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S705.1-01, Standard for Thermal Insulation Spray Applied Rigid Foam, Medium Density, Material Specification.

.2 CAN/ULC-S705.2-05, Standard for Thermal Insulation Spray Applied Rigid Foam, Medium Density, Installer's Responsibilities-Specification.

1.4 SAFETY REQUIREMENTS

.1 Protect workers as recommended by CAN/ULC-S705.2 and manufacturer's recommendations:

.1 Workers must protective clothing when applying foam insulation.

.2 Workers must not eat, drink or smoke while applying foam insulation.

1.5 PROTECTION

.1 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and 24 hour after application to maintain non-toxic, unpolluted, safe working conditions.

.2 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.

.3 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

Part 2 Products

2.1 MATERIALS

.1 Insulation: spray polyurethane to CAN/ULC-S705.1.

.2 Primers: in accordance with manufacturer's recommendations for surface conditions.

Part 3 Execution

3.1 APPLICATION

.1 Apply insulation to clean surfaces in accordance with CAN/ULC-S705.2 and manufacturer's printed instructions. Use primer where recommended by manufacturer.

.2 Apply sprayed foam insulation to fill voids between windows or aluminum frames and structure.

END OF SECTION

1 **GENERAL**

1.1 **General Requirements**

1.1.1 Conform to Sections of Division 1 as applicable.

1.2 **Related Work Specified Elsewhere:**

1.2.1	Masonry Walls	Section 04 20 00
1.2.2	Installation of spray foam insulation	Section 07 21 60
1.2.3	Firestopping Materials	Section 07 84 00
1.2.4	Joint Sealers:	Section 07 92 00
1.2.5	Door Frames:	Section 08 11 00
1.2.6	Installation of aluminium entrance framing:	Section 08 41 00
1.2.6	Installation of windows:	Section 08 51 00

1.3 **References:**

1.3.1 ASTM E2357 - 11 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

1.4 **Product Delivery, Storage and Handling**

1.4.1 Deliver materials to the job site in their original wrappings with labels intact, indicating the name of the manufacturer and product.

1.4.2 Store roll materials on end in original packaging.

1.4.3 In cold weather, at temperatures of 5˚C or below, provide warm storage for adhesives and primers, such that their consistency is suitable for ease of application. Follow manufacturer’s instructions for application in cold weather.

1.4.4 Keep solvent away from open flame or excessive heat.

1.4.5 Protect rolls from direct sunlight until ready for use.

1.5 **Site Conditions**

1.5.1 Protect surfaces from being marred or contaminated by other building materials or damaged in any way.

1.5.2 Supervise the work of other Sections where such work is closely associated with the work of this Section and report any damage done to the work of this Section.

1.5.3 Protect the work of this Section from damage until the building cladding or other permanent protection is in place.

1.6 **Submittals**

1.6.1 Prior to commencing the Work, submit independent documentation certifying that the air barrier membranes have been tested independently, indicating air leakage at rates recommended by the NRC and the National Building Code.

1.6.2 Prior to commencing the Work, submit manufacturers complete set of standard details for air barriers.

1.7 **Qualifications**

1.7.1 Applicator: the company performing the work of this section must be approved by the air/vapour membrane material manufacturer.

1.8 **Mock-Up**

1.8.1 Provide mock-up of air barrier materials where directed on site. Construct a sample exterior wall panel, incorporating substrate, window frame, attachment of insulation and showing air barrier membrane application details.

1.8.2 Mock-up may remain as part of work. Allow for review of mock-up by Consultant before proceeding with air/vapour barrier work.

1.9 **Environmental Conditions**

1.9.1 Ensure application temperature and humidity recommended by material manufacturer is maintained before, during and after installation.

1.10 **Quality Assurance**

1.10.1 Perform work in accordance with the printed requirements of the air barrier manufacturer and this specification.

1.10.2 Maintain one copy of manufacturer instructions on site.

1.10.3 At the beginning of the work and at all times during the execution of the Work, allow access to work site by the air barrier membrane manufacturer=s representative.

1.10.4 Components used in this section shall be sourced from one manufacturer, including sheet membrane, air barrier sealants, primers, mastics and adhesives.

2 PRODUCTS

2.1 Air Barrier Membrane

.1 Self-Adhesive Air/Vapour Barrier Membrane: Blueskin SA as manufactured by Henry Company Canada Inc. or equal. **All equals must comply with ASTM E-3257**

.2 Blueskin Primer Spray Prep primer aerosol or Blueskin Primer as may be required as manufactured by Henry Company Canada Inc. or equal.

.3 Blueskin SA at window sill locations.

.4 Blueskin TWF at door and window head locations.

.5 Air-Blok 21, apply around masonry reinforcing/ties to secure rigid wall insulation, where insulation support do not hold insulation in place

3 EXECUTION

3.1 Inspection

3.1.1 Ensure that surfaces to receive air/vapour barrier are clean, dry, firm, straight, and free from loose material, projections, ice, frost, slick, oil, grease, excess mortar or other matter detrimental to bond of the air/vapour barrier or uniform bedding of the wall insulation.

3.1.2 Report surfaces left unacceptable by other trades to the Consultant.

3.2 Installation: Primer

3.2.1 Apply primer to all surfaces to receive Blueskin SA using method and rate recommended by manufacturer if appropriate adhesion is not obtained due to surface conditions beyond the control of the installer.

3.2.2 Ensure that primer is allowed to dry to a tacky film. Ensure that all primed surfaces are covered in the same day.

3.3 Application: Air Barrier

3.3.1 Install materials in strict accordance with manufacturer's instructions, over entire surface as indicated. Membrane must be lapped a minimum of 50 mm on both side and end laps. Position membrane for alignment with protective film in place. Roll back, remove protective film and press firmly in place. When membrane is entirely in place, roll membrane including seams with a counter top roller to ensure full contact.

3.4.2 Transition Joints: seal with transition strip at beams, columns, changes in substrate material, and similar joints or connections to provide continuity of air/vapour barrier assembly. Generally, apply transition strip so that a minimum of 75 m (3") coverage is achieved over both substrates. Position strip over firm bearing.

3.4.3 Door and Window frames: Lap air barrier from wall substrate with 75 mm (3") of full contact over firm bearing to window sill with 50 mm (2") of full contact. Provide Blueskin thru wall flashing at wall and window heads.

3.4.4 Apply air barrier membrane within recommended application temperature ranges. Consult manufacturer when membrane cannot be applied within these temperature ranges.

********** END **********

1 GENERAL

1.1 General Requirements

1.1.1 Conform to Sections of Division 1 as applicable.

1.2 Related Work Specified Elsewhere:

1.2.1 Flashing and Sheet Metal: Section 07 62 00

1.2.2 Sealants: Section 07 92 00

1.3 Submittals:

1.3.1 Product data: submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00.

1.3.2 Shop Drawings: submit shop drawings in accordance with Section 01 33 00. Submit duplicate 305 x 305 mm samples of cladding material of selected colour and profile specified.

2 PRODUCTS

2.1 Materials

2.1.1 Preformed Metal Exterior Cladding:

.1 Profile:

.1 Exterior Cladding: prepainted, to match existing profile, 3-300 as manufactured by Agway Metals Inc. or equal, panel width and colour, Dark Brown, Standard Colour Range to match existing to approval of Consultant. Base steel nominal thickness to be 22 gauge.

.2 Flat prepainted sheet metal, 18 gauge, for flat metal panels

.3 Soffit: HF-12F by Agway Metals Inc. or AD300R by VicWest, to be 22 gauge, white colour.

.2 Accessories, flashings, fascia, face panels and trim shall be provided by manufacturer designed for use with the cladding or soffit and having the same finish.

.3 Sealants: in accordance with Section 07 92 00, colour to match siding colour.

.4 Touch-up paint: as recommended by panel manufacturer.

.5 Fasteners: screws – ANSI B18.6.4 Purpose made stainless steel or cadmium plated steel, exposed fasteners to be prepainted to match cladding.

2.1.2 Fascia facings and Exposed Trim:

.1 Brake or bend to shape, inside corners, outside corners, drip flashing, internal corner flashing, copings and closures for head, jamb and sill corners and trip, starter strip and window/door trim of same material, colour and gloss as cladding, with fastener holes pre-punched.

2.1.3 Sealants:

.1 Concealed: tape or compound, non-skinning, non-drying, butyl rubber.

.2 Exposed: Acrylic co-polymer to CGSB 19-GP-5M

3 EXECUTION

3.1 Preparation

3.1.1 Protect metal surfaces in contact with concrete, masonry mortar, plaster or other cementitious surface with isolation coating.

3.1.2 Plan and prepare necessary adjustments for tying new siding to existing girts and substructure as required to ensure interior of building is not affected by new construction.

3.2 Installation - (Field Assembled)

3.2.1 Ensure structural framing and metal back-up or sub-girt framing system for new cladding are securely fastened to structural wall.

3.2.2 Install continuous starter flashing, drip and other flashing, inside and outside corners, edgings, soffit, drip, cap, will and door opening flashings with fasteners and in accordance with the manufacturer's instructions and in accordance with the best practice.

3.2.3 Install outside or inside corners, fillers and closure strips with carefully formed and profiled work at edges and around obstructions (new structural columns etc.) and profiled work to match existing profiles.

3.2.4 Provide notched and formed closures, sealed to arrest direct weather penetration at vertical profiles. Ensure continuity of rain screen principle.

3.2.5 Maintain joints in cladding and soffit, true to line, tight fitting hairline joints.

3.2.6 Install fascia, face panel cladding, as indicated.

3.2.7 Maintain joints in exterior cladding, true to line, tight fitting, hairline joints.

3.2.8 Attach components in manner not restricting thermal movement.

3.2.9 Caulk junctions with adjoining work with sealant. Do work in accordance with Section 07 92 00 Sealants.

3.3 Touch Up and Cleaning

3.3.1 Touch up minor paint abrasions with touch-up paint.

3.3.2 Wash down exposed exterior surfaces using solution of mild domestic detergent in warm water, applied with soft clean wiping cloths. Wipe clean as part of final clean-up.

3.3.3 Remove excess sealant with recommended solvent.

********** END **********

Part 1 General

1 GENERAL

1.1 General Requirements

1.1.1 Conform to Sections of Division 1 as applicable.

1.1.2 Existing roof is under warranty with Trio Roofing Systems Inc. GC is required to carry Trio Roofing Systems Inc., 5 West Dr. Brampton, ON L6T 4T2, (905) 456-1688; Contact: pvieira@triorooing.ca **for canopy roofing to tie into existing roofing membrane. New membrane to match existing system and shall fall under the existing warranty.**

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)

- .1 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
- .2 CGSB 37-GP-15M-84, Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.
- .3 CAN/CGSB-51.26-M86, Thermal Insulation, Urethane and Isocyanurate, Boards, Faced.

.2 Canadian Standards Association (CSA)

- .1 CSA A123.2-M1979(R1992), Asphalt Coated Roofing Sheets.
- .2 CSA A123.3-M1979(R1992), Asphalt or Tar Saturated Roofing Felt.
- .3 CSA A123.4-M1979(R1992), Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems.
- .4 CSA A231.1-1972, Precast Concrete Paving Slabs.

.3 Canadian Roofing Contractors(Association (CRCA)

- .1 CRCA Specification.

.4 Underwriters(Laboratories of Canada (ULC)

- .1 CAN/ULC-S704-98, Thermal Insulation, Urethane and Isocyanurate, Boards, Faced.

1.2 DELIVERY, STORAGE AND HANDLING

.1 Deliver, handle, store and protect materials of this section in accordance with Section 01 60 00 – Material and Equipment.

.2 Provide and maintain dry, off-ground weatherproof storage.

.3 Store materials on supports to prevent deformation.

.4 Remove only in quantities required for same day use.

.5 Store materials in accordance with manufacturers written instructions.

.6 Store insulation protected from sunlight and weather and deleterious materials.

.7 Identification for delivery: indicate on containers or wrappings of and materials:

.1 Manufacturer's name and brand.

.2 Compliance with applicable standard.

.8 Deliver materials in original containers, sealed, with labels intact. Ensure that shelf life of materials has not expired.

.9 Deliver fasteners in boxes or kegs and keep in protective storage until used. Do not oil or grease fasteners.

.10 Remove damaged and/or rejected materials from site.

1.3 PROJECT/SITE ENVIRONMENTAL REQUIREMENTS

.1 Temperature, relative humidity, moisture content.

.1 Apply built-up bituminous membranes only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

.2 Do not install built-up bituminous membranes when air and substrate temperature remains below 5(C in accordance with manufacturer's recommendations or when wind chill gives equivalent cooling effect.

.3 Install built-up bituminous membranes on dry substrate, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into system.

.2 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.

1.4 WARRANTY

.1 Contractor hereby warrants that Built-up Bituminous Roofing and membrane flashings will stay in place and remain leakproof in accordance with CCDC 2 GC 24, but for 24 months.

Part 2 Products

2.1 ROOF-THERMAL LAYER

.1 DensDeck roof board, with fiberglass mats and non-combustible gysum board core as manufactured by Georgia-Pacific or equal.

2.2 VAPOUR BARRIER MEMBRANE

.1 Vapour Barrier Membrane: Sopravap’r self adhesive membrane as manufactured by Soprema.

2.3 BUILT-UP MEMBRANE

.1 Four ply asphalt and felt built-up conventional membrane roof system.

2.4 BITUMEN

.1 Asphalt: Type 2 for use with organic and glass felts, to CSA A123.4,

2.5 FELTS

.1 Saturated organic felts: 1st ply - to CSA A123.3 No.15, saturated asphalt.

.2 Fibreglass felts: 4 additional plies – IKO Glass Type 4 Glass felts or equal.

2.6 ISOCYANURATE (URETHANE) INSULATION, FACED

.1 To CAN/ULC-S704:

.1 Facing: fibre reinforced.

.2 Thickness: 100 mm, R-20 as indicated on drawings.

.3 Overlay Board: Sopraboard as manufactured by Soprema Inc. or equal, 3.2 mm, 1.2 m x 1.5 m, multi-ply, semi-rigid asphaltic roofing substrate board composed of a mineral fortified asphaltic core formed between two asphaltic saturarted fibreglass liners.

.4 Acceptable material:

.1 Ikotherm as manufactured by IKO Industries Ltd..

.2 Sopra-Iso as manufactured by Soprema Inc.

2.7 TAPERED INSULATION

.1 Tapered insulation: tapered insulation system consisting of minimum thickness 50 mm fibreboard insulation, as manufactured by Posi-Slope Enterprises Inc. or equal in accordance with shop drawings approved by Consultant. All tapered panels shall have a uniform slope and all valley corners and crickets to be factory mitered by manufacturer. Tapered insulation to provide a minimum slope of 1%. Tapered insulation shall be minimum thickness of 50 mm at trench at low point of roof insulation. Refer to drawings.

2.8 CANT STRIPS

.1 Cut from 38 mm thick fibreboard material to measure 140 mm on slope.

2.9 FASTENERS

.1 Insulation to substrate: fasteners and plates must meet Factory Mutual 4470 Standard for wind uplift and corrosion resistance.

2.10 BALLAST

.1 Stone: 19 to 32 mm size, well graded crushed stone, opaque, non-porous, washed, free from fines, long splinters, moisture, ice and snow.

2.11 FLASHING FOR CONVENTIONAL BUR

.1 Base Ply for flashing system, Base sheet: MP-180 FS Base sheet, non-woven reinforced polyester mat, coated on both sides with SBS modified bitumen to a nominal thickness up to 3.0 mm, as manufactured by IKO or Soprema Inc.

.2 Top ply in Flashing Installation, Cap sheet: TP-250-CAP, cap sheet, non-woven, reinforced polyester mat, coated on both sides with SBS modified bitumen to a nominal thickness of 5.0 mm. Ceramic clad mineral granules are embedded into the top surface while the bottom surface is covered by a thin thermo-fusible film as manufactured by IKO or Soprema Inc. .

Part 3 Execution

3.1 WORKMANSHIP

.1 Do work in accordance with applicable, standard in Canadian Roofing Contractors Association (CRCA) Roofing Specifications Manual, except where specified otherwise.

.2 Do priming for asphalt in accordance with CGSB 37-GP-15M.

3.2 HEATING OF ASPHALT

.1 Asphalt to be heated in kettle or tanker sufficiently to provide correct EVT range at point of application.

.2 In cold weather insulate hauling equipment and re-circulation lines to minimize heat loss.

.3 Do not heat asphalt above its Final Blowing Temperature (FBT) in tanker.

.4 Heating asphalt above its FBT may be permissible in kettle as long as asphalt is used up within four hours.

.5 Equip kettle and tanker with working thermometers.

3.3 PLANT AND EQUIPMENT

.1 Do not use direct fired equipment.

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

.3 Locate kettles in safe place outside of building at location to avoid danger of igniting combustible material below. When locating kettles, give consideration to direction of prevailing winds, building fans and air handling units to minimize possibility of smoke and fumes entering surrounding occupied buildings. If wind direction causes smoke and fume problems, relocate kettles on daily basis when directed by Owner or Consultant.

.4 Maintain supervision while kettles are in operation and provide metal covers for kettles to smother flames in case of fire. Provide suitable fire extinguishers.

.5 Maintain efficiency of kettles and equipment by frequent cleaning. Remove all carbonized bitumen.

.6 Use only fibreglass roofing mops.

3.4 PROTECTION

.1 Cover walls and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of work.

.3 Clean off drips and smears of bituminous material immediately.

.4 Dispose of rain water off substrates and away from face of building until drains or hoppers installed and connected.

.5 Protect from traffic and damage. Comply with precautions deemed necessary by Consultant.

.6 Place plywood runways over work to enable movement of material and other traffic.

.7 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed work and materials out of storage.

.8 Install insulation promptly to avoid possibility of condensation beneath vapour retarder.

3.5 SUBSTRATE EXAMINATION

.1 Examine substrates and immediately inform of Consultant in writing of defects.

.2 Prior to commencement of work ensure:

.1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris.

.2 Curbs have been built.

.3 Drains have been installed at proper elevations relative to finished roof surface.

.4 Plywood and lumber nailer plates have been installed to walls and parapets as indicated.

3.6 VAPOUR RETARDER (STEEL DECK)

.1 Adhere peel and stick vapour retarder as per manufacturer's instructions.

3.7 INSULATION: MECHANICALLY FASTENED APPLICATION

.1 Mechanically fasten insulation using screws and pressure distribution plates.

.2 Number and pattern of screws per board to meet Factory Mutual requirements.

.3 Place boards in parallel rows with ends staggered, and in firm contact with one another.

.4 Cut end boards to suit.

.5 Mechanically fasten overlay board over insulation as recommended by manufacturer

3.8 TAPERED INSULATION: APPLICATION

.1 Install tapered insulation as second insulation layer, sloped to drain as indicated on drawings. Stagger joints between layers 150 mm minimum.

.2 Mechanically fasten overlay board over insulation as recommended by manufacturer.

3.9 CONVENTIONAL MEMBRANE APPLICATION

.1 Membrane application.

.1 Starting at low point, perpendicular to slope, embed 1st layer and next four plies of roofing felts in hot asphalt over recover board & insulation.

.2 Overlap sheets 3/4 of their width plus 15 mm for four ply glass felt membrane and lap ends 150 mm.

.3 Apply asphalt at rate of 1 kg/m^2 with organic felts.

.4 Extend felts up to top of cant strip.

.5 Install water cut-offs at end of day, and remove before resuming work.

.6 Apply uniform flood coat at rate of 3 kg/$m^2$for asphalt and while bitumen is still hot, apply protective gravel at rate of 20 kg/m^2 .

.7 Ensure that there are no skips in flood coat. If some are found, sweep gravel aside and reflood area.

.8 Apply asphalt flood coat at rate of 0.8 - 1.2 kg/m^2followed by asphalt emulsion at rate of 1.2 L/m^2.

.2 Flashing application.

.1 Install flashings as recommended by manufacturer as required for complete warranty.

.3 Gravel surfacing

.1 Inspect entire area to ensure no wrinkles, buckles or fishmouths exist.

.2 Apply bitumen and gravel surfacing only after placement of roofing felts and membrane flashings.

.3 Apply flood coat of hot bitumen at 3 kg/m^2 into which, while hot, embed aggregate at minimum rate of 20 kg/m^2. Ensure aggregate is dry and free from frost.

3.10 CANTS

.1 Install fibre cants over rigid insulation.

.2 Apply hot bitumen to receiving surface and embed cant firmly by hand.

.3 Angle cut cants to fit tightly on back and bottom where roof to wall angle varies from 90˚.

3.11 PROTECTION OF COMPLETED WORK

.1 Ensure membrane is undamaged before application of protection board.

3.12 CLEANING

.1 Clean work in accordance with Section 01 01 00 General Requirements.

.2 Clean to Owner's approval, soiled surfaces, spatters, and damage caused by work of this Section.

.3 Check drains to ensure cleanliness and proper function, and remove debris, equipment and excess material from site.

END OF SECTION

1 **GENERAL**

1.1 **General Requirements**

1.1.1 Conform to Sections of Division 1 as applicable.

1.2 **Related Sections**

.1 Section 07 42 00 – Preformed Metal Cladding

2 **PRODUCTS**

2.1 **Sheet Metal Materials**

2.1.1 Galvanized steel sheet: commercial quality to ASTM A526-71(1975) with (G90) designation zinc coating to ASTM A525-77, provide colour to match existing finishes.

2.2 Accessories

2.2.1 Isolation coating: alkali resistant bituminous paint.

2.2.2 Plastic cement: to CGSB 37-GP-5M.

2.2.3 Cleats: of same material, and temper as sheet metal, minimum 2" wide. Thickness same as sheet metal being secured.

2.2.4 Fasteners: of same material as sheet metal, to CSA B111-1974, flat head roofing nails of length and thickness suitable for metal flashing application.

2.2.5 Touch-up paint: as recommended by metal flashing and trim manufacture.

2.3 **Fabrication**

2.3.1 Fabricate metal flashings and trim above and below new steel cladding to tie into existing elements designated to remain or fabricate as noted to Consultant approval.

2.3.2 Form sheet metal on bending brake. Do shaping, trimming, and hand seaming on bench as far as practicable.

2.3.3 Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.

2.3.4 Fabricate supplemental parts necessary to complete each item of work.

2.3.5 Hem exposed edges on underside 12 mm (1/2"). Mitre and seal corners with sealant.

2.3.6 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

2.3.7 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.4 **Metal Flashings**

2.4.1 Form flashings and copings to profiles indicated of 24 ga thick, galvanized, prefinished to match preformed metal siding.

2.4.2 Provide coloured fasteners to match siding.

3 **EXECUTION**

3.1 **Installation**

3.1.1 Supply and install sheet metal work as required.

3.1.2 Fabricate and install metal flashings, trim, in accordance with the recommendations given by CRCA.

3.1.3 Use concealed fastenings except where approved before installation.

3.1.4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips, except where otherwise shown.

3.1.5 Lock end joints and caulk with sealant.

3.1.6 Insert metal flashing under cap flashing to form weathertight junction.

3.1.7 Install all metal drips, cleats, clips and starter strips as required which shall be of sufficient thickness to hold flashings in true planes without deformations.

3.1.8 Secure to substrates or wood nailers as applicable with screws or nails and washers.

3.1.9 Set metal already partly formed in place and fasten to by means of cleats.

********** END **********

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1 GENERAL

1.1 Conform to Sections of Division 1 as applicable.

1.2 **RELATED SECTIONS**

1.2.1 Cutting and patching: Section 01 45 00 Cutting and Patching.

1.2.2 Masonry partitions including mortaring in of fire dampers: Section 04 20 00 Masonry Procedures.

1.2.3 Sealants and caulking: Section 07 92 00, Sealants.

1.2.4 Mechanical: Division 15, Mechanical.

1.2.5 Electrical: Division 16, Electrical.

1.3 **REFERENCES**

CAN/ULC S101-07	Standard Methods of Fire Endurance Tests of Building Construction and Materials
CAN/ULC -S102-07	Standard Method of Tests For Surface Burning Characteristics, Building Materials and Assemblies,
CAN/ULC-S115-05	Standard Method of Fire Tests of Firestop Systems
ULC Guide No. 40 U19.13	FireStop Systems
ULC Guide No. 40 U19.15	FireStop Systems Components

1.4 **DESCRIPTION OF WORK**

1.4.1 Work of this Section is inclusive of all firestopping specified herein and indicated on Drawings except for firestopping and smoke seal within mechanical assemblies (i.e. inside ducts, dampers) and electrical assemblies (i.e. inside bus ducts) shall be provided as part of work of Divisions 15 and 16 respectively. Firestopping and smoke seals around outside of such mechanical and electrical assemblies, where they penetrate fire rated separations, shall be part of work of this Section.

1.4.2 Section include fire stopping materials and/or systems intended to act as firestop and smoke seal for any through-penetrating items, termination devices, receptacles or any unpenetrated openings or joints, including openings and spaces at perimeter edge conditions, with wall and floor assemblies having fire-resistance rating.

1.4.3 Fire stop and seal (draft-tight) gaps, expansion joints and penetrations in fire separations and fire walls against passage of fire, smoke, gasses, firefighter's hose stream and, where designated, passage of liquids. Smoke seal at angle support at fire dampers.

1.5 **QUALITY ASSURANCE**

1.5.1 Provide work of this Section using competent installers experienced trained and approved by material or system manufacturer for application of materials and systems being used. Installers shall have minimum 5 years experience in installation of firestopping materials as systems for multiple trade project.

1.5.2 Work of this Section shall be by 1 Sub-Contractor responsible for firestopping materials and systems for all of the Work except as outlined above.

1.6 **COORDINATION**

1.6.1 Coordinate with trades involved (and advise dates) where work will take place throughout various areas of Work.

1.7 **DELIVERY, STORAGE AND HANDLING**

1.7.1 Deliver materials to Site in manufacturer's sealed and labelled containers. Materials shall be subject to Consultant's inspection.

1.7.2 Store materials inside building for 24 hours prior to use; store in area designated by Consultant; protect from damage and environmental conditions detrimental to material.

1.8 **ENVIRONMENTAL CONDITIONS**

1.8.1 Maintain minimum temperature of 5 deg C (40 deg F) for minimum period of 1 week before application, during application and until application is fully cured.

1.8.2 Conform to manufacturer's recommended temperatures, relative humidity and substrate moisture content for storage, mixing, application and curing of firestopping materials.

1.8.3 Ventilate areas in which firestopping is being applied. Protect water-soluble material from wetting until fully cured.

1.8.4 Use products that are environmentally responsible

1.9 **SUBMITTALS**

1.9.1 **Product Data**

1.9.1.1 Submit up-to-date manufacturer's product data for each material proposed for use under this Section. Include manufacture printed instructions for installation.

1.9.2 **Certification**: Submit (if requested) current ULC listings and certified copies of test reports and/or smoke seals indicating that firestopping material/systems conforms to or exceeds specified requirements.

2 **PRODUCTS**

2.1 **General**

2.1.1 Supply materials and systems capable of providing effective barrier against passage of fire, smoke, gasses in compliance with ULC S115 and where specifically indicated passage of liquids.

2.1.2 Ensure firestopping system provides fire-resistance rating (flame and temperature) not less than fire resistance rating of surrounding floor, wall or assembly, in accordance with requirements of OBC.

2.1.3 **Firestop system rating**: to ULC S115.

2.1.4 Firestopping seals except for wall joints in visible areas must be of easily identifiable colour, such as red or yellow to be clearly distinguished from other building materials.

2.1.5 Supply asbestos and PCB-free materials and systems tested in accordance with ULC-S115, be ULC listed, or be certified by Building Code officials in locality in which building is situated.

2.1.6 Ensure suitability of products for application and compatibility of materials with surfaces to which it will be applied.

2.1.7 Site system assembly shall be in accordance with ULC or UL listed system design limitations, unless proposed assembly is approved by authorities having jurisdiction and meets Consultant approval.

2.2 **Materials**

2.2.1 Materials of following manufacturers are acceptable provided they meet requirements of Specifications and are suitable for application as indicated:

- 3M Canada Inc.
- Hilti Canada Corporation
- Bio-Fire Protection Inc.
- Canadian General Electric Company Limited
- Dow Corning Canada Inc.
- FireStop Systems (Canstrut Inc.)
- Instant Firestop Inc.
- Nelson Electric Ltd.
- Standard Oil Engineered Materials Company
- Thermal Ceramics FireMaster
- Tremco Canada Ltd. (A/D Fire Protection System Inc.)
- Wieland Electric

2.2.2 **Primers**: As recommended by firestopping material manufacturer for specific substrate and use.

2.2.3 **Damming and Backup Materials, Support and Anchoring Devices**: Non-combustible, in accordance with tested assembly installed as acceptable to authorities having jurisdiction and as recommended by manufacturer. Combustible material for damming purpose may be permitted only if they are removed after permanent firestop materials are cured. Sheet steel covers over temporarily unused sleeves shall be minimum 0.9 mm (1/32") thick galvanized steel sheet and shall be supplied by Section 05999, Miscellaneous Metals. .

2.2.4 **Pipe and Duct Insulation and Wrappings:** Compatible with firestopping material; as recommended by manufacturer.

2.2.5 Fire stopping and smoke seals at opening intended for ease of re-entry such as cable: elastomeric seal. Do not use cementitious or rigid seal at such locations.

2.2.6 Fire stopping and smoke seals at opening around penetrations for ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

2.2.7 Do not use cementitious or rigid seal at such locations.

2.2.8 Sealants at vertical surfaces: non-sagging.

2.2.9 Sealants on floor surfaces requiring level finish: self-levelling.

3 EXECUTION

3.1 PREPARATION

3.1.1 Remove combustible material and loose material detrimental to bond from edges of penetration. Clean, prime or otherwise prepare substrate material to manufacturer's recommendation.

3.1.2 Do not apply firestop material to surfaces previously painted or treated with sealer, curing compound, water repellent to other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

3.1.3 Verify openings, dimensions and surfaces conform to fire and smoke seal assembly.

3.1.4 Comply with manufacturer's recommended requirements for temperature, relative humidity, moisture content and presence of any sealer or release agents on substrate during application and curing of materials. Surfaces shall be dry and frost free.

3.1.5 Fully protect walls, windows, floors and other surfaces around areas to be firestopped from marring or damage.

3.1.6 Prime surfaces in accordance with manufacturer's directions. Mask where necessary to avoid spillage on to adjoining surfaces. Remove stains on adjacent surfaces as required.

3.1.7 Remove insulation from area of insulated pipe and duct where such pipes or ducts penetrate fire separation unless ULC certified assembly permits such insulation to remain within assembly.

3.1.8 Provide temporary forming, packing and bracing materials necessary to contain firestopping. Upon completion, remove forming and damming materials not required to remain as part of system.

3.1.9 Install damming and firestopping materials as per manufacturer's instructions.

3.2 INSTALLATION

3.2.1 Seal penetrations through and gaps in fire rated separations. Fill gap in accordance with ULC details for tested system selected.

3.2.2 Mix and apply firestopping materials in strict accordance with manufacturer's written instructions and tested designs to provide required temperature and flame rated seal. Apply with sufficient pressure to properly fill and seal openings to ensure continuity and integrity of fire separation. Tool or trowel exposed surfaces as required.

3.2.3 Remove excess compound promptly as work progresses and upon completion.

3.2.4 Examine sizes, anticipated movement and conditions of opening and penetration to establish correct system and depth of backup materials and of firestopping material required. Use firestopping and smoke seals best suited for specific application as required, indicated or specified. Use only components specified in fire test of system. Do not eliminate any component for firestop system that was present in fire tests.

3.2.5 Do not cover materials until full cure has taken place.

3.2.6 Provide firestop systems at following locations, without being limited to:

3.2.6.1 At all openings, voids and penetrations through fire rated masonry, concrete and gypsum board walls, partitions and shaft walls.

3.2.6.2 At all openings, voids and penetrations installed for future use through fire rated masonry, concrete and gypsum board walls, partitions and shaft walls.

3.2.6.3 Around mechanical and electrical assemblies penetrating fire assemblies.

3.2.6.4 Between tops of all fire rated walls and partitions and underside of floor or roof slabs as detailed

3.2.6.5 At all expansion joints in walls, floors and assemblies as detailed

3.2.7 Refer to all other sections of Specifications and the Drawings to ascertain where firestops are to be used and, if noted, type of firestop required.

3.2.8 Request inspection by Consultant of completed systems before they are covered.

3.2.9 **Curing**: Cure materials in accordance with manufacturer's directions.

3.3 CLEANING

3.3.1 Remove excess materials and debris and clean adjacent surfaces immediately after application to satisfaction of Consultant. Remove and/or correct staining and discolouring of adjacent surfaces as directed.

3.3.2 Remove temporary combustible damming materials after initial set of firestopping materials. Such dams may be required to remain in place if flame spread rating is below 25, in accordance with CAN/ULC -S102.

End of Section

1 GENERAL

1.1 Conform to Sections of Division 1 as applicable.

1.2 RELATED SECTIONS

1.2.1 Firestopping and smoke seals: Section 07 84 00, Penetration Fire-stopping.

1.2.2 Read other Sections of Specifications for extent of sealing specified in those Sections. Do all other sealing indicated, specified or required.

1.3 REFERENCES

CAN/CGSB-19.13-M87	Sealing Compound, One-Component, Elastomeric, Chemical Curing
CAN/CGSB-19.17-M90	One-Component Acrylic Emulsion Base Sealing Compound
CAN/CGSB-19.24-M90	Multicomponent, Chemical-Curing Sealing Compound

1.4 QUALITY ASSURANCE

1.4.1 **Qualifications**: Perform work of this Section by recognized and established sealant applicator having experience using skilled mechanics trained in use of sealing equipment and specified materials.

1.4.2 Submit proof of experience upon Consultant's request.

1.5 DELIVERY, STORAGE AND HANDLING

1.5.1 Deliver caulking and sealing materials to Site in original, unopened containers with manufacturer’s labels and seals intact. Labels shall identify manufacturer's name, brand name of product, grade and type, application directions and shelf life or expiry date of product.

1.5.2 Handle and store materials in accordance with manufacturer's printed directions. Store flammable materials in safe, approved containers to eliminate fire hazards.

1.5.3 Do not use caulking and sealing materials that has been stored for period of time exceeding maximum recommended shelf life of materials

1.6 PROJECT CONDITIONS

1.6.1 **Environmental Requirements:** Do not apply any sealant under adverse weather conditions, when joints to be sealed are damp, wet or frozen or when at ambient temperatures below 5 deg C (40 deg F). Maintain minimum temperature of application during application and for 8 hours after application. Consult manufacturer for specific instructions before proceeding and obtain Consultant's approval.

1.7 **WARRANTY**

1.7.1 Warrant work of this Section against defects and deficiencies in accordance with General Conditions of the Contract. Promptly correct to satisfaction of Consultant and at no expense to Owner, any defects or deficiencies which become apparent within warranty period. Defects include, but are not limited to cracking, crumbling, melting, shrinkage, sag, failure in adhesion, cohesion or reversion, air and moisture leakage, marbling or streaking due to improper mixing, discolouration due to dirt pick-up during curing and staining of adjacent materials.

2 **PRODUCTS**

2.1 **MATERIALS**

2.1.1 **Colours**: Selected by Consultant from manufacturer's standard range to match colour of predominant materials to which sealant is applied.

2.1.2 **Formulation:** non-bleeding, non-migrating, and capable of supporting their own weight. Use self levelling type for horizontal surfaces and non-sag type at vertical and soffit applications. Use 1 manufacturer's product for each Type specified

2.1.3 **Sealant Type A**

2.1.3.1 One component modified urethane base chemical curing conforming to CAN/CGSB-19.13-M, Class MCG-2-25-B-N,
Acceptable Products:

Sikaflex 1A	Sika Canada Inc.
Dymonic and or Vulkem 116	Tremco Limited.

OR

Multi-component modified urethane base chemical curing conforming CAN/CGSB-19.24-M, Type 2, Class B.
Acceptable Products:

Sikaflex 2C NS	Sika Canada Inc.
Dymeric 240	Tremco Limited.

2.1.4 **Sealant Type B**

2.1.4.1 One component, chemical curing, mildew resistant silicone conforming to CGSB-19GO22M,, containing non-toxic fungicidal agents,
Acceptable Products:

DC786	Dow Corning Canada Limited,
Sanitary 1700	GE Silicones
Tremsil 200	Tremco Limited

2.1.5 **Sealant Type C**

2.1.5.1 One component, acrylic latex emulsion base, Interior Latex conforming to CAN/CGSB-19.17-M, Tremflex 834 by Tremco Limited.

OR

One component urethane conforming to CAN/CGSB-19.13-M, Class MC-2-25-B-N,
Acceptable Products:

Sikaflex 1A	Sika Canada Inc.
Dymonic	Tremco Limited.

OR

Multi-component modified urethane base chemical curing conforming CAN/CGSB-19.24-M, Type 2, Class B.
Acceptable Products:

Sikaflex 2C NS	Sika Canada
Dymeric	Tremco Limited.

2.1.6 **Sealant Type D**

2.1.6.1 One component urethane conforming to CAN/CGSB-19.13-M, Class MC-2-25-B-N,
Acceptable Products:

Sikaflex 1CSL or THC900	Sika Canada Inc
Vulkem 45	Tremco Limited.

OR

Multi-component chemical curing polyurethane base conforming to CAN/CGSB-19.24-M, Type 1, Class B,
Acceptable Products:

Sikaflex 2CSL or THC900	
Or RC-2 SL	Sika Canada Inc.
THC900 and or Vulkem 245	Tremco Limited.

2.1.7 **Joint Backing**: preformed, compressible, resilient, non-waxing, non-extruding, non-staining strips of closed cell polyethylene or urethane foam. Sizes and shapes to suit various conditions, diameter 25% greater than joint width. Backing shall be compatible with sealant, primer and substrate.

2.1.8 **Bond Breaker Tape:** as recommended by sealant manufacturer.

2.1.9 **Joint Primer**: non-staining, suitable for substrate surfaces, compatible with joint forming materials and as recommended by sealant manufacturer.

2.1.10 **Cleaning material**: non-corrosive, non-staining, solvent type, xylol, methyl-ethyl-ketone (MEK), toluol, isopropyl alcohol (IPA) or as recommended by sealant manufacturer and acceptable to material or finish manufacturers for surfaces adjacent to sealed areas.

3 EXECUTION

3.1 EXAMINATION

3.1.1 Ensure joints are suitable to accept and receive sealants. Commencement of work implies acceptance of surfaces and conditions.

3.1.2 Do not apply sealant to masonry until mortar has cured.

3.1.3 Before any sealing work is commenced, test materials for indications of staining or poor adhesion.

3.2 PREPARATION

3.2.1 Ensure that all joint interfaces are clean.

3.2.2 Clean joints and spaces which are to be sealed and ensure they are dry and free of dust, loose mortar, oil, grease, oxidation, coatings, form release agents, sealers and other foreign material.

3.2.3 Clean porous surfaces such as concrete, masonry or stone by wire brushing, grinding or sandblasting as required to obtain clean and sound surfaces.

3.2.3.1 Remove laitance by grinding or mechanical abrading.

3.2.3.2 Remove oils by sandblast cleaning.

3.2.3.3 Remove loose particles present or resulting from grinding, abrading or sandblast cleaning by thorough brushing.

3.2.4 Clean ferrous metals of rust, mill scale and foreign materials by wire brushing, grinding or sanding.

3.2.5 Wipe non-porous surfaces such as metal and glass to be sealed, except pre-coated metals, with cellulose sponges or clean rags soaked with ethyl alcohol, ketone solvent, xylol or toluol and wipe dry with clean cloth. Where joints are to be sealed with silicone based sealants clean joint with methyl-ethyl-ketone (MEK) or xylol. Do not allow solvent to air-dry without wiping. Clean pre-coated metals with solutions or compounds which will not injure finish and which are compatible with joint primer and sealant. Check ferrous metal surfaces are painted before applying sealant.

3.2.6 Examine joint sizes and where depth of joint exceed required depth of sealant correct to achieve proper following width/depth ratio:

3.2.6.1 Maintain 2:1 width/depth ratio: minimum joint size shall be 6 mm (1/4") x 6 mm (1/4"), maximum depth of sealant to be 13 mm (1/2").

3.2.7 Install joint backing material to achieve correct and uniform joint profile.

3.2.8 Where joint design or depth of joint prevents use of joint backing material, apply bond breaker tape to prevent three-sided adhesion.

3.2.9 Do not stretch, twist, puncture or tear joint backing. Butt joint backing at intersections. Install bond breaker tape at back of joint where joint backing is not required or cannot be installed.

3.2.10 Where surfaces adjacent to joints are likely to become coated with sealant during application, mask them prior to priming and sealing.

3.2.11 Do not exceed shelf life and pot life of materials, and installation times, as stated by manufacturers.

3.2.12 Be familiar with work life of sealant to be used. Do not mix multiple component materials until required for use.

3.2.13 Use materials as received from manufacturer, without additions, deletions and adulterations of materials.

3.2.14 Mix multiple component sealants and bulks sealants using mechanical mixer capable of mixing without mixing air into material, strictly in accordance with manufacturer's directions and recommendations. Continue mixing until material is homogeneously blended, uniform in colour and free from streaks of unmixed material. Install compound prior to start of hardening or curing cycle.

3.2.15 Seal joints in surfaces to be painted before surfaces are painted. Where surfaces to be sealed are prime painted in shop before sealing check to make sure prime paint is compatible with primer and sealant. If they are incompatible, inform Consultant and change primer and sealant to compatible types approved by Consultant.

3.2.16 Where irregular surface or sensitive joint border exists, apply masking tape at edge of joint to ensure joint neatness and protection.

3.2.17 Prime all exterior horizontal joints. Prime sides of joints for type of surface being sealed prior to application of joint backing, bond breaker or sealant as recommended by sealant manufacturer

3.3 **APPLICATION**

3.3.1 Apply sealant using hand operated guns or pressure equipment fitted with suitable nozzle size and equipment approved by sealant manufacturer. Apply in accordance with manufacturer's directions and recommendations.

3.3.2 Force sealant into joint and against sides of joints to obtain uniform adhesion. Use sufficient pressure to completely fill all voids in joint regardless of variation in joint widths and to proper joint depth as prepared. Ensure full firm contact with interfaces of joint. Superficial pointing with skin bead shall not be acceptable.

3.3.3 Finish face of compound to form smooth, uniform beads. At recesses in angular surfaces, finish compound with flat face, flush with face of materials at each side. At recesses in flush surfaces, finish compound with concave face flush with face of materials at each side.

3.3.4 Compound may be tooled, provided that such tooling does not damage seal or tear compound. Avoid pulling of sealant from sides.

3.3.5 Tool surfaces as soon as possible after sealant application or before any skin formation has occurred, particularly when using silicone sealants.

3.3.6 Joint surfaces shall be straight, neatly finished, free from ridges, wrinkles, sags, dirt, stains, air pockets and embedded foreign matter or other defacement and be uniform in colour, free from marbling and/or colour streaking due to improper mixing or use of out of shelf life products.

3.3.7 Solvent curing sealants shall not be used indoors.

3.3.8 Use 1 of sealants specified for each type in following locations. Ensure sealant chosen (from several specified under each type under "MATERIALS") for each location is recommended by manufacturer for use for conditions encountered.

3.3.8.1 Type A (non-traffic bearing): Joints between metal frames and adjacent masonry and/or concrete construction in exterior walls, exterior and interior; control and expansion joints in exterior and interior surfaces of poured-in-place concrete walls, precast architectural wall panels and unit masonry walls; sealing of joints between underside of pre-stressed precast concrete floor slabs and masonry; and all other locations where sealing is required or noted on Drawings except in locations designated for Type B, C and D and except where sealing specified in other Sections.

3.3.8.2 Type B: Joints between urinals and walls, around washrooms accessories, at corners of walls, between splash backs and walls, in shower, damp or wet areas, at ceramic tiles.

3.3.8.3 Type C: Joints between interior metal frames and adjacent construction in interior partitions.

3.3.8.4 Type D (traffic bearing): Joints in horizontal surfaces between concrete slabs, pavers and precast concrete panels.

3.3.9 Joint designation in preceding paragraphs and fact that Drawings do not show all locations to be sealed, does not limit responsibility of this Section to seal all locations except those indicated in other Sections of Work, required to create and ensure continuous enclosure.

3.3.10 Fire-stopping and smoke seal

3.3.10.1 Sealants part of firestopping systems and smoke seals provided within fire rated assemblies shall be part of work of Section 07 84 00, Penetration Fire-stopping and shall be carried out under supervision of this Section.

3.4 **REPAIR**

3.4.1 Remove any compounds not complying with requirements specified herein. Exercise care in removal operations not to mar or damage finishes adjacent to joints. Repeat preparation, priming and installation of new material as specified to provide finished work complying with specified requirements, and acceptable to Consultant. Do such repair work at no extra cost to Owner.

3.5 **CLEANING**

3.5.1 Immediately clean adjacent surfaces which have been soiled and leave Work in neat, clean condition. Remove excess materials, compounds smears or other soiling resulting from application of sealants. Use recommended cleaners and solvents.

3.6 **PROTECTION OF COMPLETED WORK**

3.6.1 Provide approved, non-staining means of protection for completed joint sealant installations where required to protect work from mechanical, thermal, chemical and other damage by construction operations and traffic.

3.6.2 Maintain protection securely in place until completion of Work. Remove protection when so directed by Consultant.

End of Section

1. GENERAL

1.1. Conform to Sections of Division 1 as applicable.

1.2. RELATED SECTIONS

1.2.1. Installation of steel door frames in masonry: Setting in place by Section 06 20 00, Finish Carpentry and Millwork, building in by Section 04 20 00, Masonry Procedures.

1.2.2. Caulking of door frames: Section 07 92 00, Joint Sealants.

1.2.3. Hardware supplied by Section 08 71 00, Finish Hardware, installed by Section 06 41 00, Finish Carpentry and Millwork.

1.2.4. Glass & Glazing:. Section 08 80 00 for Glazed doors and screens.

1.2.5. Finish painting: Section 09 91 00, Painting and Finishing.

1.3. REFERENCES

ASTM A 653/A653M-09	Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
ASTM A568M-09	Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold Rolled, General Requirements for
CSA W59-03	Welded Steel Construction (Metal Arc Welding)
CAN4-S104-M80 (R1985)	Fire Tests of Door Assemblies
CAN4-S105-M85 (R1992)	Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104
NFPA 80-90	Fire Doors and Windows

1.4. SUBMITTALS

1.4.1. Submit shop drawings in accordance with Section 01 33 00 Submittals.

1.4.2. Indicate each type of frame, door, core, metal thicknesses and finishes, openings, glazed, fire ratings, location of exposed fasteners, hardware blanking, reinforcing, tapping and drilling arrangements. Show large scale frame sections and anchoring details. Submit door and frame schedule identifying each unit. Ensure each unit bears legible identifying mark corresponding to that listed in door and frame schedule.

1.4.3. Submit for Consultant's approval, sample of frame corner showing construction, workmanship and finish.

1.4.4. Submit in addition to fire label, certificate to substantiate design and construction of fire-rated screen assemblies, if required by Consultant or authorities having jurisdiction.

1.5. DELIVERY, STORAGE AND HANDLING

1.5.1. Protect doors and frames during shipping and storage.

1.5.2. Note damage incurred during shipping.

1.5.3. Make good immediately any damage done. Clean scratches and touch up with rust-inhibitive primer. Replace damaged work which cannot be repaired, restored or cleaned.

1.5.4. Store materials on wood sleepers in dry area and cover to protect from damage. Coordinate this requirement with Section 06 20 00, Finish Carpentry installing doors.

1.5.5. Remove wrappings or coverings from doors upon delivery at Site. Store doors in vertical position, spaced by blocking to permit air circulation between them.

2. PRODUCTS

2.1. **MATERIALS**

2.1.1. Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:
Ambico Ltd.
Artek Door Limited
Baron Metal Industries
Daybar Industries Ltd.
Macotta Company of Canada Ltd.
Metal Door Hardware Ltd.
S.W. Fleming Ltd.
Stanley-Bumeda Ltd.

2.1.2. **Sheet Steel:** Commercial grade steel to ASTM A568M, Class 1, hot-dip galvanized to ASTM A 653/A653M-96-Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, ZF 75 (A25), known commercially as "Colourbond", "Satincoat", or "Galvanneal".

2.2. STEEL CORE THICKNESS (MINIMUM)

		Metric Thickness	Gauge
2.2.1.	**Door Frames (and Transom Frames):**	1.519 mm	16
2.2.2.	**Side Light and Window Frame Assemblies:**	1.519 mm	16

2.2.3. Doors (and Base & Upper Panels located in Screens):

2.2.3.1. Hollow Steel Construction

	- Face Sheets	1.519 mm	16
	- Vertical Stiffeners	0.912 mm	20
2.2.3.2.	Honeycomb Core Construction		
	- Face sheet	1.519 mm	16

2.2.4. **Accessories (Doors and Frames)**

2.2.4.1. Reinforcements

- Lock and Strike Reinforcements	1.519 mm	16
- Hinge Reinforcements	3.416 mm	10
- Flush Bolt Reinforcement	1.519 mm	16
- Reinforcement for Surface Applied Hardware	1.214 mm	18
- Concealed Door Closer or Holder Reinforcements	2.657 mm	12
- Top and Bottom End Channels	1.214 mm	18

2.2.5.	Steel Top Caps:	0.912 mm	20
2.2.6.	Glass Trim (Screw Fixed or Snap-In Types):	0.912 mm	20
2.2.7.	Floor Anchors:	1.519 mm	16
2.2.8.	Jamb Spreaders:	0.912 mm	20
2.2.9.	Wall Anchors:		
	- Masonry T-strap Type	1.214 mm	18
	- Masonry Wire Type	4.0 mm dia.	-
	- Masonry Stirrup-strap Type 50 mm x 250 mm (2" x 10" min.)	1.519 mm	16

2.2.10. **Primer:** Rust inhibitive touch-up only.

2.2.11. **Adhesives**

2.2.11.1. Honeycomb Cores and Steel Components: Heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.

2.2.11.2. Polyurethane Cores for Insulated Doors: Heat resistant, epoxy resin based, low viscosity, contact cement.

2.2.11.3. Lock-Seam Doors: Fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

2.2.12. **Door Silencers:** Single stud rubber/neoprene type.

2.2.13. **Fasteners for Stops:** Cadmium plated steel, counter sunk flat or oval head sheet metal Phillips screws.

2.3. **FABRICATION**

2.3.1. Permit access by an approved inspection and testing company for purpose of inspecting at random doors under fabrication.

2.3.2. **Welding:** CSA W59-M.

2.3.2.1. 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 arises and profiles, and sand down to smooth, true, uniform finish.

2.3.3. **Hardware Requirements:** Blank, mortise, reinforce, drill and tap doors and frames to receive mortised templated hardware. Check hardware list for requirements.

2.3.4. **Frames-General**

2.3.4.1. Fabricate frames for doors, screens and borrowed lights to profiles indicated.

2.3.4.2. Interior frames shall be 1.519 mm (16 ga) welded type construction.

2.3.4.3. Exterior frames shall be paintable G90 hot dipped galvanized steel and filled with insulation.

2.3.4.4. Reinforce frame as required for surface mounted hardware. For door frames wider than 1.5 mm (5'), reinforce door frame head and jamb and mullions at junction of head.

2.3.4.5. Where frames occur in masonry provide strip strap, T-strap or wire type anchors. Where frames occur in gypsum board provide stud type anchors.

2.3.4.6. Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb. Provide 2 anchors for rebate opening heights up to and including 1.5 mm (5') and 1 additional anchor for each additional 760 mm (30") of height or fraction thereof, except as indicated below. For frames in previously placed concrete, masonry or structural steel provide anchors located not more than 150 mm (6") from top and bottom of each jamb and intermediate anchors at 660 mm (26") on centre maximum.

2.3.4.7. Where floor finishes allow, fabricate frames to extend 38 mm (1-1/2") below finished floor level. Where frames are to terminate at finished floor level, provide plates for anchorage to slabs.

2.3.4.8. Prepare each door opening for single stud door silencers: 3 for single door openings placed opposite hinges: 2 for double door openings approximately 150 mm (6") each side of centreline of head stop.

2.3.4.9. Supply removable portion of stop and frame where required for overhead concealed door closers and properly connect to frame and prepare for attachment to closer prior to shipment.

2.3.4.10. Factory apply touch-up primer to areas where zinc coating has been removed during fabrication.

2.3.4.11. Factory apply touch-up primer to areas where zinc coating has been removed during fabrication.

2.3.4.12. Undercut 19 mm (3/4") for air intake at washrooms and other doors indicated on Door Schedule.

2.3.4.13. Install grilles in doors as noted in Mechanical Drawings and Specifications.

2.3.5. **Welded Type Frames**

2.3.5.1. Mitre corners of frames. Cut frame mitres accurately and weld continuously on inside of frame.

2.3.5.2. Protect mortise cut outs with mortar guard boxes. Omit for gypsum board applications.

2.3.5.3. When required due to large size of frame product, fabricate and ship to Site in sections. Indicate joints for field assembly on shop drawings.

2.3.5.4. Cope and weld butt joints of mullions, transom bars, centre rails and sills. Grind welded joints to smooth uniform finish.

2.3.5.5. Attach floor anchors to inside of each jamb profile.

2.3.5.6. Weld in 2 temporary jamb spreaders at each frame to maintain alignment during shipment.

2.3.5.7. Form glazing stops into channels, minimum 16 mm (5/8") height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.

2.3.6. **Prime Painting:** Apply factory touch up primer at areas where zinc coating has been damaged during fabrication.

2.3.7. **Doors-General**

2.3.7.1. Fabricate doors to be swing type flush with 1 continuous face free from joints, tool markings and abrasions and with provisions for glass and/or louvre openings as indicated on Door Schedule and Drawings.

2.3.7.2. Fabricate interior doors to be honeycomb construction or insulated where noted.

2.3.7.3. Interior doors to be steel stiffened with lockseam construction where noted.

2.3.7.4. Insulate exterior doors and frames. **Exterior doors and frames to be paintable, G90 hot dipped galvanized steel.**

2.3.7.5. For honeycomb doors longitudinal edges shall have mechanically interlocked, tack welded 150 mm o.c. (6”), filled and sanded flush.

2.3.7.6. Fabricate doors with top and bottom inverted recessed spot welded channels.

2.3.7.7. Reinforce, blank, drill and tap doors for mortised, templated hardware, including wide angle door scope to be provided under this section.

2.3.7.8. Reinforce doors for surface mounted hardware.

2.3.7.9. Factory prepare holes 13 mm (1/2") diameter and larger. Factory prepare holes less than 13 mm (1/2") when required for function of device for knob, lever, cylinder, turnpieces or when these holes overlap function holes.

2.3.7.10. Fabricate fire rated door assemblies as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by nationally recognized listing agency to individual manufacturer and tested in conformance with CAN4-S104-M. Provide labels for fire rated doors.

2.3.7.11. Fabricate fire rated doors where indicated in Door Schedule or Drawings, to meet required maximum temperature rise on unexposed side of door in accordance with OBC and ULC requirements.

2.3.7.12. Construct rail and stile doors in same manner as flush doors.

2.3.7.13. Construct panels to match doors.

2.3.7.14. Reinforce panels to prevent oil canning. Install panels with concealed fasteners and reinforce to accommodate hardware as required. Provide door top and rebated matching panel where no transom mullion occurs.

2.3.8. **Prime Painting:** Apply factory touch up primer at areas where zinc coating has been damaged during fabrication.

3. EXECUTION

3.1. Installation

3.1.1. Supply steel doors & frames to Section 04 20 00 Masonry or 06 20 00, Finish Carpentry for installation.

3.1.2. Install screens where indicated.

End of Section

1 GENERAL

1.1 Conform to Sections of Division 1 as applicable.

1.2 **RELATED SECTIONS**

1.2.1 Supply steel door frames: Section 08 11 00, Steel Doors and Frames and setting in place by Section 06 20 00, Finish Carpentry and Millwork and installed by Section 04 20 00, Masonry.

1.2.2 Supply of hardware: Section 08 71 00, Finish Hardware installed by Section 06 20 00, Finish Carpentry and Millwork.

1.2.3 Supply of Glass: Section 08 80 00 Glass and Glazing

1.3 **REFERENCES**

ASTM E2074-00	Methods of Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side Hinged and Pivoted Swinging Door assemblies
AWMAC	Architectural Woodwork Manufacturers Association of Canada, latest edition
CSA O112 Series-M77 (R2001)	CSA Standards for Wood Adhesive
CSA O115-M82	Hardwood and Decorative Plywood
CAN/CSA-O132.2 Series 90(R1998)	Wood Flush Doors
CAN4-S104-M80 (R1985) -	Standard Method for Fire Tests of Door Assemblies
NFPA 80-1999	Standard for Fire Doors and Fire Windows
NFPA 252-1999	Standard Method of Fire Tests of Door Assemblies.

1.4 **SUBMITTALS**

1.4.1 **Shop Drawings**

1.4.1.1 Submit shop drawings in accordance with Section 01 33 00 Submittals.

1.4.1.2 Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required.

1.4.1.3 Submit product data indicating door core materials and construction; and face type.

1.5 **DELIVERY, STORAGE AND HANDLING**

1.5.1 Do not accept delivery to Site until work of wet trades is complete and moisture readings of surfaces in proposed storage area is less than 18%.

1.5.2 Accept doors at Site in individual protective packaging.

1.5.3 Store doors flat on level surface in dry, well ventilated area inside building.

1.5.4 Cover top of pile with waterproof covering but allow air circulation at sides. Use opaque covering where sunlight might bleach veneer.

1.6 **WARRANTY**

1.6.1 Warrant work of this Section against defects and deficiencies for period of **3 years**. Promptly correct defects and deficiencies which become apparent during warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include, but are not limited to, bubbling, delamination of faces, or edges, warp, twist bow exceeding 6 mm (1/4"), and telegraphing of core. "Correct" referred to herein includes installing hardware, finishing, hanging and fitting.

2 PRODUCTS

2.1 MANUFACTURERS

2.1.1 Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Door Schedule and Specifications:

Baillargeon Doors Inc. 8600 Series – Provide fire rated doors where indicated.

2.2 MATERIALS

2.2.1 Conform to CAN/CSA-O132.2 Series for wood flush doors and AWMAC for stile and rail doors, except as specified herein.

2.2.2 Supply wood doors from same manufacturer.

2.3 Door Construction

2.3.1 Solid Particleboard Core Wood Flush Doors

- Construction: 7 ply.
- Fire Rating: 20 or 30 minutes for 5 ply construction or (unrated for 7 ply construction).
- Core: Solid particleboard core conforming to CSA-O188 or ANSI A208.1 Standards. Density of 28-32 lbs/cubic foot.
- Crossband: Hardwood veneer 1.6 mm (1/16") thick.
- Stiles: 2 ply, minimum 38 mm (1-1/2") laminated hardwood, for 5 ply construction or minimum 115 mm (4-1/2") laminated low density wood with 16 mm (5/8") (maple) outer edge for 7 ply construction.. Matched with door faces, **ME**
- Top and Bottom Rail: Minimum 30 mm (1-3/16") wood or SCL.

2.4 Door Facing

2.4.1 Paint grade

2.4.2 Exposed Vertical Edges: Hardwood, manufacturer's standard.

2.5 **Adhesives**

2.5.1 Type I: CSA 0112.7-M Waterproof phenol, resorcinol and phenol - resorcinol resin adhesive.

2.6 **FABRICATION**

2.6.1 **General**

2.6.1.1 Fabricate flush doors in accordance with CAN/CSA-O132.2 and CAN4-S113 and stile and rail doors in accordance with AWMAC except as specified herein.

2.6.1.2 Size doors for 1.6 mm (1/16") clearance of heads and jamb and 9 mm (3/8") at bottom.

2.6.1.3 Undercut 19 mm (3/4") for air intake at washrooms and other doors as indicated on Door Schedule.

2.6.1.4 Bevel vertical edges of single acting doors 3 mm in 50 mm (1/8" in 2") on lock side and 1.5 mm in 50 mm (1/16" in 2") on hinge side.

2.6.1.5 Radius vertical edges of double acting doors to 60 mm (2-3/8") radius.

2.6.1.6 Seal wood edges and edges of cut outs before units are placed in unheated storage areas at plant or shipped to Site.

2.6.2 **Flush Doors**

2.6.2.1 Fabricate doors using 5 ply hot press construction technology. Bond stiles and rails to core using Type I or II adhesive. Sand for uniform thickness. Laminate door facing, crossbanding and assembled core in hot press.

2.6.2.2 Factory sand assembled door leaf.

2.6.2.3 Factory machine doors for finish hardware in accordance with hardware requirements and dimensions.

2.6.2.4 Factory fit doors for frame opening dimensions identified on shop drawings.

2.6.2.5 Provide inner blocks at lock edge, top of door closer and bottom for hardware reinforcement.

3 EXECUTION

3.1 **INSTALLATIONs**

3.1.1 Supply wood doors to Section 06 20 00, Finish Carpentry and Millwork for installation.

End of Section

1 GENERAL

1.1 General Requirements

1.1.1 Comply with Sections of Division 1 as applicable.

1.2 Related Work

1.2.1	Final cleaning:	Section 01 01 00, Paragraph 12.1
1.2.2	Wood blocking:	Section 06 10 00, Rough Carpentry
1.2.3	Caulking of joints between frames and other building components:	Section 07 92 00 Sealants

1.3 Reference Standards

1.3.1 CAN/CSA-A440 - Windows.

1.4 Shop Drawings

1.4.1 Submit shop drawings in accordance with Section 01 33 00 - Submittals.

1.4.2 Indicate materials and details in scale full size for head, jamb and sill, profiles of components, junction between combination units elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes fasteners, and caulking. Submit colour samples with shop drawings to confirm colour to match existing windows.

1.5 Source Quality Control

1.5.1 Windows supplied under this specification shall have been tested by an independent testing agency indicating compliance with the performance requirements of CAN/CSA-A440. Classification: Fixed, B7, C5, minimum I value of 55 and AAMA/NWWDA 101/I.S.2-97 (Performance rating: F-HC80 (6'-0"X 6'-0") FER Grade 40.

1.6 Maintenance Data

1.6.1 Provide operation and maintenance data for windows for incorporation into manual specified in Section 01 33 00 - Submittals.

1.7 Special Protection

1.7.1 Temporarily and clearly mark each light to indicate presence of glass. These must be removed prior to installation.

1.7.2 Replace defective, damaged or broken glass due to faulty manufacture, setting, handling or storage carried out under work of this Section. Defective glass shall be as defined in CAN2-12.3-M76.

1.8 Extended Guarantee

1.8.1 Provide a written guarantee, signed and issued in the name of Owner stating that the aluminum windows, including factory-sealed glazed units, are guaranteed against leakage, defects and malfunction under normal usage for a period of five (5) years from the date of Certificate of Substantial Performance.

2 PRODUCTS

2.1 Materials

2.1.1 Materials: to CSA standard CAN/CSA-A440 supplemented as follows:

2.1.2 Aluminum extrusions: Aluminum Association alloy AA6063-T54

2.1.3 Thermal barrier: extruded, foamed polyvinylchloride, interlocked between outer and inner aluminum framing members to provide thermal separation.

2.1.4 Fasteners: non-magnetic, stain and corrosion resistant stainless steel to ASTM E-149

2.1.5 All windows by same manufacturer,

2.1.6 Main frame: aluminum, thermally broken with aluminum sill full width of opening.

2.1.7 Glass:

.1 Insulating glass units (use tempered glass) for exterior doors: to CAN/CGSB-12.8, double unit, 25 mm overall thickness.

.1 Tempered Glass to CAN/CGSB-12.1, thickness: 6 mm tempered inner light; 6 mm tempered outer light.

.2 Inter-cavity space thickness: with low conductivity spacers; 12mm between inner and outer lights.

.3 Glass coating: surface number 3, low "E".

.4 Inert gas fill: argon.

2.1.8 Isolation coating: alkali resistant bituminous paint.

2.2 Window Type and Classification

2.2.1 Types:

.1 Fixed: with insulating glass.

.1 Acceptable material: Shadowline 970 Series fixed window units with thermal break to CAN/CSA - A440, Classification Fixed, B7, C5, min I value of 55, as manufactured by Alumicor or Kawneer or equal approved by Board. No other alternates will be considered. Frame members – Shadowline 970 Series, 2" bullnose, extruded aluminium alloy 6063-T6, minimum 1.6 mm wall thickness, Thermal Break, extruded foamed polyvinylchloride, colour – clear anodized.
Depth of jamb and head to bridge cavity of existing masonry wall.

.2 Classification rating: to CAN/CSA-A440
- .1 Water leakage: B7
- .2 Wind load resistance: C5

2.3 Fabrication

2.3.1 Prior to fabrication all existing windows must be site measured. Fabrication of window units must suit site conditions.

2.3.2 Fabricate in accordance with CAN/CSA-A440 supplemented as follows:

2.3.2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.

2.3.3 Fabricate window frames using two extruded components joined by means of a thermal break. Provide complete metal to metal separation between the two frame components. Do not use connecting screws, clips or other devices which would bridge the thermal break.

2.3.4 Assemble all frame joints neatly, in weather-tight manner and secure by means of screws anchored into integral screw ports.

2.3.5 Deburr and make smooth all sharp edges and corners. Fabricate entire window in a manner that will allow easy replacement of any defective or damaged component.

2.3.6 Provide frames which will permit glass replacement without the use of special tools.

2.4 Aluminum Finishes

2.4.1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.

.1 Clear anodized, Designated AA-M12C22A42/44 (Aluminum Association, mechanical finish unspecified, medium matte etch, Architectural Class 1, 0.7 mils (18 um) coating) in accordance with Aluminum Association

finish standards.
Confirm Colour prior to ordering, submit samples

2.5 Isolation Coating

2.5.1 Isolate aluminum from following components, by means of isolation coating:

.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
.2 Concrete, mortar and masonry.
.3 Wood.

2.6 Void Insulation: spray foam insulation, type best suited to end use.

3 EXECUTION

3.1 Window Installation

3.1.1 Install in accordance with CAN/CSA-A440 Appendix A and to strict accordance with manufacturer's printed instructions and reviewed shop drawings.

3.1.2 Arrange components to prevent abrupt variation in colour.

3.1.3 Set units in prepared openings plumb, square and level, free from warp, twist or superimposed loads and at proper elevations and alignment with other work.

3.1.4 Do not use wood for shimming.

3.1.5 Secure work adequately and accurately to structure, in required position and in a manner not restricting thermal movement. Make provisions for structural movement. Final anchor settings after alignment.

3.1.6 Conceal fixings.

3.1.7 Fully fill voids between adjacent surfaces and exterior window frames with loose glass wool insulation to prevent movement or infiltration of air.

3.1.8 Install covers, closures, flashings and trim pieces using concealed fasteners.

3.1.9 Remove all stickers from glazing prior to installation. All glass must be clean and polished on the outside face prior to installation.

3.2 Caulking

3.2.1 Seal joints between windows and masonry and gypsum board with sealant. Seal joints between frame members and window openings with sealant to provide weather-tight seal at outside and air vapour seal at inside.

3.2.2 Apply sealant in accordance with Section 07 92 00 – Joint Sealants. Conceal sealant within window units except where exposed use is permitted by Consultant.

********** END **********

1. GENERAL

1.1 General Requirements

1.1.1 Conform to all sections of Division 1 as applicable.

1.2 Related Work Specified Elsewhere:

1.2.1.1 Steel Doors and Frames: Section 08 11 00

1.2.1.2 Solid Core Wood doors: Section 08 14 00

1.3 Quality Assurance

1.3.1 The supplier of finishing hardware shall be regularly involved in the sale and distribution of Builders Hardware for Commercial Projects of this nature.

1.3.2 Furnish services of an Architectural Hardware Consultant for preparation of hardware shop drawings, keying, co-ordination with other trades, consultation with the Owner and the Consultant and for on-site inspections.

1.3.3 Hardware furnished for this project shall be as listed or, supplied with approved equivalents as noted.

1.4 References

1.4.1 All hardware for fire rated openings shall meet ULC or Warnock-Hersey testing as required.

1.4.2 Hardware for doors and frames shall conform to ANSI standards.

1.4.3 All fire and life safety codes shall be met as required by the Authority having Jurisdiction.

1.5 Submittals

1.5.1 Submit shop drawings in schedule form, indicating manufacturer's names, product descriptions, finishes, location of each item and complete keying schedule. The schedule shall list doors by number including size, hand and swing.

1.5.2 The schedule shall incorporate the manufacturer’s catalogue number.

1.5.3 Submit as specified for shop drawings, manufacturer's cut sheets for each hardware item.

1.5.4 Submit samples when requested. Mark samples plainly giving hardware item numbers, types and sizes.

1.5.5 Submit template information to the contractor for distribution to related trades.

1.5.6 Prepare for review a key schedule to be co-ordinated with the Consultant and Owner.

1.5.7 Provide to building maintenance staff prior to date of Substantial Performance:

.1 One set wrenches for door closers, locksets and panic sets.

.2 Three sets of manufacturer's installation instructions for door closers, locksets, and panic sets.

.3 Three sets of manufacturer's instructions for proper care of hardware including lubrication.

1.6 Keying System

1.6.1 Lay out the keying system for the Building in consultation with the Consultant.

1.6.2 Prepare and submit keying chart and related explanatory data to the Consultant for approval. Do not commence lock work until written confirmation of keying arrangements is received from the Consultant.

1.6.3 Supply 2 change keys for each lock.

1.7 Product Delivery, Storage and Handling:

1.7.1 Deliver to the Building, finish hardware for doors listed in Door Schedule, and hardware for cabinet work. Hand hardware over to trades which are designated to install it.

1.7.2 Label all packages legibly indicating manufacturer's numbers, types, sizes, and Hardware List reference number. Wrap all hardware in paper, and pack in the same package as screws, bolts, and fastenings necessary for proper installation.

1.7.3 Ensure that the hardware is not damaged after it has been installed.

1.8 Warranty

1.8.1 Warrant work of this Section against defects and deficiencies for a period of 2 years, 5 years on exit devices, 10 years for door closers, provide supplier's written warranty from date Work is certified as substantially performed. Promptly correct defects and deficiencies which become apparent within warranty period, including making good any work damaged by this work, satisfactory to Consultant, and at no expense to Owner.

2. PRODUCTS

2.1 Materials:

2.1.1 Provide all items included in Hardware Schedule complete with fastening devices necessary to ensure a neat and secure installation.

2.1.2 Screws, unless otherwise directed shall be full threaded brass and stainless steel screws of approved length to ensure positive fastening.

2.1.3 Equivalent hardware manufactured by other firms is also acceptable subject to approval by the Consultant of samples and a list of items proposed.

2.1.4 Refer to Hardware Schedule at end of this section for full list of hardware components.

2.1.5 Provide and install door signage where indicated on schedule.

2.2 Fabrication and Manufacture:

2.2.1 Strikes:

2.2.1.1 Lock strikes shall be standard template box strikes, with extended lips to protect door frames and trim from marking with bolts, and shall be set flush in hollow metal door frames.

2.2.1.2 Blank standardized template strikes for hollow metal door frames shall be supplied as schedules for such doors without locks.

2.2.2 Door Closers:

2.2.2.1 Door closers shall be rack and pinion type with back checking feature and shall be of proper sizes to operate each respective door efficiently. Shaft packing shall be leak-proof.

2.2.3 Kick and Bumper Plates:

2.2.3.1 Kick and bumper plates shall be as scheduled with edges cut square and smoothed off and shall have countersunk holes and oval head screws which shall be placed at each corner and symmetrically arranged at a maximum spacing of 200 mm (8") along edges.

2.2.4 Push and Pull Plates:

2.2.4.1 Push and pull plates shall be as scheduled with edges cut square and smoothed off and shall have counter sunk holes and flat head screws which shall be placed at each corner and symmetrically arranged at a maximum spacing of 200 mm along edges.

2.2.5 Thresholds:

2.2.5.1 Thresholds shall be supplied complete with countersunk holes, and with screws and anchors as required for proper anchorage.

2.2.6 Fasteners:

2.2.6.1 Hardware shall be complete with screws, bolts, expansion shields and other fastening devices as required for the satisfactory installation and operating of the hardware.

2.2.6.2 Fastening devices shall be of the same finish as the hardware which is to be fastened.

2.2.6.3 Where a pull is scheduled on one side of the door, and a push plate on the other side, issue installation directions to the trade responsible for fixing, so that the pull shall be secured through the door from the reverse side and the push plate installed to cover the screws. Flush pulls shall be supplied with machine screws for attaching as specified above.

2.2.7 Finishes:

2.2.7.1 The type and finish of hardware shall be equal in all respects to the samples of hardware and finishes approved by the Consultant.

2.2.7.2 Metal finishes shall be free from defects, clean and unstained and of a uniform colour.

3 EXECUTION

3.1 Preparation:

3.1.1 Examination:

3.1.1.1 Before furnishing any hardware, carefully check Drawings of the Work requiring hardware, verify door swings, door frame materials and operating conditions and ensure that hardware will fit the work to which it is to be attached.

3.1.1.2 Check shop drawings and frame and door lists affecting hardware type and installation, and certify to the correctness thereof, or advise the Consultant in writing of required revisions.

3.1.2 Templates:

3.1.2.1 Check the hardware schedule, Drawings and Specifications and furnish promptly any patterns, templates, template information and manufacturer's literature, required for the proper preparation for the application of hardware, in ample time to facilitate the progress of the work.

3.2 Installation

3.2.1 General

3.2.1.1 Assist and supervise hardware installation supplied by this Section.

3.3 Hardware Mounting Heights

3.3.1 Review with the Consultant the proper mounting heights and any special conditions.

3.3.2 Standard mounting heights are as follows:

.1 Mortise lock strike: 990 mm (39") from centre of knob to finished floor.

.2 Deadlock strike: 1270 mm (50") from centre of cylinder to finished floor.

.3 Mortised night latches: 1270 mm (50") from centre of cross bar to finished floor.

.4 Panic sets: 1020 mm (40") from centre to finished floor.

.5 Door pulls: 1020 mm (40") from centre to finished floor.

.6 Push plates: 1120 mm (44") from centre to finished floor.

.7 Blank strikes: 1270 mm (50") from centre to finished floor.

.8 Blank fronts: 1270 mm (50") from centre to finished floor.

.9 Door closer arms: to allow maximum degree of swing.

.10 Floor stops: to allow maximum degree of swing.

3.4 Performance

3.4.1 Adjust and clean:

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

3.4.1.2 Check door stops to determine if wall or floor types have been installed, as specified.

3.4.1.3 Verify that doors are set to swing to maximum allowable opening.

********** END **********

Sallows Corp.
270 Bayview Dr., Barrie, Ontario L4N 4Y8
Tel: 705-737-2241 Fax: 705-737-3841

Tecumseth Beeton Interior Childcare Renovations 301975

SCHEDULE OF FINISHED HARDWARE

DATE	October 20, 2022
ARCHITECT	Formworks Architect
CONTRACTOR	
DETAILED BY	Brent Sallows

Permanent BEST keyed cores to be provided by the board.

Manufacturer List

Code	Name
BE	Best Access Systems
CAMD	Camden(Hardware)
CCX	Camden Door Controls
CGA	Gallery
CKN	K.N. Crowder
CSM	Standard Metal
CST	BEST Hinges
DITE	Ditec
GESC	G. E. SALLOWS CORP.
GL	Glynn Johnson
HS	HES
LC	LCN Closers
SA	Sargent

Finish List

Code	Description
26D	Satin Chrome
32D	Satin Stainless Steel
626	Satin Chromium Plated
630	Satin Stainless Steel
652	Satin Chromium Plated
AL	Aluminum
AL	Aluminum (BHMA 689)
C26D	Satin Chromium, Lacquered
C32D	Satin Stainless Steel
CA	Clear Anodized
US32D	Stainless Steel, Dull

Hardware Schedule

Heading #1

1	Single Door #**107A**	corridor 109 to work area 107a		90° LH
		950mm x 2150mm Type WDDUTCH Type HMDUTCH		
4	Hinge	CB179 114mm x 101mm	26D	CST
1	Flush Bolt	F65 UL 305	C26D	CSM
1	Lockset	9K3-7IN15D L/C S3	626	BE
2	Construction Core	7190224		BE
1	Overhead Holder	904H	652	GL
1	Kick Plate	GSH 80A 200 x 910 3M TAPE	C32D	CGA
1	Wall Stop	GSH 250	C32D	CGA

Note: Height of the bottom leaf to be 1000mm uff.

Heading #2

1	Single Door #**107B**	work area 107a to washroom 107b		90° LH
1	Single Door #**113A**	toddlers 113 to washroom 113a		90° RH
		950mm x 2150mm Type WD F Type HM A		
6	Hinge	CB179 114mm x 101mm	26D	CST
2	Passage Set	9K3-0N15D S3	626	BE
2	Kick Plate	GSH 80A 200 x 910 3M TAPE	C32D	CGA
2	Wall Stop	GSH 250	C32D	CGA

Heading #3

1 Single Door #**109** exterior to corridor 109 90° RHR

950mm x 2150mm Type HMPSV6T Type HMS-S3

4	Hinge	CB199 114mm x 101mm NRP		32D	CST
1	Exit Device	8888 F		32D	SA
1	Electric Strike	9500-LBM		630	HS
1	Advanced Logic Relay	CX-33			CAMD
1	Door Push & Pull	3012-2		C32D	CSM
1	Automatic Door Operator	HA8SP PUSH 41" HEADER	LH	AL	DITE
1	Labor	OPERATOR INSTALLATION LABOR 1			GESC
1	Overhead Stop	104S ADJ		US32D	GL
1	Kick Plate	GSH 80A 200 x 910 3M TAPE		C32D	CGA
1	All Active Switches	CM-60/4-WT			CCX
1	Enclosures and Mounting Boxes	CM-89S			CCX
1	All Active Switches	CM-46/4			CCX
1	Weatherstrip	W-23 1 X 965, 2 X 2150		CA	CKN
1	Door Sweep	W-13S 965		CA	CKN
1	Threshold	CT-45 965.2		AL	CKN

Note: All electrified hardware shown to be installed and terminated by the hardware supplier. Division 16 to supply & terminate 120 VAC, supply back boxes, conduit & 18-4 low voltage wire as required. Contractor to supply adequate wood blocking for secure mounting. Integration with access control by security contractor. Access control system, keypad, door contact & power supply by security contractor. Push side operation: free egress at all times. Pull side operation: door normally closed & locked. Access by valid credential. Pushbutton active only upon valid credential.

Heading #3.1

1 Single Door #**113B** exterior to toddlers 113 90° LHR

950mm x 2150mm Type HMPSV6T Type HMS-S4

4	Hinge	CB199 114mm x 101mm NRP	32D	CST
1	Exit Device	8888 F	32D	SA
1	Electric Strike	9500-LBM	630	HS
1	Door Push & Pull	3012-2	C32D	CSM
1	Closer	4040XP CUSH	AL	LC
1	Kick Plate	GSH 80A 200 x 910 3M TAPE	C32D	CGA
1	Weatherstrip	W-23 1 X 965, 2 X 2150	CA	CKN
1	Door Sweep	W-13S 965	CA	CKN
1	Threshold	CT-45 965.2	AL	CKN

Note: Division 16 to supply & terminate 120 VAC, supply back boxes, conduit & 18-4 low voltage wire as required. Integration with access control by security contractor. Access control system, keypad, door contact & power supply by security contractor. Push side operation: free egress at all times. Pull side operation: door normally closed & locked. Access by valid credential.

Heading #4

1	Single Door #**111**	corridor 109 to office 111	90°	RH
		950mm x 2150mm Type WD V6 Type HMS-S1		
3	Hinge	CB179 114mm x 101mm	26D	CST
1	Lockset	9K3-7AB15D L/C S3	626	BE
1	Construction Core	7190224		BE
1	Kick Plate	GSH 80A 200 x 910 3M TAPE	C32D	CGA
1	Wall Stop	GSH 250	C32D	CGA

Heading #5

1	Single Door #**111A**	corridor 109 to kitchen 111a	90°	RH
		950mm x 2150mm Type WD V6 Type HM A		
3	Hinge	CB179 114mm x 101mm	26D	CST
1	Lockset	9K3-7AB15D L/C S3	626	BE
1	Construction Core	7190224		BE
1	Kick Plate	GSH 80A 200 x 910 3M TAPE	C32D	CGA
1	Wall Stop	GSH 250	C32D	CGA

Heading #6

1	Single Door #**111B**	corridor 109 to staff w/r 111b	90°	LH
		950mm x 2150mm Type WD F Type HM A		
3	Hinge	CB179 114mm x 101mm	26D	CST
1	Privacy Set	9K3-0L15D S3	626	BE
1	Kick Plate	GSH 80A 200 x 910 3M TAPE	C32D	CGA
1	Wall Stop	GSH 250	C32D	CGA

Heading #7

1	Single Door #**113**	corridor 109 to work area 107a	90°	LH
		950mm x 2150mm Type WDDUTCH Type HMDUTCH		
4	Hinge	CB179 114mm x 101mm	26D	CST
1	Flush Bolt	F65 UL 305	C26D	CSM
1	Lockset	9K3-7IN15D L/C S3	626	BE
2	Construction Core	7190224		BE
1	Overhead Holder	904H	652	GL
1	Kick Plate	GSH 80A 200 x 910 3M TAPE	C32D	CGA
1	Wall Stop	GSH 250	C32D	CGA

Note: Mount stop to pull side of bottom door leaf so it contacts the millwork appropriately.

Note: Height of the bottom leaf to be 1000mm uff.

Heading #8

1	Single Door #**109A**	corridor C01 to corridor 109	90°	LH
		900mm x 2150mm Type WD V6 Type HM A		

3	Hinge	CB179 114mm x 101mm	26D	CST
1	Lockset	9K3-7D15D L/C S3	626	BE
1	Construction Core	7190224		BE
1	Electric Strike	1006CLB-LBM	630	HS
1	Closer	4040XP CUSH	AL	LC
1	Kick Plate	GSH 80A 200 x 860 3M TAPE	C32D	CGA

Note: Access control system, door contact & power supply by security contractor. Pull side operation: free egress at all times. Push side operation: door normally closed & locked. Access by valid credential.

Heading #9

1	Single Door #**120**	corridor to custodian 120	90°	LH
		900mm x 2130mm Type WD V6 Type EX. HM x 20 min.		

3	Butt Hinge	CB179 114mm x 101mm	26D	CST
1	Lockset	9K3-7D15D L/C S3	626	BE
1	Construction Core	7190224		BE
1	Closer	4040XP CUSH	AL	LC
1	Kick Plate	GSH 80A 200 x 860 3M TAPE	C32D	CGA
1	Wall Stop	GSH 250	C32D	CGA

Heading #10

2	Single Door #**COT STORAGE**	toddlers 113 to cot closet	90°	RHR
3	Single Door #**TEACHERS CLOSET 113**	toddlers 113 to teachers closet	90°	RHR
3	Single Door #**TEACHERS CLOSET 107**	toddlers 113 to teachers closet	90°	RHR
		762mm x 1200mm Type WD F Type WD (COT STORAGE(2)) 762mm x 950mm Type WD F Type WD (TEACHERS CLOSET 113(3), TEACHERS CLOSET 107(3))		

8	Deadbolt	8T3-7K L/C STK	626	BE
	Openings/Qty: 2@COT STORAGE 3@TEACHERS CLOSET 113, TEACHERS CLOSET 107			
8	Construction Core	7190224		BE
	Openings/Qty: 2@COT STORAGE 3@TEACHERS CLOSET 113, TEACHERS CLOSET 107			
8	Cylinder Pull	GSH 981	C26D	CGA
	Openings/Qty: 2@COT STORAGE 3@TEACHERS CLOSET 113, TEACHERS CLOSET 107			

Note: Inactive leaf locked with a slide bolt (by millwork supplier) mounted on inside face of door.

1 GENERAL

1.1 Conform to Sections of Division 1 as applicable.

1.2 RELATED SECTIONS

1.2.1 Glass and glazing for hollow metal doors and screens: Section 08 11 00, Steel Doors and Frames.

1.3 REFERENCES

American National Standards Institute (ANSI):
ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings
Consumer Product Safety Commission (CPSC):
CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials
Glass Association of North America (GANA):
GANA – Glazing Manual.
FGMA – Sealant Manual.

CAN/ CGSB-12.3-M91	Flat, Clear Float Glass
CAN/CGSB-12.5-M86	Mirrors, Silvered

1.4 QUALITY ASSURANCE

1.4.1 Conform to OBC design requirements and design glass and glazing to CAN/CGSB-12.20-M89. In case of discrepancies most stringent requirements shall govern.

1.4.2 Perform work in accordance with Glass Association of North America (GANA) Glazing Manual, and glazing standards FGMA Glazing Manual and Sealant Manual

1.5 SUBMITTALS

1.5.1 Comply with requirements of Section 01 33 00 – SUBMITTALS.

1.5.2 Product Data: Submit manufacturer's technical data for each glazing material required, including installation and maintenance instructions.

1.5.3 Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.

1.5.4 Product Test Listings: From ULC indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.

1.5.5 Samples: Submit, for verification purposes, approx. 8-invh by 10-inch sample for each type of glass indicated.

1.6 **WARRANTY**

1.6.1 Provide manufacturer's limited warranty under provision of Section 01 78 00 – Close Out Submittals.

1.6.2 Warranty Period: Five years from date of Substantial Completion

2 **PRODUCTS**

2.1 **MATERIALS**

2.1.1 **Safety Glass:** CAN/CGSB-12.1-M, thickness as indicated on Drawings, Type 1, (laminated glass, with clear or tinted to suit design and shading coefficient requirements, with appropriate PVB interlayer of 1.52 mm thickness) or Type 2, (tempered glass). Class B float glass, clear or tinted.

2.1.2 **Mirrors, Silvered, Glass:** CAN/CGSB-12.5-M, clear or tinted, size(s) as indicated on Drawings, minimum 6 mm (1/4") thick float glass with process deposit of silver coats, copper coats and final protective seal, warranted for 10 years against deterioration of silvering.

2.1.2.1 Frameless Mirror Clips: for 6 mm Mirror by C. R. Laurence of Canada.

2.1.2.2 Back: Galvanized metal back, minimum 0.49 mm (26 ga) overall thickness, zinc coating designation Z275 for mirrors up to 406 mm x 610 mm (16" x 24"), and minimum 0.64 mm (24 ga) overall thickness zinc coating designation Z275 for mirrors over 406 mm x 610 mm (16" x 24"). Provide with hidden mounting device for vertical or horizontal setting as required.

2.2 **GLAZING AND SEALING COMPOUND MATERIALS AND ACCESSORIES**

2.2.1 **Glazing Compound:** DAP 33 putty.

2.2.2 **Glazing Tape:** Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer. 440 polyisobutylene-butyl tape manufactured by Tremco Manufacturing Co. (Canada) Ltd., or 3M ribbon sealer butyl tape manufactured by Minnesota Mining and Manufacturing Co. Ltd.

2.2.3 **Spacer Shims and Setting Blocks:** Neoprene, Shore "A" Durometer hardness 70-90, 100 mm (4") long, wide enough to extend from fixed stop to opposite face of glass and of height suitable to provide adequate glazing "bite" for setting blocks. Neoprene, Shore "A" 40 to 50 Durometer hardness, of adequate thickness to provide correct glass to face clearance of at least 3 mm (1/8") for spacer shims.

2.2.4 **Primer Sealers and Cleaners:** Type recommended by glazing manufacturer's glass and gaskets.

2.3 **FABRICATION**

2.3.1 Label each light of glass with registered name of product and weight and quality of glass.

2.3.2 Check dimensions on Job Site before cutting materials.

2.3.3 Ensure minimum bite or lap of glass on stops and rabbets as recommended by glass manufacturer.

2.3.4 Install openings in mirror for electrical wiring for glass mounted light fixtures. Confirm exact locations.

2.3.5 Grind and chamfer edges of unframed glass and mirrors.

2.3.6 Ensure minimum bite or lap of glass and/or plastic glazing on stops and rabbets as recommended by glass and/or plastic glazing manufacturer.

3 EXECUTION

3.1 INSTALLATION

3.1.1 Conform to recommendation of Glazing Manual 1990, Flat Glass Marketing Association, except as specified herein.

3.1.2 Glaze hollow metal doors, screens, borrowed lights, windows, guards and other work, scheduled to be glazed.

3.1.3 Check frames are plumb, within tolerance for size and joints, connectors, screws or bolt heads are effectively sealed.

3.1.4 Do not field cut or abrade tempered glass.

3.1.5 Check compatibility of glazing materials and framing sealants with each other.

3.1.6 Install glazing within temperature limits recommended by glazing manufacturer.

3.1.7 Check to ensure openings and stops to be painted have been primed before commencing installation.

3.2 WORKMANSHIP

3.2.1 Ensure openings are free from moisture, frost, rust, dirt and foreign matter.

3.2.2 Remove protective coatings. Clean glass surface to receive sealant with clean cloth dampened with Xylol or 50-50 mixture of Acetone and Xylol. Wipe dry with clean, dry cloth.

3.2.3 Clean plastic glazing with cleaning agents and follow procedures recommended by glazing manufacturer.

3.2.4 Apply primer-sealer to contact surfaces.

3.2.5 Place setting block in accordance with manufacturer's instructions.

3.2.6 Install glass by resting on setting blocks. Ensure full contact and adhesion at perimeter. Do not impact glass against framing during installation.

3.2.7 Install removable stops without displacing tape, sealant or gasket.

3.2.8 Provide edge clearance of 3 mm (1/8") minimum.

3.2.9 Apply cap bead of sealant at exterior void. Apply sealant to uniform and level line, flush with sightline and tool or wipe with solvent to smooth appearance.

3.2.10 Apply tape to clean dry surface not more than 24 hrs prior to glazing. Do not remove release paper until glass is ready to be installed. Joints shall be squared and tightly and neatly butted. Do not overlap. Do not stretch tape to make it fit. Lightly daubed joints with compatible gunnable sealant to assure positive seal. Only joints in tape shall be at corners.

3.2.11 Lateral shims if not continuous shall be spaced uniformly at 450 mm (18") to 600 mm (24") centre.

3.2.12 For wet glazing both inside and outside, inside and outside shims shall be exactly same dimensions and exactly opposite each other.

3.3 **INTERIOR GLAZING**

3.3.1 **Hollow Metal Screens**:

3.3.1.1 Set glass in metals screens on continuous setting block with 3 mm (1/8") gap between glazing stop glass and embed in glazing compound in accordance with vision panels in fire-rated doors to requirements of NFPA 80. Where other types of glass is specified install in accordance with OBC Requirements.

3.3.2 **Dry Method-Tape/Tape**:

3.3.2.1 Cut glazing tape to proper length and install against permanent stop projecting 1.5 mm (1/16") above sightline.

3.3.2.2 Place glazing tape on free perimeter of glass projecting 1.5 mm (1/16") above sightline.

3.3.2.3 Trim off excess tape to sightline.

3.3.3 **Combination Method-Tape/Sealant**:

3.3.3.1 Cut glazing tape to proper length and install against permanent stop projecting 1.5 mm (1/16") above sightline.

3.3.3.2 Fill gap between glass and applied stop with sealant to depth equal to bite of frame on glass to uniform and level line.

3.3.3.3 Trim off excess tape to sightline.

3.3.4 **Wet Method-Compound-Compound**:

3.3.4.1 Apply sealant to back and bottom of rabbet.

3.3.4.2 Bed glass in position with non hardening compound sealant.

3.3.4.3 Position and secure glass using spring wire or glaziers' clips. Apply face compound and trim sealant to slope away from light.

OR

3.3.4.4 Fill gaps between glass and stops with compound until flush with sightline and tool to smooth straight line.

3.3.5 **Dry Method: Gaskets**

3.3.5.1 Place gasket against permanent stop and position (glass) (acrylic) or (polycarbonate) sheet.

3.3.5.2 Apply removable stops. Install gaskets in frame channels.

3.3.6 **Combination Method-Tape/Gasket**:

3.3.6.1 Cut glazing tape to proper length and install against permanent stop.

3.3.6.2 Position glass.

3.3.6.3 Apply removable stops and install gaskets in frame channel.

3.4 **Mirrors**

3.4.1 Install mirrors where indicated on Drawings. Ensure location of lighting sconces prior to cutting glass.

3.4.2 Mount plumb and level and accurately in position and secure rigidly in position.

3.4.3 Ensure back-up wall surface is thoroughly dry, smooth and firm and is primed or painted.

3.4.4 Provide space for air circulation and elimination of condensation between back of mirror and wall.

3.4.5 Install tamper proof mirrors according to manufacturer's directions.

3.4.6 Install mirrors without frames as follows with clips located uniformly

3.4.7 Place felt or plastic pad between mirror and each clip.

3.4.8 Install mirrors with frames according to manufacturer's direction. Use concealed tamper proof fasteners.

3.5 PROTECTION AND CLEANING

3.5.1 Remove sealant and compound droppings from finished surface.

3.5.2 Avoid storing materials adjacent to glass.

3.5.3 Protect glass from other trades.

3.5.4 At completion of Work, replace any damaged or broken glass provided under this Section with similar glass.

3.5.5 Wash glass on both faces not more than four days prior to date scheduled for inspections intended to establish date of substantial completion. Wash glass by method recommended by glass manufacturer.

End of Section

1 GENERAL

1.1 Conform to Sections of Division 1 as applicable.

1.1.1 **Definitions**: Drywall - Gypsum Board.

1.2 RELATED SECTIONS

1.2.1 Installation of steel frames and frame anchor in gypsum board partitions: Section 06 20 00 Carpentry and Millwork.

1.2.2 Firestopping and smoke seals: Section 07 84 00 Penetration Fire stopping.

1.2.3 Finish painting: Section 09 91 00 Painting and finishing.

1.2.4 Mechanical installations: Division 15, Mechanical.

1.2.5 Electrical installations: Division 16, Electrical.

1.3 REFERENCES

ASTM C11-10a	Standard Terminology Relating to Gypsum and Related building Materials and Systems
ASTM C475/C475M-12	Standard Specification for Joint compound and Joint Tape for Finishing Gypsum Board.
ASTM C645-04a	Specification for Non-structural Steel Framing Members
ASTM A653/A653M-04a	Standard Specifications for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C754-04	Standard Specification for installation of Steel Framing Members to receive Screw Attached Gypsum Panel Board
ASTM C840-04a	Standard Specification for the Application, and Finishing of Gypsum Board.
ASTM C919-02	Standard Practise for Use of Sealants in Acoustical Application
ASTM C954-04	Standard specification for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in (0.84mm) to 0.112 in (2.84mm) in Thickness.
ASTM C1002-04	Standard Specification for Steel Self-Piercing, Tapping screws for The Application of Gypsum Panel Products or Metal Plaster Base to Wood Studs or Steel Studs
ASTM C1047-04	Standard Specification for Accessories for Gypsum Wallboard and Veneer Base.
ASTM C1177/C1177M-04e1	Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
ASTM C1178/C1178M-04e1	Standard Specification for Glass Mat Water-resistant Gypsum Backing Panel

ASTM C1280-04	Standard Specification for the Application of Gypsum Sheathing.
ASTM C1396/C1396M-11	**Standard Specification for Gypsum Board (incorporates ASTM C36; C37, C79, C442, C630,C931, C960, C1395)**
ASTM D 3273-00	Standard Tests Method for The Resistance to Growth of Mould on the Surface of Interior Coatings in The Environment Chamber
ASTM E84-05	Standard Test Method for Surface Burning Characteristics of Building Materials.
ASTM E90-04	Standard Tests Methods for Laboratory Measurement of Airborne Sound Transmission Loss of Buildings, Partitions and Elements.
ASTM E413 –04	Classification for Rating Sound Insulation
CAN/ULC-S101-M89	Standard Methods of Fire Endurance Tests of Building Construction and Materials
CAN/ULC-S102-M88	Surface Burning Characteristics of Building Materials and Assemblies
CAN/ULC-S702-97	Thermal Insulation, Mineral Fibre, for Buildings
ULC	Underwriters' Laboratories of Canada

1.4 **DELIVERY, STORAGE AND HANDLING**

1.4.1 Deliver materials to Site with manufacturers original labels intact. Do not remove wrappings until ready for use.

1.4.2 No outside storage permitted. Store in clean, dry area, off ground.

1.4.3 Stack gypsum board flat on level and dry surface without overhanging boards. Prevent sagging and damage to edges, ends and surfaces. Protect bagged products from excessive moisture or wetting.

1.5 **PROJECT CONDITIONS**

1.5.1 After installation, do not leave fibre-reinforced gypsum sheathing board exposed to weather conditions longer than 60 days.

2 **PRODUCTS**

2.1 **MATERIALS**

2.1.1 **Gypsum Board**: ASTM C36/C36M, paper faced; edges tapered or square rounded, to suit specific application, 1200 mm (48") wide sheets of maximum practical lengths to minimize end joints, regular, 15.9 mm (5/8") thick unless indicated otherwise on Drawings.

Acceptable Products

CGC Inc.	Sheetrock Gypsum Board
BPB Canada Inc (Westroc)	ProRoc Regular
Georgia-Pacific Canada Inc.	Toughrock Gypsum Board

2.1.2 **Gypsum Board Interior Fire Rated:** ASTM C36/C36M, Type X; edges

tapered, 1200 mm (48") wide sheets of maximum practical lengths to minimize end joints, of type and thickness approved for required fire ratings, minimum thickness 15.9 mm (5/8").

Acceptable Products

CGC Inc.	Sheetrock Firecode Core
BPB Canada Inc. (Westroc)	ProRock Type X
Georgia-Pacific Canada Inc.	Toughrock Fireguard

2.1.3 **Impact Resistant or Abuse Resistant Fibre Reinforced Panel**: for high traffic wall applications, heavy duty, impact resistant, multipurpose board, fibre-reinforced core, reinforced with fiberglass mesh reinforcement applied to backside and long edges; Edges: Tapered; 15.9 mm (5/8") thickness equivalent to Type X gypsum board when tested in accordance with ASTM E119 and CAN/ULC-S101.

Acceptable Products

CertainTeed	Extreme Abuse Resistant Drywall with M2Tech
Georgia-Pacific Canada Inc.	DensArmor Plus Abuse-Resistant Interior Panel DensArmor Impact-Resistant Interior Panel
CGC Inc	Fiberock Heavy Duty Abuse Resistant Panels

2.2 **Metal Studs**

2.2.1 **For Gypsum Board:** ASTM C645, Galvanized sheet steel, minimum 0.59 mm thickness, zinc coating G90 (Z275); (25 gsg) (0.0247"), screwable with crimped web and returned flange, of depth shown.

2.2.2 **For Abuse Resistant Fibre Reinforced Panel**: ASTM C645, Galvanized sheet steel, minimum 1.01 mm thickness, zinc coating G90 (Z275) (20 gsg) (0.0396"), screwable with crimped web and returned flange. Minimum stud depth 88.90 mm (3-1/2") or deeper if so shown.

2.2.2.1 Provide knockout openings in web at 460 mm (18") o.c. to accommodate (if required) horizontal mechanical and electrical service lines and bracing.

2.2.3 **Floor and Ceiling Partition Track for Gypsum Board**: Galvanized sheet steel, minimum 0.59 mm overall thickness zinc coating G90 (Z275); (25 gsg) (0.0247"), prepunched with square holes along Centre line and with minimum 30 mm (1-3/16") legs, top track having longer legs where required to compensate for deflection of structure above. Width to suit metal studs.

2.2.4 **Furring Channels**: Galvanized sheet steel, minimum 0.59 mm overall thickness zinc coating G90 (Z275), (25 gsg) (0.0247") screw channels, 66.7 mm wide x 22.2 mm deep, (2-5/8" x 7/8").

2.2.5 **Furring Channels For Abuse Resistant Fibre Reinforced Panel:** Galvanized sheet steel, minimum 0.59 mm overall thickness zinc coating G90 Z275, 20 gsg (0.0396") screw channels, 66.7 mm wide x 22.2 mm deep, (2-5/8" x 7/8").

2.2.6 **Runner Channels**: Galvanized sheet steel, minimum 1.64 mm overall thickness zinc coating G90 (Z275) (16 gsg) (0.0635"), 38.1 mm (1-1/2") high

with 19 mm (3/4") flanges, for primary furring member in suspended ceilings and as horizontal stiffeners or bracing in metal stud systems.

2.2.7 **Hangers**: 4.8 mm (3/16") nominal diameter mild steel rod.

2.2.8 **Tie Wire**: 1.60 mm nominal diameter (16 IW ga.) galvanized, soft annealed steel.

2.2.9 **Corner Bead**: Galvanized steel sheet, minimum 0.59 mm overall thickness zinc coating G90 (Z275) [(25 gsg) (0.0247")], ASTM A653/653M, minimum width of flanges 28.6 mm (1-1/8") for 12.7 mm (½") thick board and 31.8 mm (1-1/2") for 15.9 mm (5/8") thick board.

2.2.10 **Casing Bead**: Galvanized steel sheet, minimum 0.59 mm overall thickness zinc coating G90 (Z275) (25 gsg) (0.0247"), ASTM A653/653M, designed for finishing with joint compound.

2.2.11 **Metal Trim**: galvanized metal trim to provide protection and neat finished edges at window or door jambs and gypsum board ceilings where abutting masonry walls. Use No. 200A or 200B Metal trim at gypsum board wall edges where jamb condition is level or proud of wall surface. Use 400 Series, J-trim where gypsum board finish is proud of wall surface and vulnerable to damage.

2.2.12 **Gypsum Board Screws**: to ASTM C1002***;*** Self-drilling, self-tapping gypsum board screws, 25.4 mm (1") long #6 for single layer application, 41.3 mm (1-5/8") long #7 for double layer application**.**

2.2.13 **Laminating Compound**: asbestos-free, as recommended by manufacturer.

2.2.14 **Joint Cement, Tape, Topping & Compound to ASTM C475, Accessories to ASTM C1047**: As recommended by gypsum board manufacturer.

2.2.15 **Sponge Tape**: Self-sticking adhesive on 1 side, closed cell neoprene sponge tape.
Acceptable Products
Jacobs and Thompson Inc. Perma-Stik 1220X

2.2.16 **Adhesive**: Manufacturer's standard, multi-purpose construction adhesive.

2.2.17 **Sound Attenuation Blankets**: of sufficient thickness to meet required STC rating for sound-proofed partitions.
Acceptable Products
Rockwool Safe'n'Sound
Or approved equal.

2.2.18 **Acoustic Sealant**: Non-hardening, Tremco Acoustical Sealant by Tremco Ltd.

2.2.19 **Elastomeric Sealant**: as recommended by manufacturer of fibre-reinforced gypsum sheathing board.

2.2.20 Tuff-Hide Primer: as manufactured by CGC Inc. for use on abuse, water & mould resistant interior panels, skim coat and primer coat to be installed in a

single spray application. For use on all Category 4 Heavy/Extreme Duty Walls. ***Applicator of product must have at least 5 years experience in the installation of spray applied plaster or its equivalent and must be qualified to undertake this work. Qualifications and installations must be provided if requested by the Consultant. Under no circumstance will an inexperienced installer be used for this work.***

3 EXECUTION

3.1 EXAMINATION

3.1.1 Temporary heat is provided under Section 01 50 00, Temporary Facilities and Controls. Carry out work of this Section only when temperature is maintained and controlled in range of 13 deg C to 21 deg C (55 deg F to 70 deg F), for at least 24 hrs before installing gypsum board and is so maintained until joint cement and adhesives are cured.

3.1.2 Provide adequate ventilation to eliminate excessive moisture before commencing and during work to ensure proper drying of joint filler and adhesive. Do not force dry adhesive and joint treatment.

3.1.3 Examine substrate for compliance with applicable requirements, installation tolerances and other conditions affecting installation of fibre-reinforced gypsum board or sheathing. Do not proceed until unsatisfactory conditions have been corrected. Beginning of installation shall indicate acceptance of substrate conditions.

3.2 PREPARATION

3.2.1 Allow fibre-reinforced gypsum underlayment to acclimate for 48 hours on Site prior to installation.

3.3 INSTALLATION

3.3.1 Conform to ASTM C840 for the application of interior gypsum board, except as specified otherwise herein.

3.3.2 Cooperate with mechanical, electrical and other trades to accommodate fixtures, fittings and other items in gypsum board areas.

3.3.3 Install casing bead and sponge tape where gypsum board abuts materials other than itself and acoustic tile ceilings including at exterior door and window frames, where juncture is not concealed with trim; or elsewhere where indicated on Drawings. Unless indicated otherwise, use tape 3 mm (1/8") narrower than casing bead to provide recess at exposed side. Compress tape by 25%.

3.3.4 If gypsum board abuts another gypsum board surface and joint is shown not to be taped and filled or otherwise covered, make juncture same as above.

3.3.5 Install sponge tape between gypsum board partition or furring framing, where

such framing abuts exterior door or window frame.

3.3.6 Install sponge tape between floor and gypsum board partition track. Tape shall be either full width or 1 strip 9.5 mm (3/8") wide on each side of framing member.

3.3.7 Erect casing beads plumb or level with minimum number of joints. Do not use scrap pieces.

3.3.8 Where additional supports are not installed on electrical fixtures located in ceiling, provide written confirmation to Division 16 Electrical, when requested by Consultant, that suspended ceiling is capable of supporting weight of lighting fixtures, and other electrical fixtures required by Division 16, Electrical.

3.3.9 Allow for deflection at top of partitions to avoid transmission of structural loads to framing system.

3.3.10 Provide partitions of thickness indicated on Drawings.

3.3.11 Provide adequate reinforcing for framing to receive wall mounted fixtures and vanities.

3.3.12 Firmly fasten panel to framing members without cutting surface paper or fracturing core. Ensure panel joints are aligned. Lay out panels with maximum spacing between panels not to exceed 6 mm (1/4").

3.4 **Wall Furring**

3.4.1 Apply metal furring members vertically to masonry and concrete walls at 600 mm (24") o.c. or less as required to suit insulation sizes. Fasten members 600 mm (24") o.c. through flanges.

3.4.2 Shim furring members as required to present true, plumb line for application of gypsum board.

3.4.3 Locate furring members not more than 50 mm (2") away from openings, interior corners, intersections, frames, control joints and similar items.

3.4.4 Use 20 ga. metal furring where abuse resistant board is specified at masonry and concrete walls.

3.5 **Stud Partitions**

3.5.1 Install steel studs in accordance with ASTM C754 unless specified otherwise in this specification.

3.5.2 Provide accurately aligned partition tracks at top and bottom of partitions. Secure at 600 mm (24") o.c.

3.5.3 Erect studs vertically in partition tracks at 400 mm (16") o.c. and not more than 50 mm (2") abutting walls, openings and each side of corners.

3.5.4 Place attachment clip over main/cross tee from top. Line up pre-drilled hole on clip with hole on main/cross tee and screw clip to main/cross tee with 12 mm (½") wafer screw.

3.5.5 Screw through pre-drilled holes in attachment clip into top track of stud partition or glazed partition. Do not screw through ceiling grid.

3.5.6 Coordinate installation of attachment clip with Section 09510, Acoustic Ceilings. Do not damage ceiling grid system during installation of these clips.

3.5.7 Extend studs on each side of openings from floor to ceiling or structure above, whichever is indicated.

3.5.8 Locate 2 framing members on each side of framed openings. Frame over and below openings and runner sections at least 150 mm longer than rough openings. Cut ends to fit bend wed up and screw anchor to adjacent studs. Install cut to length intermediate vertical studs in same manner and spacing as wall studs over such framed openings. Securely anchor studs to head and jamb anchor clips of door frames by blot or screw attachment. Insert intermediate studs above and below channels to support gypsum board.

3.5.9 Install horizontal runner at top and bottom of rough opening in glazed partitions.

3.5.10 Install cut to length intermediate vertical studs, in same manner and spacing as wall studs, over door frames, above, and below other openings.

3.5.11 Where studs extend over 3600 mm (12'-0") in height provide horizontal bracing spaced approximately 2400 mm (8'-0") o.c. vertically and provide double studs at each side of door frames.

3.5.12 Size, brace and reinforce studs as necessary to provide sturdy, rigid partitions to heights and lengths required.

3.5.13 Securely anchor partition track to building structure and make 12 mm (½") allowance in partition studs for deflection of structure above to avoid transmission of structural loads on partitions. Do not secure studs or gypsum board to top track.

3.5.14 Where horizontal runs of service lines are to be installed, arrange with applicable trades to have lines installed prior to gypsum board application.

3.6 **Ceiling Furring**

3.6.1 **Hangers:**

3.6.1.1 Hangers for suspended gypsum board ceilings, bulkheads and duct furring shall support grillage independent of walls, columns, pipes, ducts, conduit and similar components. Erect hangers plumb and securely anchor to structure.

3.6.1.2 Where hangers are suspended from unfilled steel deck make holes through

both sides of deck troughs and pass hanger through and down both sides of troughs. Ensure that ends of hangers are wrapped around vertical portion of hanger rod at insert.

3.6.1.3 Alternatively, in both composite and unfilled steel deck, hangers may be dropped through punched holes in bottom of deck troughs before deck is filled or covered, provided they are suitably and securely anchored at top.

3.6.1.4 Space hangers at maximum 1200 mm (4'-0") o.c. along runner channels and not more than 150 mm (6") from ends to support weight of ceiling and superimposed loads such as lighting fixtures, diffusers and grilles.

3.6.1.5 Where ducts are large or where combination of ducts, or combination of ducts and other items interfere so that hanger spacing exceeds 1200 mm (4'-0"), increase size of main runner channels and hangers accordingly to sustain increased loading and span.

3.6.2 **Runner Channels:**

3.6.2.1 Space runner channels at maximum 1200 mm (4'-0") o.c. and not more than 150 mm (6") from boundary walls, interruptions of continuity and changes in direction.

3.6.2.2 Run channels at right angles to structural framing members.

3.6.2.3 Where splices are necessary, lap members at least 200 mm (8") and wire each end with minimum double strand of tie wire. Avoid clustering or lining up splices. Provide hanger with in 150 mm (6") of splice.

3.6.2.4 Attach channels to rod hangers by bending hanger sharply under bottom flange of runner and securely wire in place with saddle tie.

3.6.3 Cross Furring

3.6.3.1 Erect furring channels at right angles to runner channels.

3.6.3.2 Space furring channels at 600 mm (24") o.c. and not more than 150 mm (6") from boundary walls, interruptions in ceiling continuity and change in direction.

3.6.3.3 Secure furring channels to each support with double strand of tie wire or with clip approved by manufacturer of furring components. Splice joints by nesting and tying channels together.

3.6.3.4 Furring channels shall be level to maximum tolerance of 3 mm (1/8") over 3600 mm (12').

3.7 **Ceiling Bulkhead**

3.7.1 Fur for gypsum board faced vertical bulkheads within and at termination of ceilings.

3.7.2 Fur above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as shown.

3.7.3 Install studs vertically at 450mm (18") o.c., aligning stud openings. Secure studs to tracks using pinching tool or screws. Brace stud framing to form a rigid system.

3.7.4 Construct corners using a minimum of three studs.

3.7.5 Provide extended leg ceiling runners as required to accommodate deflection.

3.8 **Gypsum Board - Single Layer**

3.8.1 **Ceilings**:

3.8.1.1 Apply gypsum board to metal furring with screws.

3.8.1.2 Erect board with long dimension parallel to supports. Locate end joints over supporting members.

3.8.1.3 Space screws at 200 mm (8") o.c.

3.8.2 **Partitions:**

3.8.2.1 Apply gypsum board to metal studs with screws.

3.8.2.2 Erect board with long dimension parallel to supports. Locate end joints over supporting members.

3.8.2.3 Locate vertical joints at least 300 mm (12") from jamb lines of openings.

3.8.2.4 Space screws at 200 mm (8") o.c. at board edges and 300 mm (12") o.c. on board field.

3.8.3 Ceiling and Partition Fasteners:

3.8.3.1 Perimeter screws shall be not less than 10 mm (3/8") or more than 13 mm (½") from edges and ends and shall be opposite screws on adjacent boards.

3.8.3.2 Drive screws with power screw gun and set with countersunk head slightly below surface of board.

3.8.4 **Joints:**

3.8.4.1 Finish all joints.

3.9 **Fire Rated Construction**

3.9.1 Provide fire rated enclosures, separations, and assemblies as indicated on the drawings conforming to requirements of Authorities Having Jurisdiction

3.10 **Sound Rated Partitions**

3.10.1 Where indicated on Drawings, provide soundrated partitions with minimum Sound Transmission Class of 50.

3.10.2 Install sound rated partitions in locations indicated on Drawings to meet required minimum STC rating. Gypsum board shall be applied on both sides of sound-proofed partitions. Follow manufacturer's details and recommendations.

3.10.3 Apply minimum 12 mm (½") diameter bead of acoustic sealant continuously around periphery of each face of partition to seal gypsum board/structure junction where partitions abut fixed building components. Add additional, seal full perimeter of cut-outs around electrical boxes, ducts or similar penetration in partitions where perimeter sealed with acoustic sealant.

3.11 **Pressed Steel Frames**

3.11.1 Install pressed steel frames where they occur in gypsum board partitions.

3.11.2 Anchor frames securely to studs using minimum of 3 anchors per jamb for jambs up to 2100 mm (7') high and minimum of 4 anchors per jamb for jambs over 2100 mm (7') high.

3.12 **Finishing**

3.12.1 **Level of Finishing to ASTM C840**

3.12.1.1 **Level 0**: no taping, finishing or corner beads are required.

3.12.1.2 **Level 1**: All joints and angles shall have tape embedded in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.

3.12.1.3 **Level 2**: All joints and angles shall have tape embedded in joint compound and have one separate coat or joint compound wiped with joint knife and leaving a thin coating over the tape and fastener heads. Accessories shall be covered by one coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges shall be acceptable.

3.12.1.4 **Level 3**: All joints and angles shall have tape embedded in joint compound and two separate applications of joint compound over all joints, angles and fastener heads. Accessories shall be covered with two separate coats of joint compound. Joint compounds shall be smooth and free of tool marks and ridges. The prepared surface shall be covered with a drywall primer prior to the application of the final decoration.

3.12.1.5 **Level 4**: All joints and angles shall have tape embedded in joint compound. and have three separate coats of joint compound over all joints, angles and fastener heads. Accessories shall be covered with three separate coats of joint compound. All joint compounds shall be free of tool marks and ridges. The prepared surface shall be covered with a drywall primer prior to the application of the final decoration.

3.12.1.6 **Level 5**: Equal to level 4 and in addition, a skim coat shall be applied. Excess

material shall be immediately sheared off, leaving a film covering the paper. The prepared surface shall be covered with a drywall primer prior to the application of the final decoration.

3.12.2 Provide Level 4 finish in all instances where paint finish is required in area of new Work.

3.12.3 Do filling either manually, using tools of trade, or by mechanical taping and filling machine of proven efficiency.

3.12.4 Apply joint filler, tape and topping cement according to manufacturer's directions.

3.12.5 Finished work shall be smooth, seamless, plumb, true and flush, having square, neat corners.

3.12.6 Drive home fasteners protruding above panel surface. Fill fastener depressions.

3.12.7 Apply continuous coat of joint compound to fill channel formed by tapered edges of panels. Center tape and lightly press to embed in compound. Apply thin coat over tape.

3.12.8 Apply joint compound over butt joints and embed tape in manner similar to tapered joint. Provide sufficient quantity of compound under the tape to ensure adequate bond.

3.12.9 Apply coat of joint compound to corner and casing beads.

3.12.10 Fold tape to form 90˚ angle. Apply joint compound to both sides of corner. Embed in taping compound.

3.12.11 After joint compound has dried completely. Apply additional coats of finishing compound to obtain required level of finish. Provide recommended sanding between coats as recommended by manufacturer.

3.13 **Installation: Tuff-Hide Primer-Surfacer**

3.13.1 Substrate must be sound, dry, clean and free of oil, grease, mildew and efflorescence. During and after application, avoid drafts and maintain 13 degC. (55 deg.F) minimum product, air and surface temperature until surface is dry.

3.13.2 Interior panels, substrate must be reviewed by CGC representative prior to application of primer to ensure that interior panels have been properly installed and taped prior to installation of primer.

3.13.3 Treat all joints, fasteners, and accessories with a recommended CGC/Synko joint treatment product. Fill all nicks, voids, and gouges with joint compound. A minimum Level 4 wallboard finish must be provided as per recommendations outlined in GA-214, “Recommended Levels of Gypsum Board Finish”, or ASTM C-840.

3.13.4 Mix product as per written recommendations of manufacturer.

3.13.5 Airless spray application only as per written recommendations of manufacturer. In all applications a wet film thickness in excess of 0.51 mm (20mils) is not recommended. Use of wet film thickness gauge to ensure proper application thickness and maximum performance.

3.13.6 The use of professional equipment that meet or exceeds the written requirements of the manufacturer must be used. Ensure that the airless sprayer, hoses, guns and other related equipment are clean and in good working condition prior to application. The use of faulty equipment will result in reapplication until satisfactory application has been attained as per recommendations of the manufacturer.

3.13.7 Touch-up damaged surfaces as per written recommendations by manufacturer.

3.13.8 Wipe up drips and spills immediately with damp cloth, ensure that adjacent surfaces are well protected and unaffected by application of primer.

3.14 **Cutting and Patching**

3.14.1 Do cutting, patching and making good as required by installation of work of other Sections and co-operate closely with these Sections to assure satisfactory finish.

End of Section.

1 GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 Conform to Sections of Division 1, as required.

1.3 REFERENCE STANDARDS

1.3.1 Do tile work in accordance with Installation Manual, Tile Specification Study No. 09300, latest edition, produced by Terrazzo Tile and Marble Association of Canada (TTMAC), except where specified otherwise.

1.4 SUBMITTALS

1.4.1 Samples: submit samples in accordance with Section 01 33 00- Submittals.

1.5 Test Area

1.5.1 Provide test area to ensure satisfaction of tile installation for approval of joint width, removal of grout from tile face and for insurance that installation of grout sealer has been applied as per manufacturer's recommendations.

2 PRODUCTS

2.1 Tile

2.1.1 **Floor Tile**: where noted on room finish schedule:
POR1 - 12" x 24", floor tile, cove base to be porcelain 4" high x 24, Centura, Glocal : Perfect 12X24 GC021224, colour: concrete, as supplied by Centura. Colour for Porcelain Tile base at Corridor to be approved by Consultant and Board.
Wall Tile:
POR2 - Olympia Tile, Colour and Dimension Collections: Turquoise Bright (Daycare Washrooms)
POR3 - Olympia Tile, CDC Elongated Hexagon Series: Dove Grey HEXAGON BRIGHT QT.CD.DGY.08.HEX.BR (Staff Washroom)

2.1.2 At transition where tile and VCT meet, feather up the floor slab to create a smooth transition at Toddlers 113 and Preschool 107 classrooms and at Door 109A. Transition/Reducer strip may be used at Office 111 where tile and VCT meet. Provide Schluter RENO-U (AE), satin anodized aluminum.

2.2 MORTAR AND ADHESIVE MATERIALS:

2.2.1 Portland cement: to CAN/CSA3-A3000-98, type 10.

2.2.2 Sand: to CSA standard

2.2.3 Water: potable and free of minerals which are detrimental to mortar and grout mixes.

2.2.4 Setting Systems:

2.2.4.1 Premium Flexible Latex Portland Cement mortar system for floors: comply with ANSI A118.1, Kerabond/Keralastic as manufactured by Mapei or equal.

2.2.4.2 Adhesive bond coat: comply with ANSI A136.1, Type 1. For ceramic floors and wall adhesive: Ultra/Mastic I, as manufactured by Mapei or equal.

2.3 MORTAR MIXES

2.3.1 Bond or setting coat: 1 part cement, 1/3 part lime, 1 part water.

2.3.2 Measure mortar ingredients by volume.

2.3.3 Dry-set mortar and grout: mix to manufacturer's instructions.

2.4 GROUT:

2.4.1 Floor and Wall, Polymer Modified, Fast-setting Grout: Ultracolor® Plus FA grout, as manufactured by Mapei or equal.
Grout tile colour to be approved by Consultant.

3 EXECUTION

3.1 WORKMANSHIP

3.1.1 Install tile according to latest edition of Manual #200 prepared by Terrazzo, Tile and Marble Association of Canada.

3.1.2 Ensure that all surfaces to receive tile work are dry, clean and free from deleterious matters detrimental to positive bond.

3.1.3 Carefully plan layout of tile work to provide a symmetrical pattern and so that no tile is less than half full size. Minimize cutting.

3.1.4 Maintain a standard uniform joint width between tiles and tile sheets, as laid, throughout. Joint width will vary with size and type of tile. Maintain a tight

joint, narrowest width possible as recommended by tile supplier for 12" x 12" porcelain tile.

3.1.5 Make joints between tile uniform and plumb, straight, true, even and flush with adjacent tile.

3.1.6 Make joints watertight without voids, cracks, excess mortar or grout.

3.1.7 Use edge and corner trim where edges of tiles at terminations are left exposed.

3.1.8 Sound tiles after setting and replace hollow- sounding units to obtain full bond.

3.1.9 Ensure setting bed has cured before commencing grouting. Fill all joints solid with grout. Fill square edged tile joints flush with surface of tiles. Remove all excess grout by wiping diagonally across the joints with a damp sponge.

3.1.10 Clean installed tile surfaces after installation and grouting cured.

3.1.11 Dry-set mortar and adhesive setting bed systems: Grout tile using dry curing grout for wall tile and acid resistance grout for floor tile.

3.2 TRANSITION PROFILE

3.2.1 Trowel dry-set mortar over the area where profile is to be placed.

3.2.2 Press the perforated anchoring leg of transition profile into the mortar and align.

3.2.3 Trowel additional dry-set mortar over the perforated anchoring leg to ensure full coverage and support of the tile edges.

3.2.4 Solidly embed the tiles so that the tiled surface is flush with the top of the profile; the profile should not be higher than the tiled surface, but rather up to approx. 1/32" (1 mm) lower.

3.2.5 A joint of approx. 1/16" - 1/8" (1.5 mm - 3 mm) should be left between the tile and the profile.

3.2.6 Fill the joint completely with grout or setting material.

3.3 Edge Trim

3.3.1 Select edge trim according to tile thickness.

3.3.2 Trowel dry-set mortar over the area where profile is to be placed. If edge trim is used at outside wall corners, finish tiling one wall first; then apply dry-set mortar to the corner area of the second wall.

3.3.3 Press the perforated anchoring leg of trim into the mortar and align.

3.3.4 Trowel additional dry-set mortar over the perforated anchoring leg to ensure full coverage and support of the tile edges; fill the cavity with grout or setting material.

3.3.5 Set the tile to the integrated joint spacer, which ensures a uniform joint of 1/16" - 1/8" (1.5 - 3 mm). When installing the stainless steel profiles, leave a joint of approximately 1/16" - 1/8" (1.5 - 3 mm).

3.3.6 Solidly embed adjacent tiles and adjust flush with the profile's upper edge.

3.3.7 Fill the joint completely with grout or setting material.

3.3.8 Work with materials and tools that will not scratch or damage sensitive surfaces. Setting materials must be removed immediately, especially on aluminum.

3.3.9 Provide corner trim for inside and outside corners.

3.4 GROUTING

3.4.1 Apply grout in strict accordance with manufacturer's printed instructions.

3.4.2 Force grout into joints for full depth, level with surface of tile. Scrape surplus grout from surface of tile thoroughly and quickly. After grout has attained slight initial set, completely clean-up and polish surface of tile.

********** END **********

1 GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 Conform to Sections of Division 1 as applicable.

1.2 RELATED WORK

1.2.1 Mechanical Fixtures: Division 15

1.2.2 Electrical Fixtures: Division 16

1.3 SUBMITTALS

1.3.1 Submit samples of acoustical units for approval prior to ordering.

1.3.2 Obtain approval of Ontario Hydro and Authorities having Jurisdiction for the ceiling grid and supports as related to the support of the light fixtures. Adjust grid, fixing devices and support hangers as required to obtain approval.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

1.4 Ship grid members and mouldings in rigid crates and avoid damage. Bent or deformed materials will be rejected.

2 PRODUCTS

2.1 MATERIALS

2.1.1 Acoustical units: Mineral fibre panel, 15 mm thick x 610 mm x 1220 mm (5/8" thick x 24" x 48") Armstrong "Fissured Fire Guard" Panels, #895

2.1.2 Suspension System other areas where new ceiling grid is required: Interlocking tee system designed to support louvers as detailed, consisting of main tees and cross tees. System shall be "Prelude Plus XL Fire Guard" exposed tee system grid system by Armstrong World Industries Inc. or other approved manufacturer. The system shall provide lock joint intersections of cross and main tees.

.1 Main beams, cross tees and wall moulding are minimum G60 hot dipped galvanized steel with prefinished aluminium capping,
.2 UL design fire-rated performance
.3 Moulding 7/8”HD7801, hemmed angle moulding

2.1.3 Hanger wire: 18 gauge, galvanized soft annealed steel wire.

2.1.4 Hanger inserts: purpose made.

2.1.5 Carrying channels: 1-1/2" x 3/4" x 18 ga. steel

2.1.6 Accessories: splices, clips, wire ties, retainers and wall moulding, to complement suspension system components, as recommended by system manufacturer.

3 EXECUTION

3.1 INSTALLATION

3.1.1 Co-ordinate the work with all trades affected by the work of this Section. Provide a layout of hangers and framing suitable to accommodate fittings and units of equipment. Failure to follow this procedure will require that the hangers and channels be revised to suit as necessary without additional cost to the Board.

3.1.2 Install suspension system in accordance with ASTM C636, and manufacturer's instructions, except where specified otherwise.

3.1.3 Where ducts or other equipment prevent the regular spacing of hanger, reinforce the nearest adjacent hangers and related carrying channels and furring as required to span the greater distance.

3.1.4 Lay out work in accordance with reflected ceiling plans. Provide a tolerance of 1/360 of span and 2 mm (1/16") maximum between adjacent edges of metal pans. Allowable tolerance of finished acoustical ceiling system: 4 mm in 3600 mm (1/8" in 12 ft.) and 0.4 mm (1/64") between adjacent metal members. Tolerances shall not be cumulative.

3.1.5 Supply hangers or inserts for installation to the respective Section in ample time and with clear instructions for their correct placement. Provide additional hangers and inserts as required.

3.1.6 Design and space hangers and carrying members to support the entire ceiling system including lighting fixtures, diffusers and grilles. Recessed objects shall replace or be centred on acoustical panels, except where indicated otherwise. Consult with mechanical and electrical trades to co-ordinate the work.

3.1.7 Hang suspension system securely from structure above with hanger wires at approximately 4'-0" (1.2 m) centres maximum, both ways. Crimping of hangers not permitted. Locate hangers to avoid interference with ductwork and piping. Secure hangers to main tees by looping end of hanger through hole in tees and tying end of hanger to its= vertical suspension with minimum two twists. Hang suspended ceilings independently of walls, columns, ducts, pipes and conduit. Where carrying members are spliced avoid visible displacement of the longitudinal axis or face plane of adjacent members.

3.1.8 Centre acoustical ceiling installation on room axis leaving equal border pieces. Provide a row of hangers adjacent to and parallel with the walls for the support of the ends of the main tee runners at not more than 6" (150 mm) from the ends of runners. Lay directionally patterned tile one way with pattern parallel to longest room axis unless otherwise directed.

3.1.9 Do not erect ceiling suspension system until work above ceiling has been inspected and accepted by Consultant and authorities having jurisdiction.

3.1.10 Install finished work rigid, secure, square, level and plumb, framed and erected to maintain dimensions and contours indicated. Make allowance for thermal and structural movement.

3.1.11 Where ceiling suspension system is to be supported from steel deck construction above, support fixtures and other similar heavy items independently of suspended ceiling framing. Where this is not practical nor possible, provide framing members designed to carry superimposed loads and provide additional hangers to adequately support loads without sag.

3.1.12 Erect suspension systems at required heights and water tube, transit or laser beam level to tolerance of 1/8" over 12'-0".

3.1.13 Install exposed tee members to pattern indicated. Securely attach hangers to main tee members.

3.1.14 Space cross tee bars to suit ceiling panels and as detailed, and to accommodate lighting fixtures, diffusers, exhaust grilles and other built-in items properly fit into ceiling module and finish flush with rest of ceiling.

3.2 INSTALLATION - ACOUSTICAL PANELS

3.2.1 Lay acoustical panels into suspension system and support on flanges of tee members evenly on 4 sides.

3.2.2 Install acoustical ceiling panels to form horizontal and level ceiling with all parts flush and in true lines. Border units shall fit neatly against abutting surfaces and shall be supported by perimeter members.

3.2.3 Distribute variations in colour and texture of panels to obtain a uniform appearance.

********** END **********

1 GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 Conform to Sections of Division 1 as applicable.

1.2 QUALIFICATIONS

1.2.1 Contractor shall be an established firm regularly engaged in the installation of vinyl composite tile flooring. Contractor shall have completed at least five projects of similar size and complexity.

1.3 SUBMITTALS

1.3.1 SAMPLES:

1.3.1.1 Submit 305 mm x 305 mm (12" x 12") sample of specified vinyl composition tile and resilient rubber cove base in selected colours, in accordance with the General Conditions of the Contract.

1.3.1.2 Provide maintenance guide of the flooring system.

2 PRODUCTS

2.1 MATERIALS:

2.1.1 Resilient Floor Tile: Vinyl Composition Tile to CSA-A126.1-M 12" x 12" (305 mm x 305 mm) x 1/8" (3.2mm), Armstrong Standard Excelon Imperial Textured, ASTM F1066, Class 2- through pattern. Colour as follows:
Main colour Classrooms – VCT1,50904 Sterling, Imperial Texture; VCT2 51941 Polar White, Imperial Texture; VCT 3, 57512 Bikini Blue, Rave.
Corridor – to match existing; Imperial texture. All colours to be approved by Board.

2.1.3 Resilient base where indicated on drawings: top set, coved, rubber, minimum 4" (100 mm) high x 1/8" (3 mm) thick, including premoulded end stops and external corners, as manufactured by Johnsonite. Confirm colour prior to ordering and installation.

2.1.3 Reducer strip: for existing flooring to new flooring at entrances as may be required, wider threshold if available to straddle gap between existing flooring and centre of door, colour(s) from manufacturer’s standard colour range to the approval of Consultant and Board.

2.1.4 **Primers and Adhesives:** Johnsonite #926 Adhesive for Resilient Flooring, Johnsonite #965 Acrylic flooring and tread adhesive, #996 two-part epoxy adhesive, or #975 two-part urethane adhesive. Apply adhesive as

recommended by applicable flooring and base manufacturers which will produce good and permanent bond between substrate and flooring, and between wall surface and base. Flooring installer must use manufacturer's product for manufacturer's warranty to apply.

2.1.5 Sub-floor filler and leveller: latex filler, 'Planicrete 20' by Mapei Canada Ltd. or waterproof filler recommended by flooring manufacturer.

2.1.6 **Neutral Cleaner:** Taski ' Profi' or Johnson Wax Professional 'Stride' oil and grease emulsifying neutral detergents (pH of 7-8).

2.1.7 Sealer (for VCT): type recommended by flooring manufacturer.

2.1.8 Wax: Depending on Owner's preference and Owner's maintenance requirements provide floor finish products as follows:
Owner's who prefer not to buff floors: Taski Brilliant or S.C. Johnson's "Showplace or Pronto" flooring finish for wet look or equal as recommended by manufacturer.
Owner's who prefer to buff floors: Taski WiWax or S.C. Johnson's Klean-N-Shine or equal as recommended by manufacturer.

Confirm with Board which type of wax to be applied.

3 EXECUTION

3.1 PREPARATION

3.1.1 Subfloor shall be clean, dry, structurally sound and smooth as recommended by flooring manufacturer. Subfloor shall be free of solvents, grease, oil, asphalt, paint, dust, and sealing and curing compounds. ***Flooring Contractor is responsible for ensuring that any residue or adhesives remaining on floor are totally removed to ensure full warranty of floor as per manufacturer's instructions.*** Flooring Contractor is responsible for correcting any imperfections and ensuring a level floor. Provide and install patching compound as may be required for complete installation of floor

3.1.4 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

3.1.5 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. prohibit traffic until filler cured and dry.

3.1.6 Prime substrate surfaces in accordance with resilient flooring manufacturer's recommendations and permit drying before applying adhesive.

3.2 INSTALLATION - GENERAL

3.2.1 Unless otherwise specified, install resilient flooring and base in strict accordance with manufacturer's printed instructions.

3.2.2 Ensure that materials match approved samples. Materials with undue variations in colour, texture and finish will be rejected.

3.3 FLOORING APPLICATION

3.3.1 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.

3.3.2 Lay tile flooring with joints parallel to building lines to produce symmetrical tile pattern. Adjust starting lines to ensure border tiles are not less that tile width.

3.3.3 Scribe, cut and fit flooring to pattern as indicated on drawings and fit neatly around fixed walls, partitions, columns, fixtures and excessively heavy objects.

3.3.4 Install tile flooring to ashlar pattern with staggered joints.

3.3.5 Extend flooring full depth into closets, alcoves, toe spaces, recesses and other similar areas.

3.3.6 Continue flooring through passageways, without interrupting floor pattern.

3.3.7 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.

3.3.8 Install rubber wheeled transition at existing corridor and new VCT to carpet (where required). Align with new door frame such that transition occurs within the door frame.

3.3.9 Install sheet flooring in accordance with manufacturer's printed instructions. Heat weld seams of sheet flooring 24 hours following installation with welding rod as recommended.

3.3.10 Cut and fit neatly around fixed objects. Fit tightly to electrical and mechanical fittings, piping and equipment. Scribe and fit to abutting surfaces.

3.4 BASE APPLICATION

3.4.1 Ensure that substrate is solid and free of voids, gaps, or other defects which will preclude adequate adhesion, or will ghost or telegraph through finished base installation.

3.4.2 Set base in adhesive tightly against wall and floor surfaces. Use pieces of base minimum 18" (0.5 m) long.

3.4.3 Lay out base to keep number of joints at minimum. Uniformly space joints; butt to moderate contact.

3.4.4 Scribe and fit to door frames and other obstructions. Use pre-moulded end pieces at flush door frames.

3.4.5 Cope internal corners. Use pre-moulded corner units for right angle external corners. Use formed straight base material for external corners of other angles.

3.4.6 Where indicated, install bases to casework.

3.5 CLEANING AND WAXING

3.5.1 As work progresses and upon completion, remove excess adhesive from floor, base and wall surfaces without damage.

3.5.2 After bond has firmly set, clean, seal and wax floor and base surface to flooring manufacturer’s instructions. Apply 3 coats of wax to floor.

3.6 PROTECTION OF FINISHED WORK

3.6.1 Protect new floors until final set of adhesive and from on-going construction activities.

3.6.2 Prohibit traffic on floor for 48 hours after installation or according to manufacturer’s instructions.

********** END **********

1 GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 Conform to Sections of Division 1 as applicable.

1.2 RELATED WORK

1.2.1 Shop priming and factory prefinishing are required on some, but not, all of the items specified in other trade Sections. Read carefully other Sections of the Specifications to determine extent of prime and finish coats applied by other Sections. Other Sections include, but are not limited to, Miscellaneous Metals Section, Structural Steel Section and Rough Carpentry Section. Refer to Division 15 and 16 for instructions on painting work of those Divisions.

1.3 COLOUR SCHEDULE AND SAMPLES

1.3.1 The colour schedule will be prepared and issued for guidance in the preparation of samples of colour and finish. Final selection of colours and surface textures of finishes throughout and whether finishes are transparent (natural) or opaque (paint) shall rest solely with the Consultant.

1.3.2 Submit samples of each colour and finish, in required number of coats, for approval in accordance with Section 01300. Submit duplicate 200 mm x 300 mm (8"x 12") samples; use 10 mm (3/8") birch plywood for wood finishes, 10 mm (3/8") gypsum board for paint finishes over smooth surfaces, 50 mm (2") concrete block for concrete masonry.

1.3.3 Consult with Architect to consider samples which will be inspected under the conditions and in areas to which colours and finishes are to be applied. Modify colours as often as may be required for Consultant final approval. Upon final approval, proceed with the purchase of materials.

1.3.4 Retain approved samples in good and clean condition on job site until completion. Materials used in work shall match approved samples.

1.4 ENVIRONMENTAL CONDITIONS

1.4.1 Do not paint exterior work at temperatures below 10 deg. C. nor immediately following rain, frost, or dew. Avoid painting surfaces exposed to hot sun. Do not paint interior work at temperatures below 10 deg. C., nor surfaces where condensation has or will form due to presence of high humidity and lack of proper ventilation. Check surfaces with electric moisture water meter and do not proceed if reading is higher than 12-15% without written direction.

1.4.2 Atmosphere at the area of work shall be dust free.

1.4.3 Ensure that adequate controlled ventilation, heat and light is provided by Contractor during application and drying period of interior work.

1.5 Maintenance Materials

1.5.1 Upon completion of the work of this Section, store where directed by Consultant, 3 gallons of paint for touch up by school at later date.

2 PRODUCTS

2.1 MATERIALS:

2.1.1 Paint and finishing materials shall be highest grade first line quality of paint manufacturer whose best quality lines meet or exceed C.G.S.B. quality standards and other requirements or Standards as specified herein, except for specially mentioned materials or manufacturers. Use only products compatible with each other. Paint materials for each coating formulae to be products of a single manufacturer.

2.1.2 Painting equipment, thinners, cleaners, etc.: suitable types for purpose intended as recommended by paint manufacturer.

3 EXECUTION

3.1 INSPECTION:

3.1.1 Preparation of Surfaces:

3.1.1.1 Test cementitious surface substrates for moisture content before commencing painting. Do not apply paint to surfaces when moisture content exceeds 12% as determined by an approved moisture testing device.

3.1.1.2 Wood: Sand smooth, removing tool marks, and dust clean. Apply one coat of aluminum primer to knots and sap streaks, on wood if to be painted or one coat of white shellac if to be stained and varnished. Putty nail holes, cracks and defects only after the correct priming coat is dry. Fine sanding and dusting to be carried out between coats.

3.1.1.3 Touch up shop paint primer on steel with CGSB 1-GP-40M to CGSB 85-GP-14M.

3.1.1.4 Prepare galvanized steel and zinc coated surfaces to CGSB 85-GP-16M.

3.1.1.5 Prepare masonry and concrete surfaces to CGSB 85-GP-31M.

3.1.1.6 Prepare gypsum wallboard surfaces to CGSB 85-GP-33M. Fill minor cracks with plaster patching compound.

3.1.1.7 Repairs: Repair joints, cracks, crevices, or prepare adjacent surfaces where new work meets existing surfaces.

3.1.1.8 Use sufficient drop cloths and protective coverings for full protection of floors, furnishings, equipment and work not being painted.

3.1.1.9 Remove finish hardware, electric plates and other similar accessories; mask any that are not removable. Replace these when paint is dry and clean them. Do not clean hardware with solvent which will remove permanent lacquer finish.

3.1.1.10 Test concrete surfaces for alkalinity. Wash or etch concrete surfaces containing alkaline with proper type solution and in a manner recommended by paint manufacturer.

3.1.1.11 Where necessary, fill nail holes, screw holes and other similar defects with non-shrink filler. Tint filler to match stains for stained woodwork. Wipe excess filler from surfaces before filler has set.

3.1.1.12 Clean floors, adjacent surfaces and surfaces to be painted before work is commenced. Ensure that surfaces to be finished are free from machine, tool or sandpaper marks and free from dust, grease, oil or any other deleterious matter which may be detrimental to a satisfactory and acceptable finish.

3.1.1.13 Ensure that foreign matter left on surfaces by other trades is properly removed by the trades concerned before commencing painting.

3.2 Priming

3.2.1 Shop primed surfaces need not receive a field prime coat, except for touch-up where necessary. Feather out edges to make touch-up paint inconspicuous.

3.2.2 Spot prime exposed nails and other metals which are to be painted with emulsion paints, using a primer recommended by the manufacture of the paint system.

3.2.3 Remove rust, scale and loose shop paint from unprimed metal work by wire brushing or sanding and prime base metal before proceeding with finish coats.

3.2.4 Treat knots, saps, streaks and resin patches on wood with one coat of CGSB 1-GP-126M vinyl sealer.

3.2.5 Wash and etch galvanized and zinc coated metal to a dull primer receptive surface using an approved compound designed for intended purpose.

3.3 APPLICATION

3.3.1 Finish and number of coats specified herein are intended to cover surfaces completely. If they do not, apply further coats until complete coverage is achieved as required.

3.3.2 Areas exhibiting incomplete, unsatisfactory coverage, or part of existing surfaces shall have the entire plane painted. Patching will not be acceptable. Paint entire plane of areas which have been cut and patched or to joint deemed acceptable by Consultant.

3.3.3 Spraying will not be allowed without written permission.

3.3.4 Arrange to have traffic barred from completed areas wherever possible.

3.3.5 Apply materials in strict accordance with manufacturer's directions and specifications and be familiar with those directions and specifications. Do not use adulterants.

3.3.6 Apply paint evenly, under adequate illumination, free from sags, runs, crawls and other defects.

3.3.7 Finish tops of cabinets and projecting ledges, both above and below sight lines as specified for surrounding surfaces.

3.3.8 Where more than one coat of same paint is to be applied, tint secondary coat a shade lighter than final coat to differentiate between coats. Have each coat of paint inspected by Consultant when dry or before applying next coat. Only coats of paint inspected by Consultant will be considered in determining minimum number of coats applied.

3.3.9 Lightly sand and clean between each coat of semi-gloss, gloss and enamel finishes.

3.3.10 Ensure each coat of paint is dry before applying following coat. Minimum drying time shall not be less than that recommended by paint manufacturer.

3.3.3.11 If not prefinished, seal, prime and finish tops, bottoms, edges and cutouts of doors, including casework doors, after fitting to match adjacent door surfaces.

3.3.3.12 Finish closets and alcoves as specified for adjoining rooms.

3.3.3.13 When primer-sealer coat is dry, touch-up visible hot spots or suction spots to ensure that they are sealed, before applying first finish coat.

3.3.3.14 Finished work shall be uniform as to sheen, gloss, colour and texture.

3.3.3.15 Apply paint by brush, roller or spray. Concrete, masonry or other materials may be spray painted provided that spray coat is back rolled while still wet, in order to fill gaps and pores in base surfaces.

3.3.3.16 In instances where materials specified are not suitable for a particular job application or are contrary to manufacturer's recommendations for use on a particular surface, immediately bring such condition to attention of Architect for clarification and instructions.

3.4 MECHANICAL AND ELECTRICAL WORK

3.4.1 Read Mechanical and Electrical Sections for the extent of painting work to be done under those Sections. Piping shall be painted with an identifying colour throughout in accordance with Code Requirements.

3.4.2 Provide colour coding for piping and identify piping as to function and direction of flow with bands of "Mystic" tape applied at intervals suitable to the Consultant so that piping can be readily identified. Refer to General Mechanical Requirements.

3.4.3 Identify each piece of mechanical/electrical equipment with stencilled letter in colours contrasting the colours of the equipment. Apply to each piece of equipment the name, flow service and system number, suitable to the Consultant.

3.4.4 Mechanical equipment requiring identification shall include pumps, fans, compressors, convectors, tanks and other mechanical items in the circulation path of the various systems as directed by the Consultant.

3.4.5 Prime and paint exposed, unfinished electrical raceways, fittings, outlet boxes, junction boxes, pull boxes, and similar items.

3.4.6 Replace identification markings on mechanical and electrical work when painted over or spattered.

3.4.7 Remove grilles, covers, access panels for mechanical and electrical systems from installed location and paint separately, if these items are not factory finished.

3.4.8 Paint work to match adjacent walls and ceilings unless directed otherwise.

3.4.9 Paint interior surfaces of air ducts, that are visible through grilles and louvres, with one coat of flat black metal paint to limit of sight line.

3.5 GENERAL FINISHING ITEMS:

3.5.1 Finish listed exposed surfaces, shown of Room Finish Schedule and as described hereunder:

3.5.2 Exposed means visible in the completed work. In the case of closets, cabinets and drawers, it includes their interiors.

3.5.3 For instances where materials specified are not suitable for a particular job application or are contrary to manufacturer's recommendations, for use on a particular surface, such condition shall immediately be brought to the attention of the Consultant for clarification and instructions.

3.5.4 Finishes shall match approved samples but Consultant reserves the right to make reasonable changes to finish specifications to obtain desired results without additional cost or obligation to Owner.

3.5.5 Gloss Terms shall have following values (ASTM-D523-67 "Test for Specular Gloss")

Gloss Term	Gloss Value
Flat	5 to 20
Eggshell	20 to 40
Semi-gloss	40 to 60
Gloss, medium	60 to 80
Gloss, high	80 to 90

3.6 INTERIOR SCHEDULE

3.6.1 Finish the various surfaces as follows (in addition to previously specified treatments, coatings and primers):

3.6.1.1 Concrete Block:
proprietary block filler to produce 100% filled surface,
1 coat masonry primer,
2 coats, acrylic latex coating, semi-gloss

**(where existing walls are painted the paint type must be compatible as underlying existing finish)

3.6.1.2 Gypsum board walls, ceilings and bulkheads:
1 coat primer-sealer
2 coats alkyd enamel or 2 coats vinyl-latex paint of selected sheen.

3.6.1.3 Steel, unprimed miscellaneous:
1 coat, metal primer
2 coats alkyd enamel of selected sheen

3.6.1.4 Woodwork, millwork & trim to receive transparent finish:
1 coat paste wood filler natural
2 coat satin polyurethane varnish
or
1 coat paste wood filler natural
1 coat transparent wood stain – to match plastic laminate colour
2 coat satin polyurethane varnish

3.6.1.5 Woodwork, trim to receive paint finish:
1 coat latex undercoater primer/sealer
2 coats latex paint of selected sheen

3.6.1.6 Exterior Furnishings – Exterior Stain to match Sienna pressure treated wood or natural cedar colour – Colour to approved by Board.

3.6.1.7 Pavement Marking – Playground
Waterborne Traffic Marking Paint or Striping Paint
or equal

3.7 Schedules

3.7.1 Refer to the Room Finish Schedule, Door Schedule, and Drawings for the location of surfaces and items to be painted.

3.7.2 Colour Schedule:

Colour of surfaces adjacent to existing painted wall surfaces disturbed by demolition or construction shall be painted to match existing surfaces in rooms and areas where rooms are not to be repainted.

Colour of all surfaces shall be as noted by Benjamin Moore. All paint to be Scuff-X by Benjamin Moore. Colours to be approved by Board.

PT:1 BM, Decorator's White OC-149 (Main Wall Colour)

PT:2 BM, Grey Owl OC-52 (Accent)

PT:3 BM, Blue Lagoon 2054-40 (Accent)

PT: BM, Secret AF-710 (Doors and Frames)

********** END **********

1 GENERAL

1.1 Qualification of Manufacturer

1.1.1 Units specified herein are based on products manufactured or distributed by Architectural School Products Ltd.

1.1.2 Consultant will consider other manufacturers providing that their product lines meet the performance requirements specified and only if approved by the Board.

1.1.3 Whiteboards and tackboards shall be supplied by one manufacturer.

1.2 Shop Drawings

1.2.1 Provide shop drawings in accordance with Section 01 33 00 - Submittals.

1.2.2 Submit shop drawings shall show dimensions, layout and details for fabrication and installation of whiteboards, tackboards, aluminum trim and anchorage.

1.3 Extended Guarantee

1.3.1 Provide a written guarantee, signed and issued in the name of the Board, stating that all whiteboards are guaranteed against defects such as fading, chipping, peeling, pitting or becoming glossy due to normal wear, usage, care and maintenance for a period of 25 years from date of Architects's Certificate of Substantial Performance.

2 PRODUCTS

2.1 Materials

2.1.1 Vertical Whiteboard: Architectural School Products Porcelain Enamel white board,
Series No. 200, Factory Preframed whiteboard units must have heavy duty closed end castings, No. 212, and 25.4 mm (1") maprail No. 206, with integral cork insert and 2 map hooks where indicated; exposed face perimeter trim No. 205 for tackboards and whiteboard vertical jambs; exposed face divider bar No. 207 for adjoining whiteboard and tackboard or long length tackboard elevations; standard modular size 1219 mm x lengths as indicated on interior elevations; Colour- white.

2.1.2 Tackboards: Factory fabricated boards consisting of 6 mm thick fine grain natural cork laminated to 6 mm particle board or masonite substrate under mechanical pressure in panel sizes of 4'-0 x lengths as indicated on drawings. Bond materials with waterproof adhesive which will not delaminate nor rupture at the contact surfaces.

2.1.3 All tackboards shall meet the minimum requirements of the applicable building code and/or Ontario fire Marshal's Office and shall have a flame spread rating of under 150.

2.1.4 Perimeter: aluminum trim No. 205 trim for tackboards

3 EXECUTION

3.1 Co-ordination

3.1.1 Co-ordinate with other relevant trades to ensure that proper and adequate framing and wall finish are provided for the installation of whiteboards and tackboards in the locations required.

3.1.2 Verify exact locations with Consultant.

3.2 Installation

3.2.1 Install whiteboards and tackboards in strict accordance with manufacturer's printed instructions, anchoring all components firmly in place.

3.2.2 Erect units straight, plumb and level.

3.2.3 Secure aluminum trim with concealed fasteners. Mitre corners; butt corners will be permitted provided that open trim ends are suitably closed.

3.2.4 Securely and permanently fix units to the wall surface with concealed fasteners.

3.3 Cleaning

3.3.1 Leave trim and board surfaces clean and free of stains or marks and completely cover surfaces with "Pliofilm" immediately after installation. Remove cover at time of the final inspection and leave ready for use.

**********END**********

1 GENERAL

1.1 General Requirements

1.1.1 Conform to Sections of Division 1 as applicable.

1.2 Related Work Specified Elsewhere:

1.2.1	Installation of Temperature Sensor	Mechanical Division
1.2.2	Installation of Fire Alarm (Horn) Power Outlets, Telephone, Speaker,	Electrical Division

1.3 Submittals

1.3.1 Shop Drawings:

1.3.1.1 Submit shop drawings or catalogue excerpts in accordance with Section 01 33 00.

1.3.1.2 Indicate finishes, construction and material, receptacle and switch plate covers, plastic laminate and filler panels.

1.3.2 Acceptable Manufacturers for work of this Section:

Classmate as manufactured by Interspec Systems Ltd., Rosemont, Ontario (705) 435-3780 or equal.

1.4 Warranty:

1.4.1 Provide manufacturer's one year warranty for defects in material and workmanship for items supplied by manufacturer. This does not cover items supplied or installed by others.

2 PRODUCTS

2.1 Materials:

2.1.1 ClassMate Rec-16 Mounted Control Centre: 16" wide x 4" deep, to be mounted on new, refer to drawings for size, width, depth and length; rigid aluminum frame with clear anodized finish; recessed telephone cove, provision for classroom light switches, provision for P.A. callswitch; anodized aluminium service fascia where indicated; P.A. speaker grill with wire raceways; provision for fire alarm horn; provision for temperature sensor; provision for duplex receptacle.

2.1.2 Removable Plastic Laminate Panels: where indicated, finish laminated plastic smooth and flush with stile edges of frame, Colour: Wilsonart, Standard Laminate: Pressed Linen 4991-38

2.2 Fabrication:

2.2.1 Control panels shall be constructed of 6063 T5 alloy satin finish, anodized aluminium frame, .8 mm thick with high pressure laminate faced panels of lightweight particleboard core and .5 mm thick plastic laminate backing sheet.

2.2.2 Units to be complete with backboxes fabricated from heavy gauge satin coated steel with suitable barriers and continuous knockouts. Clear anodized faceplates shall be prepunched to accept detailed components.

2.2.3 Provide tamperproof clear lexan safety acrylic enclosure for the temperature sensor for approval by consultant and Board.

2.2.4 All units to be fabricated in accordance with reviewed shop drawings.

3 EXECUTION

3.1 Installation

3.1.1 Install extruded aluminium shell frames and faceplates and plastic laminate panels in accordance with manufacturer's printed instructions.

3.1.2 Make adjustments for correct fit and function.

3.1.3 Install removable plastic laminate panels and fillers where noted.

********** END **********

1 GENERAL

1.1 Conform to Division 1 as applicable.

1.2 REFERENCES

ASTM A167-99(2009)	Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
CAN/CSA B651-95 (R2001)	Barrier Free Design

1.3 SHOP DRAWINGS

1.3.1 Submit shop drawings in accordance with Division 01 General Requirements.

1.3.2 Indicate compartment layouts and dimensions, attachments, enforcing, anchorage, hardware and locations of exposed fastenings.

1.3.3 Submit necessary templates and instructions where supports or anchors are to be built in by other Sections.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

1.4.1 Protect surfaces store components to prevent damage to plastic laminate partitions during storage, delivery and installation.

2 PRODUCTS

2.1 LAMINATED PLASTIC SUBSTRATE WITH STEEL CORE REINFORCED STILES (DesignerSeries) floor mounted. Following products are acceptable provided they comply with requirements of these Specifications, including changes to manufacturer's standard product line as may be required:

Acceptable Products
Bobrick Designer Series 1042
Or Equal.

Plastic Laminate Wilsonart Field Elm 799K-12; colour to be approved by Board.

2.1.1 Stiles and Doors 19 mm (3/4") thick, panels and screens 13 mm (1/2") thick.

2.2 Headrail, extruded anodized aluminum with satin finish, enclosed construction.

2.3 **Stainless Steel**: ASTM A167, Type 304, minimum thickness 0.6 mm for pilaster shoes.

2.4 **Non-ferrous Metal**: For hardware and accessories of approved zinc alloy.

2.5 **HARDWARE AND ACCESSORIES**

2.5.1 **Wall Connecting Brackets**: Bright polished, smooth, stainless steel. Aluminum not acceptable.

2.5.2 **Fixing Devices**: One way theft resistant screws of stainless steel. Provide through bolts for hinges and latches.

2.5.3 **Pilaster Shoes**: Stainless steel sheet, formed and welded, No. 4 finish.

2.6 **FABRICATION**

2.6.1 Fabricate work true to dimensions and square, with flat smooth surfaces, free of waves, warping, buckles, rough areas and voids.

2.6.2 Fabricate pilasters and partition panels from solid plastic laminate. Smooth and chamfer edges.

2.6.3 Finish metal components such that no weld marks, and no pitted or marred finishes occur in installed work.

2.6.4 Provide internal reinforcement at areas of attached hardware and fittings.

3 EXECUTION

3.1 **EXAMINATION**

3.1.1 Verify dimensions on Site before preparing shop drawings or proceeding with shop work.

3.2 **INSTALLATION**

3.2.1 Install partitions in accordance with CAN/CSA B651.

3.2.2 Install compartments secure, accurately positioned, plumb, level, square and free from sag and distortion in accordance with shop drawings.

3.2.3 Spaces between panels and pilasters, between panels and walls and between pilasters and walls are of uniform consistent width and sized to ensure that it is not possible to see persons using compartments.

3.2.4 Perform drilling of steel, masonry and concrete necessary to install work of this Section.

3.2.5 Coordinate installation with work of trades providing wall and floor finishes, washroom accessories and other adjacent components and construction.

3.2.6 Insulate contact surfaces to prevent electrolysis due to metal contact with masonry, concrete or dissimilar metal surfaces. Use bituminous paint, building

paper or other approved means.

3.2.7 Install hardware supplied under this Section and ensure that it is visually aligned.

3.2.8 Apply fittings using theftproof screws. Secure shoes by positive mechanical means.

3.2.9 Provide 3 anchor brackets at all locations where partition components abut walls.

3.3 **ADJUSTMENT**

3.3.1 Upon completion of work and when directed, remove all traces of protective coatings or paper and polish compartments.

3.4 **CLEANING**

3.4.1 Clean and make good surfaces soiled or otherwise damaged about work of this Section. Pay cost of replacing finishes or materials that can not be satisfactorily cleaned.

3.4.2 Upon completion of work, remove all debris, equipment and excess material resulting from work of this Section from Site.

End of Section

1 GENERAL

1.1 GENERAL REQUIREMENTS:

1.1.1 Conform to Sections of Division 1 as applicable.

1.2 SUBMITTALS:

1.2.1 Submit shop drawings or manufacturer's data sheets bound in sets in accordance with General Conditions.

1.2.2 Submit necessary templates and instructions where recesses, openings, fastenings or anchors have to be built in by others.

2 PRODUCTS

2.1 MATERIALS:

2.1.1 General:

2.1.1.1 Washroom accessories **provided new by Board include toilet paper dispenser, soap dispenser, paper towel dispenser, sanitary napkin disposal, waste receptacle to be installed under this contract.**

2.1.2 **Coat Hook:** Provide one in Staff WC 111B, surface mounted, satin finish, stainless steel, threaded flange conceals mounting plate, provides snug fit to the wall. Flange has 1 15⁄16" (50mm) diameter. Hook is 1⁄2" (13mm) high. Projects 1 5⁄16" (35mm). Exact location to be determined.
Acceptable Products

Bobrick B-542

3 EXECUTION

3.1 INSTALLATION:

3.1.1 Install washroom accessories securely with the fasteners supplied by the respective accessory manufacturer in accordance with recommendations of the manufacturers and to the satisfaction of the Consultant.

3.1.2 Install washroom accessories provided by the Board as directed.

3.1.3 Co-ordinate installation with the work of trades affected by the installation of accessories as required for washroom accessories installations.

3.1.4 Securely fasten accessories level and plumb. Locations and mounting heights as directed by Consultant.

**********END**********

1 **GENERAL**

1.1 Conform to Sections of Division 1 as applicable.

1.2 All playground equipment and pre-cast concrete storage structure, including the construction of the pergola (quantity – 2) and stage (quantity- 2) constructed in Rough Carpentry Section 06 10 00 is to be noted as a Separate Price in the Bid Price.

1.3 RELATED WORK SPECIFIED ELSEWHERE:

1.3.1	Demolition (Salvaged Chalkboard)	Section 02 41 00
1.2.2	Cast-In Place Concrete	Section 03 30 00
1.2.3	Rough Carpentry: (Stage/Pergola)	Section 06 10 00
1.2.4	Painting	Section 09 91 00
1.2.5	Excavating, Trenching and Backfilling	Section 31 23 10
1.2.6	Engineered Wood Fibre Impact Surfacing	Section 32 18 10

1.4 SHOP DRAWINGS

1.4.1 Submit shop drawings in accordance with Section 01 33 00 Submittals.

1.4.2 Shop drawings shall clearly indicate material being supplied and shall show all connections, attachments, reinforcing, anchorage and location of exposed fastenings.

2 **PRODUCTS**

2.1 **MATERIALS**

2.1.1 **Framing Lumber**: Lumber for each type of structural component shall be of same species and grade, equally seasoned and shall be processed and stamped at same mill. Lumber identification shall conform to requirements of Standard Grading Rules for Canadian Lumber of National Lumber Grades Authority (NLGA).

2.1.2 **Pressure Treated Lumber for Playground Equipment/Stage & Pergola:** MicroPro Sienna® treated wood using a waterborne, micronized copper azole (MCA) system developed to provide long-term protection for wood exposed in exterior applications from fungal decay and termite attack, or equal.

2.1.3 **Cedar Joists and other Framing members where noted**: “No.1” structural joists and planks

2.1.4 **Members Other Than Studs and Less Than 89 mm (4") Wide**: pressure treated or cedar, "Standard" light framing, except as otherwise specified.

2.1.5 **Nailing Strips, Blocking, Furring and Strapping**: Pressure treated or cedar

"Standard" light framing.

2.1.6 **Play equipment – refer to drawings**. Coordinate with 03 30 00 - Cast-in Place Concrete for footings; 31 23 10 Excavation, Trenching and Backfilling for granular material and compaction, 32 91 10 Topsoil and Finish Grading Sections for filter fabric and growing medium.

Planter Box, Quantity (2) – 8" diameter logs, 4' lengths and 8' lengths, logs to be completely stripped of bark, rounded with no splinters, branches etc.. Cut lengthwise edges that are stacked. Pine, spruce, cedar, maple, ash.
Plastic Nailer at Perimeter of Planter Box - 2 in. x 4 in. x 12 ft. Recycled Plastic Brown Lumber (G-Grade)
100 mm Granular A on 150 mm Granular B
Filter Fabric – geotextile fabric to line inside of planter to contain topsoil
Topsoil – fill to 75 mm from top of planter wall.

Art Wall – Chalkboard (single sided – 1 required & double sided - 1 required)
Refer to Drawings.
Trim: cedar stained to match Sienna colour
Chalkboard and Chalk tray – use salvaged chalkboard and chalk tray, cut to size as indicated on drawings.

Wood Benches, quantity (2) benches
Refer to Drawings.

Wooden Bridge – Refer to Drawings (1 required)

Stage & Pergola – Refer to Drawings (no photo – 2 stages and 2 pergolas required)

2.1.7 **Wood Preservative**

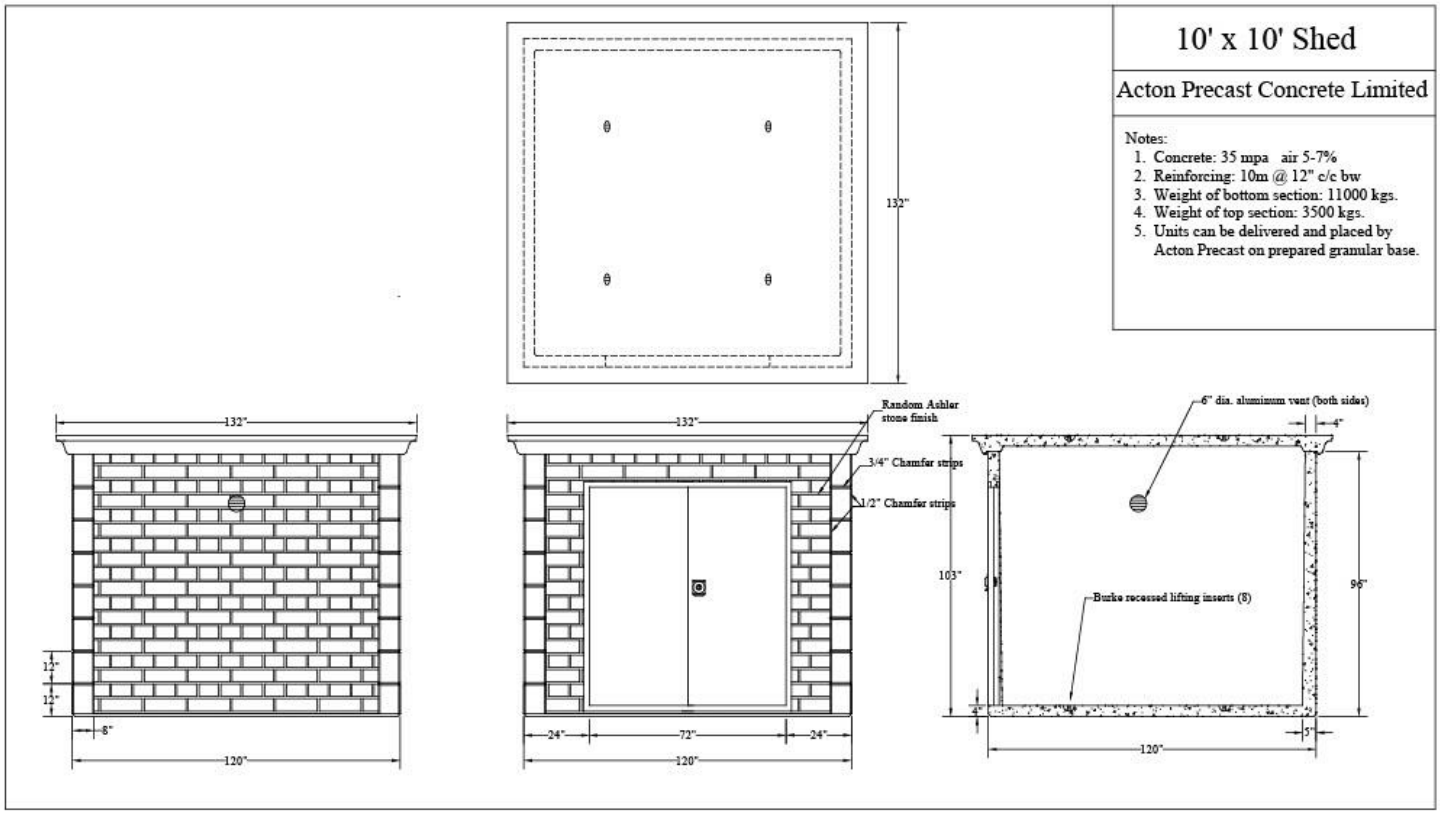
2.1.7.1 For painted and cut surfaces use stain or sealer compatible and coloured to match MicroPro Sienna® treated wood, Cut-N-Seal Waterproofing Wood Sealant – Sienna Brown, or equal.

2.1.7.2 For concealed surfaces use Pentox Green by Osmose-Pentox Inc. or Preserv-Green 1-42 by Solignum Inc.

2.1.8 **Rough Hardware**: Nails, screws, bolts, lag screws, anchors, special fastening devices and supports required for erection of carpentry components. Use galvanized components if exposed to exterior atmosphere. Galvanize in accordance with requirements of CAN/CSA-G164.

2.1.9 **Rough Hardware**: Nails, screws, bolts, lag screws, anchors, special fastening devices and supports required for erection of carpentry components. Use galvanized components if exposed to exterior atmosphere. Galvanize in accordance with requirements of CAN/CSA-G164.

2.1.10 Pre-cast concrete storage structure: Supply and Install under Separate Price, 10' x 10' Precast Concrete Shed by Acton Precast Concrete Ltd.,



3 EXECUTION

3.1 INSTALLATION

3.1.1 Construct and install work as indicated on Drawings.

3.1.2 Machine dressed work shall be slow fed using sharp cutters and finished members shall be free from drag, feathers, slivers or roughness of any kind.

3.1.3 Frame materials with tight joints rigidly held in place.

3.1.4 Design construction methods for expansion and contraction of materials.

3.1.5 Erect work plumb, level, square and to required lines.

3.1.6 Be responsible for methods of construction and for ensuring that materials are rigidly and securely attached and will not be loosened by work of other trades.

3.1.7 Fasten wood nailers, blocking, framing and strapping solidly to adjacent materials in true planes.

3.1.8 **Furring, Bearing Plates and Rough Framing**: Provide and install where indicated on Drawings or required.

3.1.9 **Strips and Blocking**

3.1.9.1 Provide and install wood strips required for attaching work of other Sections.

3.1.9.2 Provide and install all wood blocking required.

3.1.10 **Wood Preservative Treatment**

3.1.10.1 Treat all surfaces of cut surfaces with wood preservative; apply in accordance with manufacturer's directions.

3.1.11 **Rough Hardware**

3.1.11.1 Supply and install all rough hardware.

3.1.11.2 Fasten to hollow units with toggle bolts and to solid masonry or concrete with lead expansion shields and lag screws. No organic fibre or wood plugs shall be used.

3.1.12 **Miscellaneous Carpentry Work**: Supply and install all other carpentry indicated on Drawings or as required for completion of work. Co-operate with other trades in installing items supplied by other Sections, cut openings in woodwork when so required and make good disturbed surfaces.

End of Section

1 GENERAL

1.1 General Requirements

1.1.1 Conform to the Sections of Division 1 as applicable.

1.2 Related Work Specified Elsewhere:

1.2.1 Section 08 80 00 – Glass & Glazing.

1.3 References

1.3.1 International Window Film Association (IWFA)

.1 IWFA Visual Quality Standard for Applied Window Film 1999.

1.4 Submittals

1.4.1 Submit samples in accordance with Section 01 33 00 Submittals.

.1 Submit two 500 x 500 mm sample of film.

1.4.2 Submit Closeout Submittals in accordance with Section 01 78 00 Closeout Submittals.

1.4.3 Provide operation and maintenance data for window film for incorporation into manual specified in Section.

.1 Follow manufacturers written instructions for care and maintenance of privacy film.

1.4.4 Use only cleaning solution recommended by manufacturer for regularly scheduled cleaning of privacy film.

1.5 Quality Assurance

1.5.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with legislated Health and Safety Requirements.

.2 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Canada Labour Code.

1.7 Warranty

1.7.1 Warrant work of this Section for a period of 12 months.

1.7.2 Ensure warranty includes items as follows:

.1 Maintaining adhesion properties without blistering, bubbling or delaminating from glass surface.

.2 Maintaining appearance without discolouration.

.3 Removing, replace and reapply defective materials.

.4 In event of product failure under warranty terms, remove and re-apply film without glass replacement at no cost to Owner.

2 PRODUCTS

2.1 MATERIALS

2.1.1 Privacy Film – CGI SB3 3 mil, Velvet Texture, Privacy Window Film as supplied by Convenience Group Inc..

3 EXECUTION

3.1 Preparation

.1 Clean glass before beginning installation using neutral cleaning solution.

.2 Ensure no deleterious material adheres to glass by scraping surface of glass using industrial razors.

.3 Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.

.4 Examine glass under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate or cause vision transparency or distortion problems. Report findings to Consultant.

.5 Before beginning Work, place absorbent material on window sill or at sash frame to absorb moisture accumulation generated by film application.

3.2 Installation

3.2.1 Field Installation of Window Film to Windows, Door lites, Sidelights:

.1 Install film in the same manner as tested.

.2 Ensure no deleterious material adheres to glass by scraping surface of glass using industrial razors.

.3 Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.

.4 Examine glass under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate, or cause vision transparency or distortion problems. Report findings to Consultant before starting Work.

.5 Install privacy film to glass windows ensuring no blisters, bubbles, scratches or distortions.

3.2.2 Cut film edges straight and square.

3.2.3 Cut edges 3 mm maximum from edge of glass in accordance with manufacturers written instructions.

3.2.4 Apply and attach film to glass in accordance with manufacturer's written instructions.

3.3 Splicing:

.1 Splice film only when glass is greater in width than film.

.2 Splice film only after receipt of written approval from Consultant.

.3 Use only water and film slip solution on glass to facilitate positioning of film.

.4 Ensure removal of excess water from between film and glass.

.5 Remove left over material form work area and return work area to original condition.

3.4 Installer's Inspection

3.4.1 Visual Inspection: in accordance with IWFA - Visual Quality Standard for Applied Window Film.

3.4.2 Remove and replace without glass replacement, film that continues to show blisters, bubbles, tears, scratches, edge defects or vision distortion in film when viewed under natural daylight from 2.0 m minimum after 30 day period.

3.5 Final Cleaning

3.5.1 Wash interior and exterior of each window or glass panel and film using cleaning solution recommended by film manufacturer.

END OF SECTION

1 GENERAL

1.1 General Requirements

1.1.1 Conform to section of Division 1 as applicable.

1.2 Related Work

1.2.1	Building framing members:	Section 06 10 00 Rough Carpentry
		Section 09250 Gypsum Wallboard

1.3 Samples

1.3.1 Submit duplicate samples of manufacturer's standard colours, patterns and textures for exact or extremely close match to the existing facility roller shades for selection by Consultant and Client representative.

1.4 Shop Drawings and Submittals

1.4.1 Submit shop drawings in accordance with Section 01 33 00 – Submittals

1.4.2 Submit duplicate samples of manufacturer’s standard colours, patterns and textures of screen for colour and exact match to be confirmed by the Client.

1.4.3 Indicate dimensions in relation to window jambs, operator details, head and sill, anchorage details, hardware and accessories details.

1.5 Maintenance Data

1.5.1 Provide operation and maintenance data for roller screen system for incorporation into manual specified in Section 01 33 00 – Submittals.

2 PRODUCTS

2.1 Materials

2.1.1 Manual Control Roller Shade system (exterior windows):
.1 Commercial grade, chain-driven, roller-screen system, inside mount, with snap-in back fascia with valance head box, 3% openness, PVC coated fibreglass fabric, Inherently anti-static, flame retardant, fade and stain resistant, light filtering, RB500+ Roller Shade by Hunter Douglas or equal. Provide one roller shade for each window. E-Screen 7503, 36% Fiberglass, 64% Vinyl Fabric, Colour, finish, and window division to be confirmed by Board and

Consultant prior to ordering.

3 EXECUTION

3.1 Installation

3.1.1 Verify dimensions on site before preparing shop drawings.

3.1.2 Install roller screen system in accordance with manufacturer's instructions.

3.1.3 Secure brackets with aluminum or stainless steel screws. Use non corrosive metal fasteners for installation, concealed in final assembly.

3.1.4 Install roller shades square, plumb, true to line with operable parts adjusted for correct function.

**********END **********

1 GENERAL

1.1 Conform to Sections of Division 1 as applicable.

1.2 Related Sections

1.2.1 Section 31 23 10: Excavating, Trenching & Backfilling

1.3 References

OPSS 206, Nov 2000 Construction Specification for Grading

1.4 Site Conditions

1.4.1 Known underground and surface utility lines and buried objects are as indicated on site plan. Contractor to establish location of other relevant buried lines before commencing work.

1.5 Protection

1.5.1 Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing buildings, existing pavement, surface or underground utility lines which are to remain. Make good any damage.

2 PRODUCTS

2.1 Materials

2.1.1 Fill material: Type 1 or 2 in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.

2.1.2 Obtain approval from Consultant of excavated or graded material used as fill for grading work. Protect approved material from contamination.

3 EXECUTION

3.1 Grading

3.1.1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.

3.1.2 Grade to standards and minimum tolerances shown in OPSS 206.

3.1.3 Slope rough grade away from building 1:50 minimum.

3.1.4 Grade ditches to depth required for maximum run-off or as indicated.

3.1.5 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

3.1.6 Compact filled and disturbed areas to corrected maximum dry density:

.1 85% under landscaped areas.
.2 95% under paved and walk areas.

3.1.7 Do not disturb soil within branch spread of trees or shrubs to remain.

3.2 Testing

3.2.1 Inspection and testing of soil compaction will be carried out by designated testing laboratory.

3.2.2 Costs of tests will be under Cash Allowance.

3.3 Surplus Material

3.3.1 Remove surplus material from site.

3.3.2 Remove material unsuitable for fill, grading or landscaping from site.

End of Section.

1 GENERAL

1.1 General Requirements

1.1.1 Conform to Sections of Division 1 as applicable.

1.2 Related Work

1.2.1 Section 02 41 00 Demolition

1.2.2 Section 31 22 13 Rough Grading

1.2.3 Section 32 12 16 Asphalt Paving

1.3 References

OPSS 206, Nov 2000	Grading
OPSS 410, Apr 2008	Pipe Sewer Installation in Open Cut
OPSS 501, Nov 2005	Compacting
OPSS 503, Nov 2005	Site Preparation for Pipelines, Utilities and Associated Structures
OPSS 504, Nov 2005	Preservation, Protection and Reconstruction of Existing Facilities
OPSS 507, Nov 2005	Site Restoration Following Installation of Pipelines, Utilities and Associated Structures
OPSS 514, Apr 2008	Trenching, Backfilling and Compacting
OPSS 516, Nov 2005	Excavating, Backfilling and Compacting for Maintenance Holes, Catchbasins, Ditch Inlets and Valve Chambers
OPSS 517, Nov 2005	Dewatering of Pipelines, Utilities and Associated Structure Excavation
OPSS 1010, Apr 2004	Aggregates – Base, Subbase, Select Subgrade and Backfill Material

1.4 Definitions

1.4.1 Rock excavation: excavation of material from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having individual volume in excess of 1 m3.

1.4.2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation including dense tills, hardpan, frozen materials and partially cemented materials which can be ripped and excavated with heavy construction equipment.

1.4.3 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

1.5 Protection of Existing Features

1.5.1 Existing buried utilities and structures:

.1 Size, depth and location of known existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

.2 Prior to commencing any excavation work, notify applicable owner or authorities, establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during work.

.3 Identify lines that are to remain that service the building and other adjoining properties.

.4 Confirm locations of buried utilities by carefully hand digging test excavations.

.5 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered. When such services and utilities are encountered, immediately notify Consultant and protect, brace and support active services and utilities. Confirm findings of unknown services and utilities in writing. Obtain direction of Consultant before moving or otherwise disturbing utilities or structures.

.6 Advise utility company to remove or re-route existing lines in area of excavation. Costs for such work will be paid by Owner.

.7 Record location of maintained, re-routed and abandoned underground lines.

.8 In the case of damage to, or cutting off of an essential service or utility, notify Consultant immediately and repair the service or utility under the Consultant's direction.

.9 Inform Consultant about encountered services and utilities requiring adjustment or relocation to arrange for temporary disconnection and capping of services and utilities.

.10 Make good and pay for damages to existing services and utilities resulting from Work.

1.5.2 Existing buildings and surface features:

.1 Conduct, with Consultant, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, and paving, survey bench marks and monuments which may be affected by work.

.2 Protect existing buildings and surface features which may be affected by work from damage while work is in progress and repair damage resulting from work.

.3 Where excavation necessitates root or branch cutting, do so only in accordance with the direction of the Consultant.

1.6 Site Conditions

1.6.1 Visit the site of work. Inspect the site and become thoroughly familiar with site conditions to determine extent of work required by this Section under this Contract.

1.6.2 Keep excavations and site free of standing water.

1.6.3 Protect bottoms of excavations from softening.

1.6.4 Dispose of water, including water containing silt.

1.6.5 Use approved methods to protect bottoms and sides of excavations from frost and freezing.

1.6.6 Protect from injury due to work of this Section all trees, shrubs and other vegetation indicated or designated by Consultant to be saved. Where approved by Consultant remove interfering tree branches without injury to tree trunks and cover scars with tree paint.

1.6.7 Wrap trees with burlap and boards to protect them from injury. Cover existing lawns with tarpaulins before placing earth on them and remove earth and tarpaulin as soon as possible.

1.6.8 Do not stockpile excavated material to interfere with site operation or drainage.

2 PRODUCTS

2.1 Materials

2.1.1 .1 Type 1 fill: Granular 'A' conforming to OPSS 1010.

.2 Type 2 fill: Granular 'B' conforming to OPSS 1010.

.3 Type 3 fill: Selected material from excavation or other sources, approved by Consultant for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

.4 Type 4 fill: Clean, washed, coarse bank or river sand free from clay, shale and organic matter.

3 EXECUTION

3.1 Site Preparation

3.1.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

3.1.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.2 Removal of Granular Material

3.2.1 Do not handle granular material while in wet or frozen condition or in any manner in which soil structure is adversely affected.

3.2.2 Commence removal of granular material of areas as directed by Consultant to established levels and grades noted on drawings.

3.2.3 Dispose of unused granular material off site to local quarry as part of Environmental Protection Requirements.

3.3 Stripping of Topsoil

3.3.1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.

3.3.2 Commence topsoil stripping of areas as directed by Consultant.

3.3.3 Strip topsoil and avoid mixing topsoil with subsoil.

3.3.4 Stockpile in locations as directed by Consultant. Stockpile height not to exceed 2 m.

3.3.5 Dispose of unused topsoil off site.

3.4 Stockpiling

3.4.1 Stockpile fill materials in areas designated by Consultant. Stockpile granular materials in manner to prevent segregation.

3.4.2 Should acceptable excavated material be removed from the site to extent that a deficiency will occur for backfilling or regrading requirements, this Section shall haul back to site, at his own expense, sufficient acceptable fill material to properly complete work of this Section.

3.4.3 No extra payment will be considered for the stockpiling or double handling of excavated materials which may be necessary.

3.4.4 Protect fill materials from contamination.

3.5 Dewatering

3.5.1 Keep excavations free of water while work is in progress.

3.5.2 Protect open excavations against flooding and damage due to surface run-off.

3.5.3 Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction.

3.6 Grading

3.6.1 Cut or fill as necessary to bring site areas to required elevations and supply and place fill as necessary.

3.6.2 Rough grade to the depths below finish grades as required for paving.

3.6.3 Restore all grade levels, existing at commencement of work of this Section, which are not required to be changed but which have been disturbed. Level the grade where required and supply additional material if needed to bring areas to original grade levels.

3.6.4 Place the fill in horizontal layers and compact as specified.

3.6.5 Slope rough grade away from existing buildings at 1:50 minimum.

3.6.6 Unless otherwise specified, maintain rough grade generally not more than 150 mm above or below required elevations. For areas within 3 m of existing buildings, under areas to be paved and in areas where drainage is critical,

maintain rough grade not more than 25 mm above or below require elevations.

3.6.7 Unless otherwise indicated, slope subgrade evenly away from building walls for 7.6 m. at not less than 20 mm per metre. Provide roundings at top and bottom of banks and at other breaks in grade.

3.6.8 Evenly grade where required to leave all unfinished areas free from pockets.

3.6.9 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

3.6.10 Compact filled and disturbed areas to maximum dry density to ASTMD698-78, method, as follows:
.1 85% under landscaped areas.
.2 100% under paved and walk areas.

3.7 Excavation

3.6.1 Unless specified under other Sections, excavate to elevations and dimensions indicated or required for complete demolition and removal of structures. Correlate work with mechanical and electrical excavation requirements.

3.6.2 Remove concrete, masonry, paving, walks, footings, foundations, rubble and other obstructions encountered during excavation.

3.6.3 Excavation must not interfere with normal 45° splay of bearing from bottom of any footing for adjoining properties.

3.6.4 When complete, have Consultant inspect excavations to verify soil bearing capacity, depths and dimensions.

3.6.5 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw. Seal cuts with approved tree wound dressing.

3.6.6 Dispose of surplus and unsuitable excavated material off site.

3.6.7 Do not obstruct flow of surface drainage or natural watercourses.

3.6.8 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

3.6.9 Notify Consultant when soil at bottom of excavation appears unsuitable and proceed as directed by Consultant.

3.6.10 Obtain Consultant approval of completed excavation.

3.6.11 Remove unsuitable material from trench bottom to extent and depth as directed by Consultant.

3.6.12 Where required due to unauthorized over- excavation, correct as follows: Fill areas with Type 2 fill compacted to minimum of 95%.

3.6.13 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil. Clean out rock seams and fill with concrete mortar or grout to approval of Consultant.

3.7 Trench Excavating

3.7.1 In the context of this Section, reference to "pipe" includes ducts, raceway systems and other such lines and services.

3.7.2 Provide excavating, backfilling and grading for removal of mechanical and electrical work. The work shall be laid out and supervised by trade concerned.

3.7.3 Excavate trenches to a minimum of 150 mm below pipe conduit invert.

3.7.6 Cut trenches to minimum width required to permit removal of pipe and consolidating backfill, plus allowance for shoring if required. Trim and shape trench bottoms and leave free of irregularities, lumps or projections.

3.7.7 Where bottom of trench is in unstable soil, such as saturated clay or quicksand, deepen trench to depth required for installation of approved backfill material.

3.8 Fill Types and Compaction

3.8.1 Use fill of types as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698-78 or ASTM D1557-78. Ensure equipment and workmanship provides uniform density of entire thickness of layer. Compact each layer to density specified before placing another layer of loose material. In confined spaces, where heavy compacting equipment cannot be utilized, use power actuated compactors or other suitable equipment to achieve required density.

3.8.2 Dimensions specified in following paragraphs are minimum dimensions of fill after compaction, unless otherwise specified, compaction densities are Minimum Standard Proctor Density.

.1 Exterior side of perimeter walls and within perimeter of demolished structures: Use Type 2 fill to subgrade level and to underside of sub-base or base course levels. Compact to 95%.

.2 Within perimeter of building area: use Type 2 to underside of base course for floor slabs. Compact to 98%.

.3 Under concrete slabs: provide 150 mm compacted thickness base course of Type 1 fill to underside of slab. Compact base course to 100%.

.4 From minimum 1.2 m from face of exterior side of building perimeter or structure walls, including retaining walls: use type 3 fill to subgrade levels required. Compact to 95% density, except under areas to be sodded, seeded or planted, which shall be compacted to 85% density.

.5 Compaction: compact bedding and immediate protective cover to 95% minimum density. In areas within buildings and where paving and walks occur, compact remainder of fill to 100% SPMDD. In other areas compact remainder of fill to at least 85% density.

.2 Underground Services:

.1 Sanitary and storm sewer pipe and conduit protective cover: cradle half diameter of pipe or conduit using Type 4 fill. After pipe or conduit is in place, cover with 300 mm depth of Type 1 fill. In areas within building and where concrete, paving and walks occur, fill remainder of trench with Type 1 fill, compacted to 95% density. In other areas, cover pipe or conduit with 450 mm of type 1 fill, then fill remainder of trench with Type 3 fill to subgrade level compacted to 85% density.

.2 Cable and cable duct bedding and immediate protective cover: cover bottom of trench with 150 mm of Type 1 fill. After cables and ducts are in place, side fill ducts with sand up to top of ducts. Tamp around ducts with hand tampers and cover with 150 mm of same material.

.3 Fill above protective cover: in areas where paving and walks occur, fill remainder of trench with Type 1 fill, compacted to 95% density. In other areas, cover pipe or conduit with 450 mm of Type 1 fill.

.4 Compaction: compact bedding and immediate protective cover to 85% minimum density. In areas within buildings and where paving and walks occur, compact remainder of fill to at least 95% density. In other areas compact remainder of fill to at least 85% density.

.5 Notify Consultant prior to backfilling of trenches for electrical services.

3.9 Backfilling

3.9.1 In the context of this Section, reference to backfilling includes bedding.

3.9.2 Do not proceed with backfilling operations until Consultant has inspected and approved removals.

3.9.3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

3.9.4 Do not use backfill material which is frozen or contains ice, snow or debris.

3.9.5 Prior to placing fill, compact existing subgrade to obtain same compaction as specified for fill. Remove "soft" material and fill with approved material until specified compaction is obtained.

3.9.6 Backfill simultaneously each side of existing walls and other existing structures to equalize soil pressures, wherever possible.

3.9.7 Where temporary unbalanced earth pressures are liable to develop on walls or other structures, erect bracing or shoring to counteract unbalance and leave in place until their removal is approved by Consultant.

3.9.8 Place and compact backfill material in continuous horizontal layers not exceeding 150 mm loose depth. Use methods to prevent disturbing or damaging buried services, foundation drainage system, perimeter insulation.

3.9.9 Maintain optimum moisture content to enable compaction to attain specified density.

3.9.10 Maintain minimum 150 mm layer of sand fill between pipelines which cross each other.

3.9.11 Use mechanical tampers, with suitably shaped bottoms, to properly compact material under and around pipes. Compaction effort and equipment shall be compatible with degree of compaction required and the strength of pipe so as to avoid any damage to pipe.

3.9.12 At any location where there is insufficient space between pipe and wall of trench to permit mechanical compaction equipment to be used effectively, provide hand compaction up to spring line, using suitably shaped tools to ensure that bedding material is compacted as specified against wall of pipe and for full width of trench.

3.9.13 Should existing ground water conditions and bedding material be such as to produce the possibility of a "French Drain" effect in the trench, provide impervious barriers. The location and type of barrier shall be as directed by Consultant.

3.9.14 At pipe joints, leave bedding materials clear of joints to permit connections.

After connection has been completed, properly bed pipe section by thoroughly tamping approved bedding material under the joint. Do not take bedding material from completed portions of trench for this purpose.

3.9.15 Place backfill material to a minimum depth of 1 metre above crown of pipe before using power operated tractors or rolling equipment to compact the backfill.

3.9.16 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

3.9.17 Install drainage or filter system in backfill as indicated or as directed by Consultant.

3.10 Inspection and Testing

3.10.1 Testing of materials and compaction will be carried out by testing laboratory designated by Consultant. Frequency of tests will be determined by Consultant.

3.10.2 Costs for inspection and testing to be by allowance as provided under Section 01 20 00 – Cash Allowance.

3.10.3 Density test: tests will be conducted on compacted fill to ASTM D698-70 for Standard Proctor Density and to ASTM D1557 for Modified Proctor Density.

3.10.4 Frequency of Tests

.1 Excavated surfaces: when undisturbed excavated surface is being prepared, make a series of 3 tests of surface for each 500 m2 area.

.2 Fills under paving and floor and other slabs on grade, concrete walks: make arrangements for testing with Consultant.

3.11 Restoration

3.11.1 Upon completion of work, remove surplus materials and debris, trim slopes, and correct defects noted by Consultant.

3.11.2 Replace topsoil as directed by Consultant.

3.11.3 Reinstate pavement and sidewalks to condition and elevation which existed before excavation.

3.11.4 Clean and reinstate areas affected by work as directed by Consultant.

End of Section

1 GENERAL

1.1 General Requirements

1.1.1 Conform to Sections of Division 1 as applicable.

1.2 Related Sections

1.2.1 Section 31 23 10: Excavation, Trenching & Backfilling

1.3 References

OPSS 206, Nov 2000	Construction Specification for Grading
OPSS 310, Nov 2008	Hot Mix Asphalt
OPSS 314, Nov 2004	Untreated Granular, Subbase, Base, Surface, Shoulder and Stockpiling
OPSS 1003, Nov 2006	Aggregates – Hot Mix Asphalt
OPSS 1010, Apr 2004	Aggregates – Base, Subbase, Select Subgrade and Backfill Material
OPSS 1103, Nov 2007	Emulsified Asphalt
OPSS 1150, Nov 2008	Hot Mix Asphalt

1.4 Protection

1.4.1 Take measure to prevent damage to buildings, landscaping, curbs, sidewalks, trees, and adjacent property. Make good any damages.

1.4.2 Keep vehicular traffic off newly paved areas until paving surface temperature has cooled below 38°C. Do not permit stationary loads on pavement until 24 h after placement.

1.4.3 Provide access to buildings as required. Arrange paving schedule so as not to interfere with normal use of premises.

2 PRODUCTS

2.1 Materials

2.1.1 Granular sub-base (Granular B):

Crushed or uncrushed bank or pit gravel or stone obtained from an approved source and conforming to requirements OPSS 1010 for Granular 'B' aggregate.

2.1.2 Granular base (Granular 'A'):

Crushed gravel or stone, obtained from an approved source and conforming to requirements OPSS 1010 for Granular 'A' aggregate.

2.1.3 Hot mix asphalt:

HL3A course conforming to OPSS 1003 and 1150.

2.1.4 Asphaltic primer:

SS.1 Emulsified Asphalt as specified in OPSS 1103.

3 EXECUTION

3.1 Inspection

3.1.1 Check grades indicated on site plan to ensure that final grades will be achieved with new graded subgrade surface.

3.1.2 Proof roll new graded subgrade surface with weight and type of roller approved by Architect and:
.1 Check for unstable areas.
.2 Check for areas requiring additional compaction.
.3 Notify Architect of unsatisfactory conditions.

3.1.3 Do not begin work of this Section until such conditions have been corrected and are ready to receive sub-base and base materials and/or paving.

3.2 Preparation

3.2.1 Remove ice, snow and water from surfaces before doing any work on such surfaces. Ensure sub-grades are not frozen.

3.2.2 Fine grade and maintain existing gravelled surfaces until asphalt paving is placed.

3.2.3 Fine grade new subgrade surfaces in areas to be paved to within 12 mm of specified grade and cross section, but not uniformly high or low, and maintain surface at required grade and compaction until sub-base course is placed.

3.3 Granular Sub-Base And Granular Base Courses

3.3.1 Place granular sub-base and base in accordance with OPSS 314.

3.3.2 Place granular sub-base to 150 mm compacted thickness. Place granular base to 100 mm compacted thickness.

3.3.3 Place in layers not exceeding 100 mm loose thickness.

3.3.4 Mechanically compact granular sub-base and base materials to density not less than 98% maximum Proctor dry density in accordance with ASTM D698-78 method D.

3.3.5 Grade and compact surface until it conforms to lines and grades required. If sub-base material becomes mixed with base material and is determined to be unacceptable by Architect remove materials affected; replace with clean, acceptable sub-base and base materials and re-compact.

3.3.6 Use water, if required, within acceptable limits, to aid compaction and dust control.

3.3.7 Each specified course thickness shall be thickness after compaction.

3.4 Pavement Thickness – 2 layers 40mm HL3A

3.5 Asphalt Concrete Paving

3.5.1 Unless otherwise specified, place hot mix asphaltic concrete paving in accordance with OPSS 310.

3.5.2 Do not place asphalt paving during winter months or during wet weather nor if base is water saturated. Remove loose and foreign material from surfaces to be paved. Do not place any asphaltic mixture, unless air temperature is minimum 7 deg. C and rising.

3.5.3 Place compacted asphaltic concrete paving in two layers of thickness indicated, in layers not exceeding 40 mm.

3.5.4 Spread asphalt mixture over base evenly and to correct thickness so that, after first passage of roller, a minimum amount of back patching will be required.

3.5.5 Minimum 120 deg C mix temperature required when spreading.

3.5.6 Maximum 150 deg C mix temperature permitted at any time.

3.5.7 Place mixture as continuously as possible. Compact each course with roller as soon as it can support roller weight without undue cracking or displacement.

3.5.8 Roller shall be power driven, minimum mass of 4.5 T, minimum wheel width 600 mm.

3.5.9 Roll until roller marks are eliminated. Compact to 95% Marshall Density ASTM D1559-82.

3.5.10 Keep roller speed slow enough to avoid mix displacement and do not stop roller on fresh pavement.

3.5.11 Moisten roller wheels with water to prevent mix adhesion.

3.5.12 Compact mix with hot tampers or other approved equipment in areas inaccessible to roller. Effectively seal joints between paving and structures so that joints are completely watertight.

3.5.13 The finished paving shall have average thickness specified and shall not vary more than 6 mm from specified thickness at any point.

3.5.14 Finish surface smooth, true to grade to within 6 mm in 3 m.

End of Section.

1 GENERAL

1.1 Related Work

1.1.1 Cast-In Place Concrete Section 03 30 00

2 PRODUCTS

2.1 Materials

.1 Concrete mixes and materials: in accordance with OPSS 351, 353 and 1350.

.2 Granular base: Granular A to OPSS 1010.

.3 Fill material: Granular B Type 1 to OPSS 1010.

2.2 Specification

.1 Concrete walks to OPSD 310.010 Concrete Sidewalk.

3 EXECUTION

3.1 Grade Preparation

.1 Do grade preparation work in accordance with OPSS 206 and 314.

.2 Construct embankments using excavated material free from organic matter or other objectionable materials.

.1 Dispose of surplus and unsuitable excavated material in approved location on site.

.3 When constructing embankment provide for minimum 1.0m shoulders, where applicable, outside of neat lines of concrete.

.4 Place fill in maximum 150mm layers and compact to at least 95% of maximum dry density to ASTM D698.

3.2 Granular Base

.1 Obtain Consultant's approval of subgrade before placing granular base.

.2 Place granular base material to lines, widths, and depths as indicated.

.3 Compact granular base in maximum 150 mm layers to at least 95% of maximum density to ASTM D698.

3.3 Concrete

.1 Obtain Consultant's approval of granular base prior to placing concrete.

.2 Do concrete work in accordance with OPSS 351, 353 and 1350.

.3 Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2mm deep, by drawing broom in direction normal to centre line.

.4 Provide edging as indicated with 10mm radius edging tool.

.5 Broom finish surfaces.

3.4 Tolerances

.1 Finish surfaces to within 3mm in 3m as measured with 3m straightedge placed on surface.

3.5 EXPANSION AND CONTRACTION JOINTS

.1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals of 1.5m.

.2 Install expansion joints as directed by Consultant at intervals of 6m.

.3 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

3.6 ISOLATION JOINTS

.1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.

.2 Install joint filler in isolation joints in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.3 Seal isolation joints with sealant approved by Consultant.

3.7 Curing

.1 Cure concrete in accordance with OPSS 351 and 353 as directed by Consultant.

.2 Where burlap is used for moist curing, place two pre-wetted layers on concrete surface and keep continuously wet during curing period.

.3 Apply curing compound evenly to form continuous film, in accordance with manufacturer's requirements.

3.6 Backfill

.1 Allow concrete to cure for 3 days prior to backfilling.

.2 Backfill to designated elevations with material as directed by Consultant.

.1 Compact and shape to required contours as indicated.

3.7 CLEANING

.1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

End of Section

1 GENERAL

1.1 Conform to Sections of Division 1 as applicable.

1.2 Related Sections

1.2.1 Section 06 10 00 Rough Carpentry

1.2.2 Section 31 23 10: Excavating, Trenching and Backfilling

1.2.3 Section 32 92 00: Sodding

1.3 References

1.3.1 IPEMA certification to ASTM-F1292-13 & ASTM-F2075-15

1.3.2 ASTM F2373(2017) Standard Consumer Safety Performance Specification For Public Use Play Equipment for Children 6 Months Through 23 Months.

1.4 Scheduling Of Work

1.4.1 Schedule placing of granular material to permit installation of engineered wood fibre under optimum conditions.

1.5 SUBMITTALS

1.5.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.5.2 Submit product list for engineered wood fibre and include product characteristics, performance criteria, physical size, etc.

2 PRODUCTS

2.1 Materials

2.1.1 Impact Surfacing - Engineered Wood Fibre: Recently harvested North American hardwood and softwood which may include Maple, Oak, Ash, Beech, Poplar, Hickory, Birch, Pine, etc. and comprised of virgin “off-the-log” material only. Acceptable manufacturers: Fibretop, PlaySafe as manufactured by Herman’s or equal.

a. Free of soil, leaves, twigs or other contaminants, which could hasten decomposition.
b. Free of any chemical treatments and/or additives.
c. Free of recycled wood from pallets or construction debris.
d. Free of tramp and heavy metals. friable, neither heavy clay nor of very light sandy nature consisting of 45% sand, 35% silt, 20% clay and pH value of 6-

7. Free from subsoil, roots, vegetation, debris, toxic materials, stones over 50 mm dia.

.**1** **Dimensions**

a. Randomly sized.
b. Approximately 10 times longer than wide.
c. 80% of dimensions: Maximum of 4cm long, 1.3cm wide and 3.25cm deep.
d. Gradation, sieve analysis, ASTM 136, cumulative passing by weight
   1) ¾" sieve: 99%
   2) 3/8" sieve: 95%
   3) No.16 sieve 3%
e. Sized to promote drainage.

.2 **Properties**

a. Coefficient of permeability, ASTM D2434; Greater than 0.6cm.
b. Moisture absorption: maximum of 150% by weight.
c. Moisture content: 25% to 60% by weight.
d. Density: 15 to 24 lbs per cubic foot.
e. Impact attenuation: ASTM 1292, Procedure C: 8" thickness rated to 8" and 12" thickness rated to 12".
f. Accessibility: tested compliant with ASTM 1951
g. Product quality: tested compliant with ASTM 2075-10 – Engineered Wood Fiber Standard.

2.1.2 Filter Cloth – as supplied and installed by manufacturer.

3 EXECUTION

3.1 Preparation of Grade below Engineered Wood Fibre

3.1.1 Work shall conform to Section 31 23 10 Excavating, Trenching and Backfilling.

3.1.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage. Remove soil contaminated with toxic materials. Dispose of removed materials as directed by Consultant.

3.1.3 Provide a minimum of 75 mm of Granular B on compacted subsurface.

3.1.4 Install geotextile fabric to encapsulate granular and separate sub soil from Engineered Wood Fibre.

3.2 Spreading of Engineered Wood Fibre.

3.2.1 Work shall conform to manufacturer’s standards.

3.2.2 Spread Engineered Wood Fibre to compacted 150 mm depth

End of Section.

1 GENERAL

1.1 General requirements

.1 Conform to Sections of Division 1 as applicable.

.2 All grass and soil will be removed, a level compacted granular B base layer to be installed by others.

.3 Total thickness of 40 mm granular A aggregate/limestone screenings to be installed and compacted under this section.

1.2 Submittals

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit the product name/description as well as the name and location of the manufacturers and suppliers of each component. **Material to be manufactured in North America.**

.3 Submit one (1) sample, 915 mm x 1830 mm minimum size to Owner. Provide drawing illustrating details of finished product, including full cross section of subbase, turf, and infill material.

.4 Submit digital copy of manufacturer's recommended installation and maintenance information, including any technical criteria for evaluation of the installed product. Descriptions of all equipment recommended for the maintenance and repair of turf product, as well as a list of any activities not recommended relative to the warranty.

.5 Submit a 1-lb sample of infill material(s).

.6 A letter and specification sheet certifying that the products of this section meet or exceed specified requirements.

1.3 Warranty

.1 Provide manufacturer's warranty for a minimum of fifteen (15) years manufacturer's warranty and ten (10) year workmanship.

.2 Defects shall include, but not be limited to ultraviolet ray fading, degradation, or excessive wear of fiber.

.3 Warranty shall be for full replacement of any damaged product within the warranty period. Warranty shall be comprehensive and sufficient to replace all turf if necessary.

.4 Warranty shall become effective from the date of substantial completion.

.5 Submit Manufacturer Warranty and ensure that forms have been completed in Owner's name and registered with Manufacturer.

1.4 Product Delivery, Storage and Handling

.1 Deliver products to site in original containers and wrappers.

.2 Store products in a location and in a position that protects them from crush damage or any other defects.

.3 Handle and store (on and off site) all materials safely to ensure their physical properties are not adversely affected and that they are not subject to vandalism or damage.

.4 Rubber and sand infill shall arrive dry and loose.

.5 Adhesives shall arrive in dry, sealed containers.

1.5 Quality Assurance

.1 The Synthetic Turf Installer shall have minimum experience of at least 5 years, installing and maintaining in-fill synthetic turf project of similar size.

.2 The Synthetic Turf Installer must provide a list of references based on previous installations.

.3 Installation team shall be established, insured installation firm experienced as a premium turf installer with suitable equipment and supervisory personnel, with a minimum of 5 years' experience.

2 PRODUCTS

2.1 Synthetic grass for Playgrounds:

.1 Ultrablade 50 as manufactured by Rymar Grass or equal.

.2 Face Weight: 50 oz. per sq/yd.

.3 Backing: 26 oz, Double PP/Polyurethane

.4 Total Product Weight: 76 oz. per sq yd.

.5 Primary Yarn Face: double W-shape, Field Green/Olive Green

.6 Thatch Yarn 4800 texturized Polyethylene Thatch, Golden

.7 Pile Height: 1.5"

.8 Turf roll seams to be sewn or glued on site. All turf fabric edges to be securely bound.

.9 Minimum width: 15 feet with no transverse seams.

.10 Turf material shall be non-combustible and pass the DIN standard Pill Burn test or ASTM D2859.

.11 Adhesive: type purpose suited to the system and approved by the manufactuer.

.12 Filter Fabric: geotextile/weed control as may be recommended and required by manufacturer's turf system.

.13 Bender Board: manufacturer to provide edge restraint for turf system as may be required with system.

EXECUTION

2.2 General

.1 Installation of the synthetic turf system is to comply with the manufacturer's recommendations, requirements and the reviewed and approved shop drawings.

.2 Perform all work in strict accordance with the Contract Documents and the manufacturer's specifications and instructions.

2.3 Installation – Granular Base

.1 Verify that grades are correct. If discrepancies occur, notify Consultant and do not commence work until instructed by Consultant.

.2 Install 40 mm, limestone screening aggregate, granular base evenly over the prepared surface and compact to 90% proctor or as recommended by manufacturer.

2.4 Installation – Turf

.1 Install synthetic turf system in accordance with the manufacturer's written installation instructions..

.2 Roll the synthetic turf out on top of the compacted base, ensure **the grain of the fibers on each roll of turf running in the same direction.**

.3 Where seaming is required (multiple roll widths), trim, adjust and lay the rolls as straight as possible. Lay it on the base, in the desired position.

.4 Turf shall be attached to the perimeter edge as per the manufacturer's instructions using seam tape and adhesive seaming.

.5 Secure edges with landscape spikes or sod staples at required intervals to prevent curling.

2.5 Infill Installation

.1 The synthetic turf shall be thoroughly brushed prior to installation of infill materials.

.2 Spread the infill in lifts ranging from to no greater than ½" depths. In between the spreading of lifts or layers, the fibers should be brushed upright with a plastic bristle industrial broom or a power-broom. Repeat the infill spread / fiber brooming process until the infill to achieve the required coverage to 2 lbs/sq.ft. as per manufacturer's instructions.

2.6 Cleaning

.1 Protect all installed work from other construction activities as installation progresses.

.2 Keep the area clean throughout the construction period and free from the installation process.

.3 Upon completion of the installation, thoroughly clean surfaces and site of all refuse resulting from the installation process.

.4 Repair any damage to existing fixtures or facilities resulting from the installation of the synthetic turf system prior to Substantial Completion and commencement of the Warranty Period.

.5 Provide a written acceptance from the manufacturer that the turf and base system is installed in accordance with their recommendations prior to final completion.

END OF SECTION

1 GENERAL

1.1 WORK INCLUDED IN THIS SECTION

1.1.1 This Section includes furnishing and installing chain link fencing for security purpose consisting of but not limited to the following:

1.1.1.1. Galvanized or aluminum-coated-steel chain link fabric.

1.1.1.2. Galvanized-steel framework.

1.1.1.3. Gates.

1.1.2 Related Sections: The following Sections contain requirements that relate to this Section:

1.2 SUBMITTALS

1.2.1 General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

1.2.2 Product Data: Submit manufacturer's technical specifications and installation instructions for fence and gate posts fabric, gates, gate operators and accessories.

1.2.3 Shop Drawings: Show location of fence, gates and each post, and details of post installation. Include details of footings, gates, posts, rails, frames, post tops, tension wires, bands and bars, bracing, ties, clips, spacing, installation and complete interfacing with locks and all other components. Provide specific elevations of all locations with grade changes. Indicate all additional bracing, supports and connection details to meet fence performance criteria.

1.2.4 Welder Certification: Submit certificates signed by Contractor certifying that welders comply with requirements specified under the 'Quality Assurance' Article.

1.2.5 Qualification Data: Submit for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include a list of completed projects with project name, addresses, names of Architects and owners and other information specified.

1.3 QUALITY ASSURANCE

1.3.1 Installer Qualifications: Engage an experienced installer who has at least five years experience and has completed at least five chain link fence projects of similar scope as indicated for this project with a successful construction record of in-service performance.

1.3.2 Welder qualifications:

1.3.2.1. Employ only welders certified under CSA W47.1-92 Classification 2.1; or AWS

D1.1 or B2.1 certified within past 12 months and qualified for AWS D1.3 and D9.1 welding processes.

1.3.2.2 Single-Source Responsibility: Obtain chain link fences and gates including accessories, fittings and fastenings from a single source.

1.4 **PROJECT CONDITIONS**

1.4.1 Field Measurements: Verify layout information for Fencing shown on the Drawings. Verify dimensions by field measurements.

1.5 **DELIVERY, STORAGE AND HANDLING**

1.5.1 Deliver material to the site in undamaged condition. Carefully store material off the ground to provide proper protection against oxidation.

1.5.2 When handling material, care shall be taken not to damage framing or fabric in any way. Damaged material including, but not limited to deformed fabric will be rejected and shall be removed from the site.

2. PRODUCTS

2.1 **MANUFACTURERS**

2.1.1 Subject to compliance with requirements provide products by one of the following or equal.

Amico Canada, Inc., Mississauga, Ontario

Anchor Fence, Inc., Baltimore, MD

Atlas Fence, Toronto, Ontario

Simcoe Fence, Barrie, Ontario

2.2 **FABRIC**

2.2.1 Steel Chain-Link Fence Fabric: Fabricated to comply with Chain Link Fence manufactures Institute (CLFMI) "Product Manual" and with requirements indicated below:

2.2.1.1. Mesh and Wire Size: 50 mm mesh, 3.76 mm. (9 ga.)

2.2.1.2. Coating: One of the following:

.1 ASTM A 817, Type I, aluminized.

.2 ASTM A 817, Type II, Class 2, zinc-coated (galvanized).

2.2.1.3. Fence (Vertical) Fabric:

Fence Top Fabric Height	Fabric Width	Selvage
Up to 2.4 m	One Piece	Knuckle top & bottom

2.2.1.4. Cover (Horizontal) Fabric: Stretch chain link fabric parallel to supports. Lap successive piece widths 150 mm minimum over supports. Select fabric width from 3 to 3.7 m to span at least 3 supports (2 spaces) typical, minimizing lap seams. Knuckle both selvages.

2.3 **FRAMING**

2.3.1 Round member sizes are given in actual outside diameter (OD) to the nearest thousandth of inches. Round fence posts and rails are often referred to in ASTM standard specifications by nominal pipe sizes (NPS) of the equivalent trade sizes in inches. The following indicates these equivalents:

Actual OD mm	NPS Size	Trade Size
42.2	1-1/4	1-5/8
48.3	1-1/2	2
60.3	2	2-1/2
73.0	2-1/2	3
88.9	3	3-1/2
101.6	3-1/2	4
168.3	6	6-5/8
219.1	8	8-5/8

2.3.2 Type I Round Pipe: Standard weight (schedule 40) galvanized-steel pipe conforming to ASTM F 1043, Group 1A heavy industrial requirements and minimum yield strength of 170 MPa according to ASTM F 1083; and conforming to ASTM F 1043 Type A coating inside and outside with not less than 550 g/m^2 zinc as determined by ASTM A90 ; and weights per foot as follows:

Actual OD mm	Weight kg/m	NPS Size
42.2	3.4	1-1/4
48.3	4.0	1-1/2
60.3	5.4	2
73.0	8.6	2-1/2
88.9	11.3	3
101.6	13.6	3-1/2
168.3	28.3	6
219.1	42.5	8

2.3.3 Type II Round Pipe: Cold-formed, electric-welded steel pipe conforming to heavy industrial requirements of ASTM F 1043, Group IC, with minimum yield strength of 345 MPa, with protective coating system below according to ASTM F 1234 and weights per foot as follows:

2.3.3.1. Coatings: Conforming to ASTM F 1043, Outside, Type B with minimum 280 g/m^{2}zinc after welding, a chromate conversion coating and clear polymer overcoat. Inside

Type D, nominal 81% zinc pigmented coating, 0.0076 mm minimum thick or, Type B with a minimum of 280 g/m^2.

Actual OD mm	Weight kg/m	NPS Size
42.2	2.72	1-1/4
48.3	3.37	1-1/2
60.3	4.62	2
73.0	6.88	2-1/2
88.9	8.45	3
101.6	9.76	3-1/2

2.3.4 Rails (Top, Intermediate, Bottom and Brace Rails): Manufacturer's longest lengths 5.2 to 6.4 m with expansion-type rail sleeve coupling. Provide intermediate bottom and brace rails continuous between posts.

2.3.4.1. Round Steel: 42.2 mm OD Type I or II steel pipe.

2.3.5 Fence Posts (Type I or II unless noted otherwise):

Fence Top Fabric Height	Line or Intermediate Post Diameter	End, Corner, Isolation and Pull Post Diameter
Up to 2.4 m	60.3 mm	73.0 mm

2.3.6 Swing Gate Posts: Provide steel pipe gate posts sized as follows of either Type I or Type II round pipe unless otherwise indicated. Comply with ASTM F 900. Furnish gate posts as indicated below to support a single gate leaf or one leaf of a double-gate installation. Where also serving as a fence end post provide greater of sizes indicated for gate or end-posts.

Gate Leaf Width	Gate Post Diameter
Up to1.8 m	73.0 mm
Over 1.8 m to 3.7 m	101.6 mm Type I only
Over 3.7 to 5.5 m	168.3 mm Type I only
Over 5.5 to 7.3 m	219.1 mm Type I only

2.3.7 Gate Framework: Provide steel pipe gate frame members sized as follows of either Type I or Type II round pipe unless otherwise indicated. Comply with ASTM F900 for swing gates and ASTM F1184 Type I for overhead slide gates.

Gate Top Fabric Height	Swing Gate Frame Pipe Diameter
Up to 3.7 m	48.3 mm

2.4 **FITTINGS AND ACCESSORIES**

2.4.1 Material: Comply with ASTM F 626; galvanized iron or steel to suit manufacturer's standards. Unless specified otherwise, hot-dip galvanized pressed steel or cast iron fence fittings and accessories shall be coated with minimum 370 g/m^2 zinc as determined by ASTM A90 or CAN/CSA-G164-M92.

2.4.2 Post Caps: Provide tight press-fit weather tight closure cap for each post not capped with a barb arm.

2.4.3 Rail and Brace Ends: Provide manufacturer's standard galvanized-steel or cast iron rail ends with 8 x 38 mm carriage bolts or line rail clamp (boulevard) connectors with 10 mm bolts.

2.4.4 Top Rail Sleeves: Provide manufacturer's standard pressed steel or round steel tubing galvanized sleeve, 150 mm long minimum.

2.4.5 Tie Wires, Clips and Fasteners: Provide tie wires and clips(hog rings) of 3.8 mm diameter galvanized steel with a minimum of 250 g/m^2 of zinc coating according to ASTM A 641, Class 3. Where indicated, provide power driven wire/fabric fasteners complying with ASTM F626 and as follows: Security Fabricators, Inc., Sure-Loc.

2.4.6 Tension and Brace Bands: 19 mm wide by 2.7 mm thick minimum hot-dip galvanized steel with a minimum of 365 g/m^2 of zinc coating per sq. ft.

2.4.7 Tension (Stretcher) Bars: Hot -dip galvanized steel with a minimum length 50 mm less than the full height of fabric, a minimum cross section of 5 by 19 mm and a minimum of 365g/m^2 of zinc coating. Provide one bar for each gate and end post, and two for each corner and pull post.

2.4.8 Truss Rod Assembly: 10 mm diameter truss rod with turnbuckle or other adjustable tightener. Provide manufacturer's standard truss rod connections to brace rail end at line post and to brace band at terminal post.

2.4.9 Post Top Arms: Costumed fabricated galvanized structural steel angle arms, with hole for passage of top rail and with provision for anchorage to posts and attachment of tension wire to each arm. Weld to post. Provide special corner posts arms with matching features. Provide following type:

2.4.9.1. Single 45-degree arm for two rows of tension wire, one arm for each post.

2.5 **TENSION WIRE**

2.5.1 Tension Wire: 4.5 mm diameter metallic-coated steel marcelled tension wire conforming to ASTM A 824 with finish to match fabric; galvanized as follows:

2.5.1.1. Coating Type II zinc in the following class as determined by ASTM A90.

Class 3, with a minimum coating weight of 610 g/m^2 of uncoated wire surface.

2.6 **GATES**

2.6.1 Assemble specified gate framing by welding. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware and accessories. Space frame members maximum of 2.4 m apart unless otherwise indicated.

2.6.1.1. Fabric: Same as for fence unless otherwise indicated. Secure fabric at vertical edges with tension bars and bands; and to top, bottom and intermediate framing with tie wires.

2.6.1.2. Bracing: Install diagonal cross-bracing consisting of 10 mm diameter adjustable-length truss rods on gates to ensure frame rigidity without sag or twist.

2.6.1.3. Gate Top:

1. Extend vertical members of gate above top horizontal frame member and provide brace bands to secure wire to extended verticals for the following where indicated:

3. Horizontally offset welded gate top framing to prevent gate top interference with adjacent fence top as gate opens.

2.6.2 Pedestrian Swing Gates: Comply with ASTM F900, except as otherwise indicated.

2.6.2.1. Swing Gate Hardware – for Pedestrian Gate: Provide swing gates with ASTM A153 hot dip galvanized hardware as follows:

Gate Top Fabric Height	Hinges per Gate Leaf	Padlock Gates Only Drop Rod Guides
Up to 2.1 mm	2	2

1. Hinges: Industrial hinge combination (malleable) cast iron, ball and socket, non-lift-off type with offset adapter for 180° swing. Pressed steel is not acceptable.

2 Galvanized Gate Latch.

2.8 **GALVANIZING REPAIR PAINT**

2.8.1 Galvanizing Repair Paint: Provide one of the following:

Manufacturer	Product
Sherwin-Williams	Zinc Clad IV A Two Package Zinc Rich Epoxy Primer B69A8/B69V8
Southern Coatings	Chemtec 600 Hi Ratio Inorganic Zinc Rich Primer 1-4713.

Tnemec	Tnemec-Zinc, Zinc Rich Primer 90-97
Valspar	MZ-6 Hi Ratio Inorganic Zinc Rich 13-F-6

2.9 **CONCRETE AND REINFORCEMENT**

2.9.1 Concrete: CAN/CSA A23.1/A23.2-M90. Provide concrete consisting of Portland cement per ASTM C 150, aggregates per ASTM C33, and potable water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 21 Mpa. Use at least four sacks of cement per m^3,. 25 mm maximum size aggregate; 75 mm maximum slump.

2.9.2 Packaged Concrete Mix: Mix dry-packaged normal-weight concrete conforming to ASTM C 387 with clean water to obtain a 50 to 75 mm slump.

2.9.3 Reinforcement: Where indicated, provide deformed billet steel reinforcing bars meeting ASTM A615, Grade 60 or CAN/CSA-G30.18-M92.

3. EXECUTION

3.1 **FENCE INSTALLATION**

3.1.1 General: Install fence to comply with ASTM F 567. Erect fencing in straight lines between terminal posts (corner, end, gate, isolation, pull, or wall posts). Do not begin installation before final grading is complete, unless authorized in writing by Consultant.

3.1.1.1. Post Locations:

1. Line Posts: Provide equally spaced up to 2.4 m o.c. unless otherwise indicated.
2. Pull Posts: Provide, braced both ways, at abrupt changes in grade (15 degrees or more) and evenly spaced at intervals not exceeding 150 m between other terminal posts.
3. Corner Posts: Provide braced both ways, at changes in direction of 15 degrees or more.
4. End and Gate Posts: Provide at locations indicated and, where not indicated, as required. Provide bracing.

3.1.2 Tolerances

3.1.2.1. Post Deflection: Install all posts including line, end, gate, corner, pull and isolation posts to deflect, with full recovery, no more than 19 mm when a 220 Newtons load is applied to a post perpendicular to the fence fabric face at 1.5 m above grade.

3.1.2.2. Fence Fabric Deflection: Install and tension fence fabric, including horizontal and vertical applications, to defect, with full recovery, no more than 50 mm when a 130

Newtons load is applied to a fabric panel centered between framing members and perpendicular to the fence fabric face.

3.1.3 Excavation:

3.1.3.1. General:

1. Satisfactory Soils: Excavate as indicated below.

2. Unsatisfactory Soils: Notify Consultant where encountered modify footing and excavation for adjustment as a change in accordance with Conditions of the Contract.

3.1.3.2. Post Holes: Hand excavate (using post-hole digger) or drill holes for posts to diameters and depths indicated.

Excavated Earth

Fence Top Fabric Height	Post Bottom	Hole Depth
1.8 or less	840	915
2.1	990	1070

Double-post hole diameters indicated below are for isolation posts sharing a common footing with an adjacent gate or other post. Drill separate holes in rock or concrete.

Single Or Largest Post Outside Diameter (OD)	Excavated Earth Single Post Hole Diameter	Cored Rock/Concrete Double Post Hole Diameter	Hole Diameter	Post Bottom/ Hole Depth
mm	mm	mm	mm	mm
60.3	255	_ _ _	75	180
73.0	305	460	90	230
88.9	355	510	100	280
101.6	405	610	115	305
168.3	610	915	205	510
219.1	915	1220	255	660

3.1.4 Concrete Placement and Posting Setting:

3.1.4.1. Posts Setting in Holes: Center and align posts in holes with post bottom depth as indicated above.

1. Concrete for Excavated Earth Post Holes: Protect portion of posts above ground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations. Unless otherwise indicated, extend concrete post footings 50 mm above grade and trowel to a crown to shed water.

3.1.4.2. Post Setting on Base Plate: Where indicated or required, provide base plate as specified corresponding to post diameter. Center post and weld all around to base plate. Provide anchor bolts in diameters specified with length and types indicated or required.

3.1.4.4. Miscellaneous Concrete Footings: Provide concrete for gate stops, gate keepers, and other items as indicated or required. Place reinforcement at locations indicated, tied secure in position using support devices to prevent displacement. Place concrete and vibrate or tamp for consolidation.

3.1.4.5 Post Caps and Post Top Arms: Place on post immediately at post setting to prevent accumulation of rainwater in posts. Before completion, tack weld or screw fasten each post top arm to post as specified at side opposite fabric.

3.1.5.1. Where terminal posts rise above line post top arm height, provide side-mount arm welded or brace band attached to terminal post.

3.1.5.2. Install post top arms at terminal posts, including corner posts, with blade length and angle to maintain tips aligned vertically and horizontally with adjacent line post top arm tips.

3.1.6 Rails (Intermediate, Bottom, and Brace Rails):

3.1.6.1. Intermediate and Bottom Rails: Install intermediate and bottom rails in one piece between posts and flush with post on fabric side, using rail ends and special offset fittings where necessary.

3.1.6.2. Brace Assemblies: Install braces at end, isolation, and gate posts and at both sides of corner and pull posts. Locate horizontal braces at midheight of fabric on fences with top rail and at two thirds fabric height on fences without rail, unless otherwise indicated. Install so posts are plumb when diagonal truss rod is under proper tension at no more than 50 degree angle from grade.

3.1.7 Tension Wire:

3.1.7.1. Fence Fabric Support: Pull tension wire taut, without sags, before stretching fence fabric. Tie tightly to each post, post cap, or barb arm with metal straps or wire of not less than same gauge and type. Allow no slack around wire.

1. Bottom Tension Wire: Install within 150 mm of fence fabric bottom.

2. Top Tension Wire: Install 50 mm from fence fabric top, through post cap or barb arm loop holes.

3.1.8 Fence Fabric: **Install fence fabric as per manufacturer's standard.** Handle, supporting and bracing as required, to prevent deformation or other damage to chain links. Provide 3 full twists (1-1/2 machine turns) at field cut selvages. Secure to framework as follows:

3.1.8.1. Tension (Stretcher) Bars: Thread through full height uncut fabric end picket and secure to end, gate, corner, isolation or pull post with tension bands spaced not over 330 mm o.c. Tighten as required to meet deflection tolerance for fence fabric as specified.

3.1.8.2. Clips (Hog Rings): Fasten tight, without slack, at 600 mm o.c. to top or bottom tension wire.

3.1.8.3. Tie Wires: Tie through fabric and around frame member engaging at least one strand of each fabric piece. Align twist with fabric on framework side of fabric. Twist pulling fabric in close contact with frame member and forcing tie wire to conform tightly to frame member shape. Twist both tie wire ends 3 full twists (1-1/2 machine turns). Cut off excess wire to prevent hand untwisting.

1. Line Posts: Tie wires at 300 mm o.c.

2. Fence Rails: Tie wires at 600 mm o.c.

3. Gate Rails: Tie wires at 300 mm o.c.

4. Parallel Fabric Pieces Lapped on a Frame Member: Tie wires at 300 mm o.c.

3.1.8.4 Power Driven Fasteners: Provide where indicated and at Contractor's option at locations indicated for tie wires above.

3.2 GATE INSTALLATION

3.2.1 Install gates plumb, level and secure for full opening without interference. Adjust hardware for smooth operation and lubricate. Install gates according to manufacturer's instructions, with no more than 75 mm clearance under closed gate.

3.2.2 Hardware: Install latches, hinges etc. as per manufacturer's recommendations, and reviewed and accepted shop drawings. Adjust and properly lubricate hardware to provide smooth, consistent trouble-free operation.

3.3 ADJUSTING AND CLEANING

3.3.1 Debris Control: Take extreme care to ensure that scrap materials generated during installation (including, wire ties, clips, fabric trimmings and other debris) are disposed of properly. Inspect fence and ground in the work area and removal all loose items from the site at the end of each work day and upon completion.

3.3.2 Galvanizing Touchup: Immediately upon delivery at job site and continuously during construction, sand and clean any rust, abrasions, scratches, or field fabrication and welding damage to galvanized surfaces. At affected areas apply 0.15 mm min.

galvanizing repair paint in 3 coats of 0.05 mm min. each.

END OF SECTION

1 GENERAL

1.1 Conform to Sections of Division 1 as applicable.

1.2 Related Sections

1.2.1 Section 32 92 00: Sodding

1.2.2 Section 31 22 13: Rough Grading

1.3 References

OPSS 206, Nov 2000 Construction Specification for Grading

OPSS 570, Nov 2007 Topsoil

1.4 Source Quality Control

1.4.1 Inspection and testing of topsoil may be requested by Consultant at any time.

1.5 Scheduling Of Work

1.5.1 Schedule placing of topsoil and finish grading to permit sodding operations under optimum conditions.

2 PRODUCTS

2.1 Materials

2.1.1 Topsoil for sodded areas: friable, neither heavy clay nor of very light sandy nature consisting of 45% sand, 35% silt, 20% clay and pH value of 6-7. Free from subsoil, roots, vegetation, debris, toxic materials, stones over 50 mm dia.

2.1.2 Planting soil mix for planting of trees, shrubs and ground covers mix 9 parts topsoil with 1 part peat moss. Incorporate bone meal into planting soil at rate of 3 kg./cu.m. of soil mixture.

2.1.3 Peat moss:

.1 Derived from partially decomposed fibrous or cellular stems and leaves of species of Sphagnum Mosses.

.2 Elastic and homogeneous, brown in colour.

.3 Free of wood and deleterious material which could prohibit growth.

.4 Shredded particle minimum size: 5 mm.

3 EXECUTION

3.1 Preparation of Existing Grade

3.1.1 Work shall conform to OPSS 206.

3.1.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage. Remove soil contaminated with toxic materials. Dispose of removed materials as directed by Consultant.

3.1.3 Cultivate entire area which is to receive topsoil to depth of 50 mm. Repeat cultivation in those areas where equipment used for hauling and spreading has compacted soil.

3.1.4 Remove surface debris, roots, vegetation, branches and stones in excess of 50 mm diameter.

3.1.5 Notify Consultant for inspection and approval of subgrade.

3.2 Spreading of Topsoil/Planting Soil

3.2.1 Work shall conform to OPSS 570.

3.2.2 Spread topsoil after Consultant has inspected and approved subgrade.

3.2.3 Spread topsoil with adequate moisture in uniform layers over approved, unfrozen subgrade, where, sodding or planting is indicated.

3.2.4 Apply topsoil as indicated to following minimum depths:

- 100 mm for sodded areas

3.2.5 Apply planting soil to fill planters or to planting details.

3.2.6 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.3 Finish Grading

3.3.1 Work shall conform to OPSS 206 and OPSS 570.

3.3.2 Fine grade and loosen top soil. Eliminate rough spots and low areas to ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

3.3.3 Roll to consolidate topsoil for areas to be seeded leaving surface smooth, uniform, firm against deep foot printing, and with a fine loose texture to approval of Consultant.

3.4 Restoration of Stockpile Sites

3.4.1 Restore stockpile sites acceptable to Consultant.

3.5 Surplus Material

3.5.1 Dispose of materials not required off site.

End of Section.

1 GENERAL

1.1 General Requirements

1.1.1 Conform to Sections of Division 1 as applicable.

1.2 Source Quality Control

1.2.1 Obtain approval from Consultant of sod at source.

1.2.2 When proposed source of sod is approved, use no other source without written authorization.

1.3 Scheduling

1.3.1 Schedule sod laying to coincide with preparation of soil surface.

2 PRODUCTS

2.1 Materials

2.1.1 Nursery sod: Quality and source to comply with standards outlined in "Guide Specification for Nursery Stock", latest edition, published by Canadian Nursery Trades Association.

.1 Number one Kentucky Bluegrass/Fescue Sod grown from minimum 40% Kentucky Bluegrass, 30% Creeping Red Fescue.

.2 Broken, dry, discoloured pieces will be rejected by the Consultant.

2.1.2 Water: potable

2.1.3 Fertilizer: Complete, synthetic, slow release fertilizer with 35% water soluble nitrogen.

2.1.4 Herbicide: type, rate, and method of application subject to approval by Consultant.

3 EXECUTION

3.1 Laying of Sod

3.1.1 Prior to sodding, obtain approval from Consultant that finished grade and depth of topsoil are satisfactory. Sodding during excessively wet conditions, at freezing temperatures or over frozen soil is not acceptable.

3.1.2 Lay sod within 36 h of being lifted.

3.1.3 Lay sod sections in rows, longitudinally, along contours of slopes, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

3.1.4 Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.1.5 Water sod immediately after laying to obtain moisture penetration into top 100 mm of topsoil.

3.2 Maintenance

3.2.1 Maintain sodded area from start of installation until final acceptance.

3.2.2 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.

3.2.3 Cut grass to 40 mm when it reaches height of 60 mm. Remove clippings which will smother grassed areas.

3.2.4 Maintain sodded areas weed free.

3.2.5 Fertilize sodded areas one month after sodding with 2:1:1 ratio fertilizer. Spread evenly at rate of .05 kg of nitrogen/100 m2 and water in well.

3.3 Acceptance

3.3.1 Sodded areas will be accepted at final inspection provided that:

.1 Sodded areas are properly established.

.2 Sod is free of bare and dead spots and without weeds.

.3 No surface soil is visible when grass has been cut to height of 40 mm.

.4 Sodded areas have been cut minimum 2 times.

3.3.2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

End of Section.

1 GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 Division One, General Requirements is part of this Section and shall apply as if repeated here.

1.2 SOURCE QUALITY CONTROL

1.2.1 Obtain approval of plant material at source.

1.2.2 Notify Consultant of source of material at least 7 days in advance of shipment. No work under this Section to proceed without approval.

1.2.3 Acceptance of plant material at its source does not prevent rejection on site prior to or after planting operations

1.3 SHIPMENT AND PRE-PLANTING CARE

1.3.1 Co-ordinate shipping of plants and excavation of holes to ensure minimum time lapse between digging and planting.

1.3.2 Tie branches of trees and shrubs securely and protect plant material against abrasion, exposure and extreme temperature damage during transit. Avoid binding of planting stock with rope or wire which could damage bark, break branches or destroy natural shape of plant. Give full support to root ball of large trees during lifting.

1.3.3 Cover plant foliage with tarpaulin, and protect bare roots by means of dampened straw, peat moss, saw dust or other acceptable material to prevent loss of moisture during transit and storage.

1.3.4 Remove broken and damaged roots with sharp pruning shears. Make clean cut and cover cuts over 10 mm with wound dressing.

1.3.5 Keep roots moist and protected from sun and winds. Heel-in trees and shrubs, which cannot be planted immediately, in shaded areas and water well.

1.4 GUARANTEE

1.4.1 The Contractor hereby warrants that plant material as itemized on plant list will remain free of defects in accordance with the Instructions to Bidders, for 2 full growth seasons.

1.4.2 End-of-warranty inspection will be conducted by Consultant.

1.4.3 The Consultant reserves the right to extend Contractor’s warranty responsibilities for an additional 1 year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

1.5 REPLACEMENTS

1.5.1 During warranty period, remove from site any plant material that has died or failed to grow satisfactorily as determined by Consultant.

1.5.2 Replace plant material next season.

1.5.3 Extend warranty on replacement plant material for a period equal to the original warranty period.

1.5.4 Continue such replacement and warranty until plant material is acceptable.

1.6 SUBMITTALS

1.6.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.6.2 Submit product list for trees, shrubs, plant and ground cover list and include product characteristics, performance criteria, physical size, etc.

2 PRODUCTS

2.1 PLANT MATERIAL

2.1.1 Comply with Specifications for Nursery Stock, published by the Canadian Nursery Trades Association referring to size and development of plant material and root ball. Measure plants when branches in their natural position. Height and spread dimensions refer to main body of plant and not from branch tip to branch tip. Use trees and shrubs of No. 1 grade.

2.1.2 Plant material obtained from areas with milder climatic conditions from those of site acceptable only when moved to site prior to the breaking of buds in their original location and heeled-in, in a protected area until conditions suitable for planting.

2.1.3 Use trees and shrubs with strong fibrous root system free of disease, insects, defects or injuries and structurally sound. Use trees with straight trunks, well and characteristically branched for species. Plants must have been root pruned regularly, but not later than one growing season prior to arrival on site.

2.1.4 Large trees must have been half root pruned during each of two successive growing seasons, the latter at least one growing season prior to arrival on site.

2.1.5 Cold storage: approval required for plant material which has been in cold storage.

2.1.6 Container-grown stock: acceptable if containers are large enough for root development. Trees and shrubs must have grown in container for minimum of one growing season but not longer than two. Root system must be able to “hold” soil when removed from container. Plants that have become root bound are not acceptable. Container stock must have been fertilized with slow releasing fertilizer.

2.1.7 Balled and burlapped: coniferous and broadleafed evergreens over 500 mm tall must be dug with soil ball. Deciduous trees in excess of 3 m height must have been dug with large firm ball. Root balls must include 75% of fibrous and feeder

root system. This excludes use of native trees grown in light sandy or rocky soil. Secure root balls with burlap, heavy twine and rope. For large trees, wrap ball in double layer of burlap and drum lace with minimum 10 mm diameter rope. Protect root balls against sudden changes in temperature and exposure to heavy rainfall.

2.1.8 Tree spade dug material: dig plant material with mechanized digging equipment of hydraulic spade or clam-shell type. Root balls to satisfy CNTA standards. Lift root ball from hole, place in wire basket designed for purpose and line with burlap. Replace root ball and tie basket to ball with heavy rope. Take care not to injure trunk of tree with wire basket ties or rope.

2.1.9 Substitutions to plant material as indicated on planting plan not permitted unless written approval has been obtained as to type, variety, and size. Plant substitutions must be of similar species and of equal size as those originally specified.

2.2 MATERIALS

2.2.1 Maple Tree: **Autumn Blaze Maple,** *Acer x freemanii 'Jeffersred',* 100 mm caliper, Minimum. – to approval of Board.

2.2.2 Water: potable and free of minerals which may be detrimental to growth.

2.2.3 Stakes: T-bar, steel, 40 x 40 x 5 x 2440 mm.

2.2.4 Cables and accessories: factory galvanized cables, wire tighteners, eyebolts and turnbuckles. Use turnbuckles with 150 mm long eyebolts a 10 mm diameter threaded opening for tightening, or use approved horticultural guy wire tightener.

2.2.5 Guy wires: No. 10 galvanized steel wire strand to CSA G4-M1977 with turnbuckles. Trees 75 to 150 mm caliper use 3 mm wire.

2.2.6 Eyebolts: coarse threaded galvanized steel.

2.2.7 Tree rings: fabricated from 3 mm galvanized wire encased in two ply reinforced 12 mm diameter rubber garden hose or equivalent.

2.2.8 Tree wrapping material: new, clean, plain burlap strips, minimum 2.5 kg/m^2 mass and 150 mm wide, and twine fastener.

2.2.9 Anchors: T-bar.

2.2.10 **Mulch:**

2.2.10.1 Shredded bark mulch: chips from bark of coniferous trees, varying in size from 50 mm to 75 mm and 5 mm thick.

2.2.11 Wound dressing: horticulturally accepted non-toxic, non-hardening emulsion.

3 EXECUTION

3.1 PLANTING TIMING

3.1.1 Plant deciduous plant material during dormant period before buds have broken or before growing season has been completed. Plant material noted for spring planting only, must be planted in dormant period.

3.1.2 Plant material imported from region with warmer climatic conditions may only be planted in early spring.

3.1.3 Plant evergreens in spring before bud break. Planting o such stock with root balls may start after middle of August. Apply anti-desiccant to evergreens before digging.

3.1.4 Plant only under conditions that are conducive to health and physical conditions of plants.

3.1.5 When permission has been obtained, trees, shrubs and groundcovers growing in containers may be planted throughout the growing season.

3.1.6 Provide planting schedule. Extending planting operations over long period using limited crew will not be accepted.

3.2 EXCAVATION

3.2.1 Stake out locations of trees and planting beds as per planting plan. Obtain approval prior to excavating.

3.2.2 Excavate to width and depth as indicated.

3.2.3 Scarify sides of planting hole.

3.2.4 Provide drainage for planting holes in heavy soil if natural drainage does not exist. Have method approved.

3.2.5 Remove water which enters excavations prior to planting. Ensure source of water is not ground water.

3.3 PLANTING

3.3.1 Loosen bottom of planting hole to depth of 150 to 200 mm. Cover bottom of each excavation with minimum of 150 mm of topsoil mixture.

3.3.2 Plant trees and shrubs vertically with roots placed straight out in hole. Orient plant material to give best appearance in relation to structure, roads and walks.

3.3.3 Place plant material to depth equal to depth they were originally growing in nursery.

3.3.4 With balled and burlapped root balls, loosen burlap and cut away minimum top 1/3 without disturbing root ball. Do not pull burlap or rope from under root ball. With

container stock, remove entire container without disturbing root ball. Non-biodegradable wrappings must be removed.

3.3.5 Tamp soil around root system in layers of 150 mm eliminating air voids. Frozen or saturated planting soil is unacceptable. When 2/3 of planting soil has been placed, fill hole with water. After water has completely penetrated into soil, complete backfilling.

3.3.6 Build 100 mm deep saucer around outer edge of hole to assist with maintenance watering.

3.3.7 When planting is completed, give surface of planting saucer dressing of organic 10-6-4 fertilizer at rate of 12 kg/100 m2 for shrub beds or 40 to 50g/mm of caliper trees. Mix fertilizer thoroughly with top layer of planting soil and water in well.

3.4 TRUNK PROTECTION

3.4.1 Wrap deciduous trees, which caliper is 50 to 150 mm, spirally from ground up, to height of second branches. Treat trunk with paste of long residual insecticide, lindane or equivalent before applying wrapping. Secure burlap with binder twine wound in opposite direction to burlap at 100 mm intervals. Place wrapping neatly and snugly with 40 mm overlap.

3.5 TREE SUPPORT

3.5.1 Install tree supports as indicated on details.

3.5.2 Staking for trees up to 3 m and evergreens up to 2 m in height. Backfill planting hole 2/3, drive T-bar stake 900 mm into bottom of pit, taking care not to damage main roots. Place stake or anchor 150 mm away from trunk on side of prevailing wind. Fasten trunk to stake with tree-ring. Different methods of fastening tree trunk to stake are acceptable if no damage to bark of tree will occur. Obtain approval prior to using other methods.

3.5.3 Tree stakes and wire mesh: protect trees indicated requiring tree guards. Encircle staked trees with galvanized wire mesh. Leave space of at least 150 mm between tree trunk and wire mesh. Fasten wire mesh to stake at 4 places using 3 mm wire.

3.5.4 **Guy wire trees up to 150 mm caliper:**

3.5.4.1 For deciduous trees taller than 3 m and evergreens taller than 2 m, fasten three wires to tree where a branch will prevent slipping down. Use tree rings to prevent abrasion of bark.

3.5.4.2 Fasten guy wires to anchors at distance from tree base equal to height of where wire is attached to trunk. Break wires, install wire tighteners and tighten slightly.

3.5.4.3 Where guy wires are used close to pedestrian traffic ways, fasten metal flags to wires to make them clearly visible.

3.5.4.4 Use sufficient number of guy wires to support large shrubs.

3.6 MULCHING

3.6.1 Obtain approval of planting before mulching material is applied. Loosen soil in planting beds and pits and remove debris and weeds. Spread mulch to minimum thickness of 50 mm. Mulch material susceptible to blowing must be moistened and mixed with topsoil before applying. When mulching is placed in fall, pace immediately after planting. When mulch is placed in spring, wait until soil has warmed up.

3.8 MAINTENANCE

3.8.1 Water once a week for first 4 weeks and then sufficiently thereafter to maintain optimum growing conditions. Ensure adequate moisture in root zone at freeze-up.

3.8.2 Keep soils, within confines of planting saucer around trees and planting beds, shallowly cultivated and free from weeds.

3.8.3 Spray plants to combat pests and diseases. Do not use sprays prohibited by Agriculture Canada.

3.8.4 Keep tree guards and guy wires in proper repair.

3.8.5 Provide adequate protection against winter damage including damage caused by rodents.

3.8.6 Maintain plant material from date of planting up to end of warranty period.

3.8.7 Remove dead or broken branches from plant material.

3.8.8 Remove trunk wrapping, tree stakes and eyebolts at end of warranty period.

END OF SECTION

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Division 10 - Specialties

END OF TABLE

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Common Work for Mechanical: Section 21 05 01

PART 2 PRODUCTS

2.1 HAND HELD FIRE EXTINGUISHERS – GENERALLY

.1 Provide hand held fire extinguishers rated in accordance with CAN/ULC S508-02, (Rev. June 2007), Extinguishers, fire, Rating and Fire Testing of Fire Extinguishers and bearing ULC label.

2.2 HAND HELD FIRE EXTINGUISHERS

.1 Multi-Purpose Dry Chemical - Pressure Type:

.2 Light hazard and Ordinary Hazard to suit.

.3 Description: ammonium phosphate, powder type, heavy duty steel or aluminum cylinder, baked enamel finish, squeeze grip handle with positive on/off valve, hose and nozzle, mounting brackets.

.4 Capacity: 5 kg.

.5 Minimum ULC Rating: 2-A 10BC.

.6 Classification: Class A, B, and C fires.

2.3 CARBON DIOXIDE

.1 Description: carbon dioxide charged heavy duty steel or aluminum cylinder, baked enamel finish, positive on/off squeeze grip handle, impact resistance discharge horn, mounting bracket.

.2 Capacity: 5 kg.

.3 ULC Rating: 10 BC.

2.4 FIRE EXTINGUISHER CABINETS

.1 Fire Extinguisher Cabinet: cabinet tub formed of minimum 1.6 mm steel. Door and adjustable frame are fabricated of minimum 2.5 mm steel corrosion resistant treated, prime coated, ready for finish painting.

.2 Fully recessed type with approved latching device, prime coated, ready for finish painting, ULC listed, break front window in door.

.3 Refer to architects plans for recessed and surface mount locations.

2.5 APPLICABLE STANDARDS

.1 CAN/ULC-S508 Rated and Fire Testing of Fire Extinguishers and Class D Extinguishing Media.

2.6 FIRE EXTINGUISHER

.1 The following is a summary of commonly available handheld fire extinguishers, capacities and corresponding ULC ratings:

Fire Extinguisher Capacity and ULC Rating

Extinguisher Type	Capacity	ULC Rating
Multi-Purpose Dry Chemical (Pressure Type)	1.1 kg	1A5BC
	2.2 kg	2A10BC
	4.5 kg	4A40BC
	9.0 kg	10A80BC
Carbon Dioxide	2.2 kg	5BC
	4.5 kg	5BC
	6.8 kg	10BC

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install fire extinguisher 18 Kg's and less so that the top of the extinguisher is not more than 1.5 m above floor.

.2 Provide extinguishers of the type listed for the following areas.

.1 Electrical and telephone rooms: carbon dioxide.

.2 Mechanical rooms: multi-purpose dry chemical.

.3 Garbage and storage rooms: multi-purpose dry chemical.

.4 Maintenance workshop: multi-purpose dry chemical.

.5 General areas: multi-purpose dry chemical.

.3 Provide extinguishers where indicated on drawings and as required by the Ontario Fire code.

.4 Where exact location is not indicated, mount in location as directed by the owner.

.5 Location of all fire extinguishing equipment shall be prominently indicated by signs or markings.

END OF SECTION

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Pages

Division 21 - Fire Suppression, Common Work Mechanical

END OF TABLE

PART 1 GENERAL

1.1 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittals.

.2 Shop drawings; submit drawings pre-checked, stamped and signed by the General and Mechanical Contractors.

.3 Shop drawings to show:

- .1 Mounting arrangements.
- .2 Operating and maintenance clearances.

.4 Shop drawings and product data accompanied by:

- .1 Detailed drawings of bases, supports, and anchor bolts.
- .2 Acoustical sound power data for RTU equipment, where applicable.
- .3 Points of operation on performance curves.
- .4 Manufacturer to certify current model production.
- .5 Certification of compliance to applicable codes.

.5 Closeout Submittals:

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 72 10 – Project Record Documents.
- .2 Operation and maintenance manual shall be approved by, and final copies deposited with, the Consultant before final inspection.
- .3 Operation data to include:
  - .1 Control schematics for systems including environmental controls.
  - .2 Description of systems and their controls.
  - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
  - .4 Operation instruction for systems and component.
  - .5 Description of actions to be taken in event of equipment failure.
  - .6 Valves schedule and flow diagram.
  - .7 Colour coding chart.
- .4 Maintenance data to include:
  - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
  - .2 Data to include schedules of tasks, frequency, tools required and task time.
- .5 Performance data to include:
  - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
  - .2 Equipment performance verification test results.
  - .3 Special performance data as specified.
  - .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

.6 Approvals:

.1 Submit 1 copy of draft Operation and Maintenance Manual to Consultant for approval. Submission of individual data will not be accepted unless directed by Consultant.

.2 Make changes as required and re-submit as directed by Consultant.

.7 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.8 Site records:

Consultant shall provide 1 set of hard copy mechanical drawings for duplication by the contractor. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to new and existing mechanical systems, control systems and low voltage control wiring.

.1 Transfer information weekly to a clean hard copy, to show work as actually installed.

.2 Use different colour waterproof ink for each service.

.3 Make available for reference purposes and inspection.

.9 As-built drawings:

.1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.3 Submit to Consultant for approval and make corrections as directed.

.4 Perform testing, adjusting and balancing for HVAC using as-built drawings.

.5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.6 Provide a complete electronic copy of the as built drawings set in PDF file format.

.10 Submit copies of as-built drawings for inclusion in final TAB report.

1.2 MAINTENANCE

.1 Furnish spare parts in accordance with Section 21 05 01 - Common Work for Mechanical as follows:

.1 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers.

.3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Do verification requirements in accordance with Section 23 08 01 – Mechanical Performance Verification.

PART 3 EXECUTION

3.1 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with Section 09 00 00 – Painting.

.2 Restore to new condition, any equipment or architectural finishes that have been damaged by the work of this division.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.3 FIELD QUALITY CONTROL

.1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - SUBMITTALS.

.1 Standard fire protection flow test, including static pressure and residual pressure.

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.4 DEMONSTRATION

.1 The Commissioning Agent may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Refer to instructions provided by the Commissioning Agent appointed by the owner for scheduling, systems to be demonstrated, methodology.

.3 Trial usage shall apply, but not be limited to the following equipment and systems:

.1 HVAC systems and equipment;

.2 Supply and exhaust fans;

.3 Plumbing fixtures;

.4 Control Systems;

.4 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.

.5 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.6 Instruction duration time requirements as specified in appropriate sections.

.7 Contractor shall record these demonstrations on video tape for future reference.

3.5 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

PART 1 GENERAL

1.1 COORDINATION BETWEEN EXISTING BUILDING AND NEW INSTALLATIONS

.1 Check and coordinate all systems in the existing building work that are extended to new systems to ensure their proper operation.

.2 Provide components between new and existing systems as necessary for proper performance and operation.

.3 Maintain domestic hot water for the building at all times unless pre-arranged 48 hours in advance.

.4 Maintain HVAC systems for the building at all times unless pre-arranged 48 hours in advance.

.5 Maintain Fire Prevention systems for the building at all times unless pre-arranged 48 hours in advance.

1.2 HAZARDOUS MATERIALS REMOVAL

.1 Hazardous Materials ACM's are not expected at this location.

.2 Refer to the owner's Hazardous Materials Report.

1.3 PENETRATIONS IN EXISTING STRUCTURE

.1 Do all cutting and patching for the work of this division. Before proceeding, obtain Owner's approval.

.2 Where necessary to completely penetrate existing floors, concrete and block walls, ceilings, roof, or structural members, provide sleeve and follow Consultant's instructions.

.3 For foundation and wall penetrations, coordinate with the general contractors qualified masonry contractor to provide services under this contract.

.4 Include patching and repairing for the work of this division.

.5 Include fire stopping and smoke sealing for penetrations through existing structure as required by the OBC.

1.4 EXISTING SERVICES

.1 Disconnect and remove all temporary services at the completion of the new work.

.2 Disconnect and remove all piping, controls, fittings and equipment for systems and devices that are abandoned.

.3 Make safe all systems left for future use.

1.5 INTERRUPTION OF SERVICES

.1 Coordinate all work with the owner's use of the building. Refer specifically to the owner's instructions for work in the existing building and security precautions.

.2 There will be students in the school while work is proceeding. Schedule the work to complete the project and keep the disruptions to a minimum.

.3 Maintain all domestic water and electrical services to all parts of the building that are in use. Provide temporary services and wiring as necessary.

.4 Obtain owner's written approval before interrupting any service.

.5 Request permission to interrupt services in writing not less than two (2) days in advance and state time(s) and duration(s) of interruptions.

.6 Provide daily clean up.

.7 If during the course of work any contractor encounters additional asbestos, stop work immediately and notify the General Mechanical Contractor who will in turn notify the owner and consultant.

.8 During the course of installation of work it shall be Mechanical Division's responsibility to maintain integrity of existing mechanical systems including but not limited to fire protection, fire alarm, HVAC systems, plumbing, all controls and low voltage systems. Include disabling of fire alarm system by the electrical division to avoid false alarms. Contractor shall coordinate with owner's FAS and security representative.

.9 If an existing FA system needs to be altered, affected, shutdown for any reason as a result of mechanical work, a "fire plan" to be set up implemented with the owner through the Mechanical General Contractor. The owner, and electrical engineer shall be notified also.

.10 If there is need, as a result of mechanical work for security system or fire alarm devices to be disconnected/repositioned resulting in downtime, Contractor in his tender must include for overnight security, fire watch for any extended period required.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Thermal insulation for piping and piping accessories in commercial type applications.

.2 Related Sections:

.1 21 05 01 Common Work Results for Mechanical

.2 22 11 16 Domestic Water Piping.

.3 22 13 17 DWV Cast Iron & Copper

.4 23 05 29 Hangers and Supports for HVAC piping and equipment

1.2 REFERENCES

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ASHRAE Standard 90.1-10, 2010 edition, Energy Standard for Buildings Except Low-Rise Residential Buildings

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM C335-04, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.

.2 ASTM C411-04, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.3 ASTM C547-2003, Mineral Fiber Pipe Insulation.

.4 ASTM C921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Canadian General Standards Board (CGSB)

.1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.2 CAN/CGSB-51.53-95, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.5 Manufacturer's Trade Associations

.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).

.6 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102-03, Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701-01, Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.3 CAN/ULC-S702-1997, Thermal Insulation, Mineral Fibre, for Buildings.

.4 CAN/ULC-S702.2-03, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

1.3 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services in suspended ceilings, non-accessible chases and furred-in spaces.

.2 "EXPOSED" - shall mean "not concealed" as specified.

.2 TIAC:

.1 CRF: Code Rectangular Finish.

.2 CPF: Code Piping Finish.

1.4 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet. Include product characteristics, performance criteria, and limitations.

.1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).

.3 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

.1 Shop drawings: submit drawings pre-checked stamped and signed by the general contractor and the mechanical contractor.

.2 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix label beneath sample indicating service.

.4 Quality assurance submittals: submit following in accordance with Section 01 45 00 – Quality Control.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

.1 Qualifications:

.2 Installer: specialist in performing work of this Section, and have at least 3 years successful experience in this size and type of project, member of TIAC.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Storage and Protection:

.1 Protect from weather, construction traffic.

.2 Protect against damage.

.3 Store at temperatures and conditions required by manufacturer.

.3 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with the municipality.

PART 2 PRODUCTS

2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC-S102.

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Mineral fibre specified includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.

.3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/ULC-S702 ASTM C547.

.2 Maximum "k" factor: to CAN/ULC-S702.

.4 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/ULC-S702 ASTM C547.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to CAN/ULC-S702 ASTM C547.

.5 TIAC Code C-2: mineral fibre blanket faced with factory applied vapour retarder jacket (as scheduled in PART 3 of this section).

.1 Mineral fibre: to CAN/ULC-S702 ASTM C547.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to CAN/ULC-S702 ASTM C547.

.6 TIAC Code A-6: flexible unicellular tubular elastomer.

.1 Insulation: with vapour retarder jacket .

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: C534

.4 Certified by manufacturer: free of potential stress corrosion cracking corrodants.

.7 TIAC Code A-2: rigid moulded calcium silicate in sections and blocks, and with special shapes to suit project requirements.

.1 Insulation: to ASTM C533.

.2 Maximum "k" factor: to ASTM C533

.3 Design to permit periodic removal and re-installation.

2.3 INSULATION SECUREMENT

.1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.

.2 Contact adhesive: quick setting.

.3 Canvas adhesive: washable.

.4 Tie wire: 1.5 mm diameter stainless steel.

.5 Bands: stainless steel, 19 mm wide, 0.5 mm thick.

2.4 CEMENT

.1 Thermal insulating and finishing cement:

.1 Hydraulic setting or Air drying on mineral wool, to ASTM C449/C449M.

2.5 VAPOUR RETARDER LAP ADHESIVE

.1 Water based, fire retardant type, compatible with insulation.

2.6 INDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

2.7 OUTDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

.2 Reinforcing fabric: fibrous glass, untreated 305 g/m2.

2.8 JACKETS

.1 Polyvinyl Chloride (PVC):

.1 One-piece moulded type and sheet to CAN/CGSB-51.53 with pre-formed shapes as required.

.2 Colours for exposed insulation jacket to be confirmed with Architect.

.3 Minimum service temperatures: -20 degrees C.

.4 Maximum service temperature: 65 degrees C.

.5 Moisture vapour transmission: 0.02 perm.

.6 Thickness: .56 mm.

.7 Fastenings:

.1 Use solvent weld adhesive compatible with insulation to seal laps and joints.

.2 Tacks.

.3 Pressure sensitive vinyl tape of matching colour.

.8 Special requirements:

.1 Outdoor: UV rated material at least 0.5 mm thick.

.2 ABS Plastic:

.1 One-piece moulded type and sheet with pre-formed shapes as required.

.2 Colour: White.

.3 Minimum service temperatures: -40 degrees C.

.4 Maximum service temperature: 82 degrees C.

.5 Moisture vapour transmission: 0.012 perm.

.6 Thickness: 0.75 mm.

.7 Fastenings:

.1 Solvent weld adhesive compatible with insulation to seal laps and joints.

.2 Tacks.

.3 Pressure sensitive vinyl tape of matching colour.

.8 Locations:

.1 For outdoor use ONLY.

.3 Canvas:

.1 220 and 120 gm/m2 cotton, plain weave, treated with dilute fire-retardant lagging adhesive to ASTM C921.

.2 Lagging adhesive: compatible with insulation.

.4 Aluminum:

.1 To ASTM B209.

.2 Thickness: 0.50 mm sheet.

.3 Finish: smooth.

.4 Joining: longitudinal and circumferential slip joints with 50 mm laps.

.5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.

.6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 PRE-INSTALLATION REQUIREMENT

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.

.2 Surfaces clean, dry, free from foreign material.

3.3 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturer’s instructions and this specification.

.3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Install hangers, supports outside vapour retarder jacket.

.5 Supports, Hangers:

.1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

.6 Provide TIAC code C2 insulation for piping identified and having sound proofing.

3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

.1 Application: at expansion joints, valves, primary flow measuring elements flanges and unions at equipment.

.2 Design: to permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.

.3 Insulation:

.1 Insulation, fastenings and finishes: same as system.

.2 Jacket: same as system.

3.5 INSTALLATION OF ELASTOMERIC INSULATION

.1 Insulation to remain dry. Overlaps to manufacturer’s instructions. Ensure tight joints.

.2 Provide vapour retarder as recommended by manufacturer.

3.6 PIPING INSULATION SCHEDULES

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

.2 TIAC Code: A-1.

.1 Securements: Tape at 300 mm on centre.

.2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: TIAC Code 1501-H.

.3 TIAC Code: A-3.

.1 Securements: Tape at 300 mm on centre.

.2 Seals: VR lap seal adhesive, VR lagging adhesive.

.3 Installation: TIAC Code: 1501-C.

.4 TIAC Code: A-6.

.1 Insulation securements:

.2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: TIAC Code:

.5 TIAC Code: C-2 with without vapour retarder jacket.

.1 Insulation securements:

.2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: TIAC Code: 1501-C.

.6 TIAC Code: A-2 .

.1 Insulation securements: .

.2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: TIAC Code: 1501-H .

.7 Thickness of insulation as listed in following table.

.1 Run-outs to individual units and equipment not exceeding 4000 mm long.

.2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp deg C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)				
			Run out	to 1	1 1/2 to 2	2 1/2 to 4	5 to 6
Domestic DCW		A-1	25	25	25	25	25
Domestic HW		A-3	25	25	25	38	38
RWL and STM		C-2	25	25	25	25	25

.8 Finishes:

.1 Exposed indoors: PVC jacket.

.2 Exposed in mechanical rooms: canvas or PVC jacket.

.3 Concealed, indoors: canvas on valves, fittings. No further finish.

.4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.

.5 Outdoors: water-proof ABS jacket.

.6 Finish attachments: SS bands, at 150 mm on centre. Seals: closed.

.7 Installation: to appropriate TIAC code CRF/1 through CPF/5.

3.7 FIELD QUALITY CONTROL

3.8 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 American National Standards Institute/National Fire Prevention Association (ANSI/NFPA)

.1 ANSI/NFPA 13-2010, Installation of Sprinkler Systems.

.2 Underwriters Laboratories of Canada (ULC)

.1 ULC S543- 09(R2016), Internal Lug Quick Connect Couplings for Fire Hose.

.3 OLP: Contract starts at the existing sprinkler service header in the ceiling space of new daycare vestibule Room 125. Sprinkler area limitations are not impacted by the expansion.

.4 Holy Trinity: Contract starts at the existing east wing ground floor flow switch.

.5 Refer to documents and drawings.

1.2 RELATED SECTIONS

.1 Section 23 05 21 – Thermometers and Pressure Gauges - Piping Systems.

.2 Section 23 05 48 – Vibration Isolation and Seismic Restraint

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures and in accordance with ANSI/NFPA 13, working plans and design requirements.

.2 Submittals shall be specifically identified with the applicable style or series designation as published in the appropriate agency listing or approval. Trade names or other abbreviated designations are not permitted.

1.4 SAMPLES

.1 Submit samples in accordance with Section 21 05 01 Common Work Results for Mechanical. - Submittal Procedures.

.2 Submit samples of following:

.1 Each type of sprinkler head.

.2 Signs.

1.5 ENGINEERING DESIGN CRITERIA

.1 Design of systems is complete in accordance with ANSI/NFPA 13, using following parameters:

.1 Hazard:

.1 To suit occupancy as indicated on the architects OBC matrix.

.2 Individual area requirements shall vary including Light Hazard, Ordinary Hazard.

.2 Pipe size and layout:

.1 Hydraulic design sizing as required for new and relocated sprinkler systems.

.2 Sprinkler head layout: to ANSI/NFPA 13.

.3 Water supply:

.1 Verify recent water flow test was conducted in the area prior to preparing hydraulic calculations. Confirm test is acceptable to Authority Having Jurisdiction.

.4 Zoning:

.1 System zoning is not expected to change.

1.6 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in Section 21 05 01 Common Work Results for Mechanical

1.7 EXTRA MATERIALS

.1 Provide spare sprinklers and tools as required by ANSI/NFPA 13.

1.8 SCOPE OF WORK

.1 OLP: Contract starts at the existing sprinkler service header in the ceiling space of new daycare vestibule Room 125. Sprinkler area limitations are not impacted by the expansion.

.2 Holy Trinity: Contract starts at the existing east wing ground floor flow switch.

.3 Refer to these documents and drawings.

PART 2 PRODUCTS

2.1 PIPE, FITTINGS AND VALVES

.1 Pipe:

.1 Ferrous: to ANSI/NFPA 13.

.2 CPVC: to ANSI/ NFPA 13,

.3 CPVC shall be permitted in accordance with listing limitations, including installation instructions.

.2 Fittings and joints to ANSI/NFPA 13:

.1 Ferrous: screwed, welded, flanged or roll grooved.

.1 Grooved fittings shall be Victaulic FireLock ASTM A536 ductile iron type. Where ductile iron cast pattern is not available, Victaulic steel fittings may be used. ULC listed and FMG approved.

.2 Grooved couplings shall consist of two ductile iron housings, a pressure responsive elastomeric gasket, and zinc electroplated bolts and nuts.

.1 Rigid Type Couplings: Housings cast with offsetting, angle-pattern bolt pads to provide rigidity and system support and hanging in accordance with NFPA-13. ULC listed and FMG approved.

.1 1-1/4" – 4": Factory assembled for direct stab installation without field disassembly. Victaulic Style 009 EZ.

.2 5" – 8": Victaulic FireLock™ Style 005.

.3 10" and Larger: Victaulic Zero-Flex® Style 07.

.2 Flexible Type Couplings: Use for seismic applications in accordance with Victaulic instructions and in locations where vibration attenuation and stress relief are required. Victaulic Style 75 or 177. ULC listed and FMG approved.

.3 Valves:

.1 ULC listed and FMG approved for fire protection service.

.2 Up to NPS 2: bronze, screwed ends, OS&Y gate.

.3 NPS 2 1/2 and over: ductile iron, grooved ends, indicating butterfly valve with actuator and supervisory switches. Victaulic Series 705W.

.4 Check valves:

.1 Swing type, horizontal installation, stainless steel disc. Victaulic Style 712.

.2 Spring assisted type, horizontal or vertical installation, stainless steel spring and shaft. Victaulic Series 717.

.5 Ball drip.

.4 Pipe hangers:

2.2 SPRINKLER HEADS

.1 General: to ANSI/NFPA 13 and ULC listed for fire services.

.2 Sprinkler to be glass-bulb type, with die-cast brass body, with hex shaped wrench boss integrally cast into the sprinkler body to reduce the risk of damage during installation.

2.3 SPRINKLER HEAD TYPE A

.1 Upright bronze: Victaulic Model V27.

2.4 SPRINKLER HEAD TYPE B

.1 Pendant chrome link and lever type. (For use when TYPE C heads are not available.)

2.5 SPRINKLER HEAD TYPE C

.1 Pendant chrome glass bulb type: Victaulic Model V27.

2.6 SPRINKLER HEAD TYPE D

.1 Recessed polished chrome glass bulb . type with ring and cup: Victaulic Model V27

2.7 SPRINKLER HEAD TYPE E

.1 Flush polished chrome glass bulb . type: Victaulic Model V38.

2.8 SPRINKLER HEAD TYPE F

.1 Side wall polished satin chrome . glass bulb type: Victaulic Model V2709, V2710

2.9 ALARM CHECK VALVE

.1 Alarm check valve is existing at the incoming sprinkler main assembly

2.10 SUPERVISORY SWITCHES

.1 General: to ANSI/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.

2.11 FIRE DEPARTMENT CONNECTION

.1 The Fire department connection is existing to remain.

2.12 EXCESS PRESSURE PUMP

.1 The excess Pressure pumps are existing.

2.13 PRESSURE GAUGES

.1 ULC listed and to Section 23 05 21 - Thermometers and Pressure Gauges - Piping Systems.

.2 Shall have maximum limit of not less than twice normal working pressure at point where installed

2.14 PIPE SLEEVES

.1 Provide pipe sleeves where piping passes through walls, floors, and roofs.

.2 Secure sleeves in position and location during construction.

.3 Provide sleeves of sufficient length to pass through entire thickness of walls, floors, and roofs.

.4 Provide 2.5 cm minimum clearance between exterior of piping and interior of sleeve or core-drilled hole.

.1 Firmly pack space with mineral wool insulation.

.2 Seal space at both ends of sleeve or core-drilled hole with plastic waterproof cement that will dry to firm but pliable mass, .

.3 In fire walls and fire floors, seal both ends of pipe sleeves or core-drilled holes with ULC listed fill, void, or cavity material.

.5 Sleeves in Masonry and Concrete Walls, Floors, and Roofs:

.1 Provide hot-dip galvanized steel, ductile-iron, cast-iron sleeves.

.2 Core drilling of existing and new masonry and concrete may be provided in lieu of pipe sleeves when cavities in core-drilled hole are grouted smooth.

.6 Sleeves in Other Than Masonry and Concrete Walls, Floors, and Roofs:

.1 Provide 0.61 mm thick galvanized steel sheet.

2.15 ESCUTCHEON PLATES

.1 Provide one-piece type metal plates for piping passing through walls, floors, and ceilings in exposed spaces.

.2 Provide polished chromium-plated finish on copper alloy plates in finished spaces.

.3 Provide paint finish on metal plates in unfinished spaces.

2.16 INSPECTOR'S TEST CONNECTION

.1 Locate inspector's test connection at hydraulically most remote part of each system, provide test connections approximately 3 m above floor for each sprinkler system or portion of each sprinkler system equipped with alarm device.

.2 Provide test connection piping to location where discharge will be readily visible and where water may be discharged without property damage.

.3 Provide discharge orifice of same size as corresponding sprinkler orifice.

2.17 SIGNS

.1 Provide Signs for control drain and test valves: to ANSI/NFPA 13.

.2 Confirm with TCSCC if Bi-lingual type is required.

2.18 SPARE PARTS CABINET

.1 For storage of maintenance materials, spare sprinkler heads and special tools.

.2 Construct to sprinkler head manufacturer’s standard.

.3 Existing cabinet may be used where sprinkler head quantities are sufficient for system size with additions.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 PRE-QUALIFIED CONTRACTORS

.1 The following contractors are pre-qualified to provide fire protection equipment and services outlined in this specification:

.1 Bates Fire Protection Services. 905 790 6911

.2 Guardian Fire Systems Inc. 905-567-4911

.3 Simplex Grinnell. 905-212-4400

.4 Vipond Inc. 905-564-7060

3.3 INSTALLATION

.1 Install, inspect and test to acceptance in accordance with ANSI/NFPA 13 and ANSI/NFPA 25.

.2 Supervisory and control switches, mounted overhead, shall be positioned so that the indicating features is visible from below.

3.4 PIPE INSTALLATION

.1 Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings.

.2 Keep interior and ends of new piping and existing piping thoroughly cleaned of water and foreign matter.

.3 Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter.

.4 Inspect piping before placing into position.

3.5 ELECTRICAL CONNECTIONS

.1 Electrical work associated with the sprinkler system shall be provided by the electrical contractor under Section 26 05 01 – General Instructions for Electrical Sections.

.2 Provide fire alarm system devices for wiring by the electrical contractor under Section 28 31 01 - Multiplex Fire Alarm System.

.3 The electrical contractor shall provide control and fire alarm wiring, including connections to fire alarm systems in accordance with Ontario Electrical Code.

3.6 DISINFECTION

.1 Disinfect new piping and existing piping affected by the scope of work.

.2 Fill piping systems with solution containing minimum of 50 parts per million of chlorine and allow solution to stand for minimum of 24 hours.

.3 Flush solution from systems with clean water until maximum residual chlorine content is not greater than 0.2 part per million or residual chlorine content of domestic water supply.

.4 Obtain at least two consecutive satisfactory bacteriological samples from piping, analyzed by certified laboratory, and submit results prior to piping being placed into service.

3.7 FIELD PAINTING

.1 Clean, pre-treat, prime, new exposed piping systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories.

.2 Apply coatings to clean, dry surfaces, using clean brushes.

.3 Clean surfaces to remove dust, dirt, rust, and loose mill scale.

.4 Immediately after cleaning, provide metal surfaces with 1 coat of pre-treatment primer applied to minimum dry film thickness of 0.3 ml, and one coat of zinc chromate primer applied to minimum dry film thickness of 1.0 ml.

.5 Shield sprinkler heads with protective covering while painting is in progress.

.6 For exposed piping, final painting for décor colour shall be by others.

.7 Remove protective covering from sprinkler heads after final painting by GC.

.8 Remove sprinkler heads that have been painted and replace with new sprinkler heads.

.9 Provide primed surfaces with following:

.1 Exposed Piping in Finished Areas:

.1 After final painting, provide piping with 50 mm wide self-adhering red plastic bands spaced at maximum of 6 m intervals throughout piping systems.

.2 Piping in Unfinished Areas:

.1 Provide primed surfaces with one coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material.

.2 Provide piping with 50 mm wide red enamel bands self-adhering red plastic bands spaced at maximum of 6 m intervals.

3.8 FIELD QUALITY CONTROL

.1 Site Test, Inspection:

.1 Perform test to determine compliance with specified requirements in presence of Consultant .

.2 Test, inspect, and approve piping before covering or concealing.

.3 Preliminary Tests:

.1 Hydrostatically test each system at 200 psig for a 2 hour period with no leakage or reduction in pressure.

.2 Flush piping with potable water in accordance with NFPA 13.

.3 Piping above suspended ceilings: tested, inspected, and approved before installation of ceilings.

.4 Test alarms and other devices.

.5 Test water flow alarms by flowing water through inspector's test connection. When tests have been completed and corrections made, submit signed and dated certificate in accordance with NFPA 13.

.4 Formal Tests and Inspections:

.1 Do not submit request for formal test and inspection until preliminary test and corrections are completed and approved.

.2 Submit written request for formal inspection at least 15 days prior to inspection date.

.3 Repeat required tests as directed.

.4 Correct defects and make additional tests until systems comply with contract requirements.

.5 Furnish appliances, equipment, instruments, connecting devices, and personnel for tests.

.6 Authority having Jurisdiction, will witness formal tests and approve systems before they are accepted.

.2 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.9 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

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PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 21 05 05 – Common Work Results for Mechanical.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)

.1 ANSI/ASME B16.15-06, Cast Bronze Threaded Fittings, Classes 125 and 250.

.2 ANSI/ASME B16.18-01, Cast Copper Alloy Solder Joint Pressure Fittings.

.3 ANSI/ASME B16.22-01, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

.4 ANSI/ASME B16.24-01, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300.

.2 ASTM International Inc.

.1 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 ASTM A536-84(2004)e1, Standard Specification for Ductile Iron Castings.

.3 ASTM B88M-05, Standard Specification for Seamless Copper Water Tube (Metric).

.3 American National Standards Institute/American Water Works Association (ANSI)/(AWWA)

.1 ANSI/AWWA C111/A21.11-07, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.4 Canadian Standards Association (CSA International)

.1 CSA B242-05, Groove and Shoulder Type Mechanical Pipe Couplings.

.5 Backflow Prevention:

.1 CAN/CSA-B64.10-01/B64.10.1-01 (R2007)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 70 00 –Execution Requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates paddling and packaging materials.

PART 2 PRODUCTS

2.1 PIPING

.1 Domestic hot, cold and recirculation systems, within building.

.1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.

.2 Buried or embedded: copper tube, soft annealed, type K: to ASTM B88M, in long lengths and no buried joints.

2.2 FITTINGS

.1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.

.2 Cast bronze threaded fittings, Class 125 and: to ANSI/ASME B16.15.

.3 Cast copper, solder type: to ANSI/ASME B16.18.

.4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.

.5 NPS 2 and larger: ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242.

.6 NPS 1 1/2 and smaller: wrought copper to ANSI/ASME B16.22 cast copper to ANSI/ASME B16.18; with 301 stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380kPa.

2.3 JOINTS

.1 Rubber gaskets, latex-free 1.6 mm thick: to AWWA C111.

.2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.

.3 Solder: 95/5 tin copper alloy.

.4 Teflon tape: for threaded joints.

.5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM gasket.

.6 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

2.4 GATE VALVES

.1 NPS 2 and under, soldered:

.1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.

.2 NPS 2 and under, screwed:

.1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.

.3 NPS 2 1/2 and over, in mechanical rooms, flanged:

.1 Rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, OS&Y bronze trim specified Section 23 05 23.02 - Valves - Cast Iron.

.4 NPS 2 1/2 and over, other than mechanical rooms, flanged:

.1 Non-rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, bronze trim, bolted bonnet specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

2.5 GLOBE VALVES

.1 NPS2 and under, soldered:

.1 To MSS-SP-80, Class 125, 860 kPa, bronze body, renewable composition disc, screwed over bonnet as specified Section 23 05 23.01 - Valves - Bronze.

.2 Lockshield handles: as indicated.

.2 NPS 2 and under, screwed:

.1 To MSS-SP-80, Class 150, 1 MPa, bronze body, screwed over bonnet, renewable composition disc as specified Section 23 05 23.01 - Valves - Bronze.

.2 Lockshield handles: as indicated.

2.6 SWING CHECK VALVES

.1 NPS 2 and under, soldered:

.1 To MSS-SP-80, Class 125, 860kPa, bronze body, bronze swing disc, screw in cap, re-grindable seat as specified Section 23 05 23.01 - Valves - Bronze.

.2 NPS 2 and under, screwed:

.1 To MSS-SP-80, Class 125, 860kPa, bronze body, bronze swing disc, screw in cap, re-grindable seat as specified Section 23 05 23.01 - Valves - Bronze.

.3 NPS 2 1/2 and over, flanged:

.1 To MSS-SP-71, Class 125, 860kPa, cast iron body, flat flange faces, regrind renewable seat, bronze disc, bolted cap specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

2.7 BALL VALVES

.1 NPS 2 and under, screwed:

.1 Class 150.

.2 Bronze Forged Brass body, chrome plated brass stainless-steel ball, PTFE adjustable packing, brass gland and PTFE Bunan TFE seat, steel lever handle as specified Section 23 05 23.01 - Valves - Bronze.

.2 NPS 2 and under, soldered:

.1 To ANSI/ASME B16.18, Class 150.

.2 Bronze body, chrome plated brass stainless steel ball, PTFE adjustable packing, brass gland and PTFE Bunan seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01 - Valves - Bronze .

2.8 BUTTERFLY VALVES

.1 NPS 2-1/2 and over, wafer lug grooved:

.1 To MSS-SP-67, Class 200.

.2 Cast iron body, ductile iron chrome plated disc, stainless steel stem, EPT liner.

.3 Lever operated, NPS8 and over, gear operated.

.2 NPS 2-1/2 and over, grooved ends:

.1 Class 300 psig CWP, bubble tight shut-off, bronze body EPDM coated ductile iron disc with integrally cast stem.

.2 Operator:

.1 NPS 4 and under: lever handle.

.2 NPS 6 and over: gear operated.

2.9 BACKFLOW PREVENTION VALVES

.1 NPS 2 and under, screwed

.1 Type DCVA.

.2 NPS 2 1/2 and over, flanged

.1 Type DCVA.

PART 3 EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install in accordance with National Plumbing Code (NPC), Ontario Building Code (OBC), local authority having jurisdiction.

.2 Install pipe work in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified herein.

.3 Assemble piping using fittings manufactured to ANSI standards.

.4 Install COLD piping below and away from HWS, recirculating and other hot piping so as to maintain temperature of cold water as low as possible.

.5 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

.6 Buried tubing:

.1 Lay in well compacted washed sand in accordance with AWWA Class B bedding.

.2 Bend tubing without crimping or constriction. Minimize use of fittings.

3.3 VALVES

.1 Isolate equipment, fixtures, washroom groups and branches with ball valves.

.2 Balance recirculation system using lockshield globe valves. Mark settings and record on as-built drawings on completion.

3.4 PRESSURE TESTS

.1 Conform to requirements of Section 21 05 01 - Common Work Results for Mechanical.

.2 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.

3.5 FLUSHING AND CLEANING

.1 Flush entire system for 8 h. Ensure outlets flushed for 2 hours. Let stand for 24 hours, then draw one sample off longest run. Submit to testing laboratory to verify that system is clean copper to Provincial Federal potable water guidelines. Let system flush for additional 2 hours, then draw off another sample for testing.

3.6 PRE-START-UP INSPECTIONS

.1 Systems to be complete, prior to flushing, testing and start-up.

.2 Verify that system can be completely drained.

.3 Ensure that pressure booster systems are operating properly.

.4 Ensure that air chambers, expansion compensators are installed properly.

3.7 DISINFECTION

.1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction

.2 Coordinate with site service division for new 100mm incoming water service.

.3 Upon completion, provide laboratory test reports on water quality for Owner approval.

3.8 START-UP

.1 Timing: start up after:

- .1 Pressure tests have been completed.
- .2 Disinfection procedures have been completed.
- .3 Certificate of static completion has been issued.
- .4 Water treatment systems operational.

.2 Provide continuous supervision during start-up.

.3 Start-up procedures:

- .1 Establish circulation and ensure that air is eliminated.
- .2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
- .3 Bring HWS storage tank up to design temperature slowly.
- .4 Monitor piping hot water piping systems for freedom of movement, pipe expansion as required.

.5 Check control, limit, safety devices for normal and safe operation.

.4 Rectify start-up deficiencies.

3.9 PERFORMANCE VERIFICATION

.1 Scheduling:

.1 Verify system performance after pressure and leakage tests and disinfection are completed, and Certificate of Completion has been issued by authority having jurisdiction.

.2 Procedures:

.1 Verify that flow rate and pressure meet Design Criteria.

.2 TAB domestic water recirculating systems and Non-potable well systems with pumps in accordance with Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

.3 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.

.4 Sterilize hot water systems for Legionella control.

.5 Verify performance of temperature controls and thermostatic mixing valves.

.6 Verify compliance with safety and health requirements.

.7 Verify backflow preventer operation in accordance with CAN CSA B64.1.

.8 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.

.9 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning.

.3 Reports:

.1 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow, backflow prevention and pressure.

3.10 OPERATION REQUIREMENTS

.1 Co-ordinate operation and maintenance requirements including, cleaning and maintenance of specified materials and products with Section 23 05 05 - Installation of Pipework.

3.11 CLEANING

.1 Waste Management: separate waste materials for reuse and recycling.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 21 05 10 – Common Work Results for Mechanical

1.2 REFERENCES

.1 ASTM International Inc.

- .1 ASTM B32-08, Standard Specification for Solder Metal.
- .2 ASTM B306-02, Standard Specification for Copper Drainage Tube (DWV).
- .3 ASTM C564-03a, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.2 Canadian Standards Association (CSA International).

- .1 CSA B67-1972(R1996), Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.
- .2 CAN/CSA-B70-06, Cast Iron Soil Pipe, Fittings and Means of Joining.
- .3 CAN/CSA-B125.3-05, Plumbing Fittings.

.3 Green Seal Environmental Standards (GSES)

- .1 Standard GS-36-00, Commercial Adhesives.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

- .1 Provide manufacturer's printed product literature and datasheets for adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates paddling and packaging materials.

PART 2 PRODUCTS

2.1 COPPER TUBE AND FITTINGS

.1 Above ground sanitary storm and vent Type DWV 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, type 50A lead free, tin- 95:5, type TA, to ASTM B32.

2.2 CAST IRON PIPING AND FITTINGS

.1 Buried sanitary storm and vent minimum NPS 3, to CAN/CSA-B70, with one layer of protective coating of.

.1 Joints:

.1 Mechanical joints:

.1 Neoprene or butyl rubber compression gaskets: to ASTM C564 or CAN/CSA-B70.

.2 Stainless steel clamps.

.2 Hub and spigot:

.1 Caulking lead: to CSA B67.

.2 Cold caulking compounds.

.2 Above ground sanitary storm and vent: to CAN/CSA-B70.

.1 Joints:

.1 Hub and spigot:

.1 Caulking lead: to CSA B67.

.2 Mechanical joints:

.1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

PART 3 EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

.2 Extend existing systems in similar materials where copper and cast are use as base building services.

3.2 INSTALLATION

.1 In accordance with Section 23 05 01 - Use of HVAC Systems During Construction.

.2 Install in accordance with Ontario Building Code and local authority having jurisdiction.

3.3 TESTING

.1 Pressure test buried systems before backfilling.

.2 Hydraulically test to verify grades and freedom from obstructions.

3.4 PERFORMANCE VERIFICATION

.1 Cleanouts:

- .1 Ensure accessible and that access doors are correctly located.
- .2 Open, cover with linseed oil and re-seal.
- .3 Verify that cleanout rods can probe as far as the next cleanout, at least.

.2 Test to ensure traps are fully and permanently primed.

.3 Storm water drainage:

- .1 Verify domes are secure.
- .2 Ensure weirs are correctly sized and installed correctly.
- .3 Verify provisions for movement of roof system.

.4 Ensure that fixtures are properly anchored, connected to system and effectively vented.

.5 Affix applicable label (storm, sanitary, vent, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 21 05 01 – Common Work Results for Mechanical.

1.2 REFERENCES

.1 ASTM International Inc.

.1 ASTM D2235-04, Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.

.2 ASTM D2564-04e1, Standard Specification for Solvent Cements for PVC Plastic Piping Systems.

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA-Series B181.1, B181.2, B182.1, B182.2, B182.4 Thermoplastic Non-pressure Pipe, Compendium- B1800 Series.

.2 CAN/ULC S102.2

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for piping and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 60 00 -Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Store at temperatures and conditions recommended by manufacturer.

PART 2 PRODUCTS

2.1 MATERIAL

.1 Refer to manufacturers’ instruction on correct sealants and adhesives.

.2 Refer to Section 07 92 00 -Sealants.

2.2 PIPING AND FITTINGS

.1 For buried and above ground DWV piping to:

.1 CAN/CSA B1800.

2.3 JOINTS

.1 Solvent weld for PVC: to ASTM D2564.

.2 Solvent weld for ABS: to ASTM D2235.

PART 3 EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 In accordance with Section 23 05 05 - Installation of Pipework.

.2 Install in accordance with Ontario Building Code and local authority having jurisdiction.

.3 PVC DWV installed in HVAC plenums must be IPEX XFR or equal.

3.3 TESTING

.1 Pressure test buried systems before backfilling.

.2 Hydraulically test to verify grades and freedom from obstructions.

3.4 PERFORMANCE VERIFICATION

.1 Cleanouts:

- .1 Ensure accessible and that access doors are correctly located.
- .2 Open, cover with linseed oil and re-seal.
- .3 Verify cleanout rods can probe as far as the next cleanout, at least.

.2 Test to ensure traps are fully and permanently primed.

.3 Storm water drainage:

- .1 Verify domes are secure.
- .2 Ensure weirs are correctly sized and installed correctly.
- .3 Verify provisions for movement of roof system.

.4 Ensure fixtures are properly anchored, connected to system and effectively vented.

.5 Affix applicable label (storm, sanitary, vent, pump discharge) c/w directional arrows every floor or 4.5 m (whichever is less).

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 21 05 01 – Common Work Results for Mechanical

.2 22 11 16 – Domestic Water Piping

.3 22 13 17 – Drainage Waste and Vent Piping – Cast Iron and Copper

1.2 REFERENCES

.1 American National Standards Institute/Canadian Standards Association (ANSI/CSA)

.1 ANSI Z21.10.3A-2007/CSA 4.3-2007, Gas Water Heaters - Volume III-Storage Water Heaters, with Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous.

.2 Canadian Standards Association (CSA International)

.1 CSA B51-03(R2007), Boiler, Pressure Vessel, and Pressure Piping Code.

.2 CAN/CSA-B149.1-05, Natural Gas and Propane Installation Code.

.3 CAN/CSA-C309-M90(R2003), Performance Requirements for Glass-Lined Storage Tanks for Household Hot Water Service.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures .

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for domestic water heater, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Provide drawings pre-checked, stamped and signed by the General Contractor and the Mechanical Contractor.

.2 Indicate:

.1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance and engineering data for incorporation into manual specified in Section 21 05 01 – Common Work Results for Mechanical.

1.5 SCOPE OF WORK

.1 Provide new electric domestic hot water tank in mechanical mezzanine as shown on drawing M.400.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates paddling and packaging materials.

1.7 WARRANTY

.1 For the Work of this Section 22 30 05 - Domestic Water Heaters , 12 months warranty period prescribed in subsection GC 32.1 of General Conditions "C" is extended to number of years specified for each product.

.2 Contractor hereby warrants domestic water heaters in accordance with CCDC2, but for number of years specified for each product.

PART 2 PRODUCTS

2.1 ELECTRIC WATER HEATER (HWT)

.1 The heater shall be Gold Series Commercial Electric Model Number DRE52 as manufactured by A. O. Smith or approved equal. Heater(s) shall be rated at 18kW, 208 Volts, 1-phase, 60 cycle AC, and listed by Underwriters' Laboratories and approved to the NSF Standard 5 by UL.

.2 Tank shall be 190L (50 gallon) capacity.

.3 Tanks shall have 150 psi working pressure and be equipped with extruded high density anode. All internal surfaces of the heater(s) exposed to water shall be glasslined with an alkaline borosilicate composition that has been fused-to-steel by firing at a temperature range of 1400°F to 1600°F.

.4 Electric heating elements shall be low watt density.

.5 Each element shall be controlled by an individually mounted thermostat and high temperature cut-off switch.

.6 All internal circuits shall be fused.

.7 The outer jacket shall be of baked enamel finish and shall be provided with full size control compartment for performance of service and maintenance through hinged front panel and shall enclose the tank with foam insulation.

.8 Electrical junction box with heavy duty terminal block shall be provided.

.9 The drain valve shall be located in the front for ease of servicing.

.10 Heater tank shall have a three-year limited warranty as outlined in the written warranty.

.11 Manufacturer shall supply ASME rated temperature and pressure relief valve.

.12 Fully illustrated instruction manual to be included.

.13 Meets standby loss requirements of NRCan and current edition of ASHRAE/IES 90.1.

2.2 TRIM AND INSTRUMENTATION

.1 Drain valve: 19mm with hose end.

.2 Thermometer: 75 mm dial type with red pointer and thermowell filled with conductive paste.

.3 Pressure gauge: 75 mm dial type with red pointer, syphon, and shut-off cock.

.4 Thermowell filled with conductive paste for control valve temperature sensor.

.5 ASME rated temperature and pressure relief valve sized for full capacity of heater control valve, having discharge terminating over floor drain and visible to operators.

.6 This water heater shall be equipped with stainless steel cold water inlet, Hydrojet® Sediment Reduction System.

.7 The heater shall be insulated with Non-CFC foam.

.8 This water heater shall be equipped with an electronic ignition system,

.9 The entire installation shall be made in compliance with provincial and local codes and ordinances.

2.3 ANCHOR BOLTS AND TEMPLATES

.1 Supply anchor bolts and templates for installation.

PART 3 EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install in accordance with manufacturer's recommendations and authority having jurisdiction.

.2 Domestic heating boilers are installed on a new housekeeping pad.

.3 Refer to seismic restraint section of mechanical division work Vibration Isolation and Seismic Restraint 23 05 48

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's factory trained, certified Engineer shall start up and commission DHW heaters.

3.4 CLEANING

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for plumbing specialties and accessories.

.2 Related Sections:

.1 Section 01 33 00 – Submittals.

.2 Section 01 70 00 – Execution.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM).

.1 ASTM A126-95(2001), Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

.2 ASTM B62-02, Specification for Composition Bronze or Ounce Metal Castings.

.2 Canadian Standards Association (CSA International).

.1 CSA-B64 Series-01, Backflow Preventers and Vacuum Breakers.

.2 CSA-B79-94(R2000), Floor, Area and Shower Drains, and Cleanouts for Residential Construction.

.3 Plumbing and Drainage Institute (PDI).

.1 PDI-WH201-92, Water Hammer Arresters Standard.

1.3 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet for fixtures and equipment.

.2 Indicate dimensions, construction details and materials for specified items.

.3 Shop Drawings:

.1 Submit shop drawings to indicate materials, finishes, method of anchorage, number of anchors, dimensions, construction and assembly details.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Instructions: submit manufacturer's installation instructions.

.6 Manufacturers' Field Reports: manufacturers' field reports specified.

.7 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 70 00 –Execution, 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.

1.4 QUALITY ASSURANCE

.1 Pre-Installation Meetings:

.1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations.

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building sub-trades.

.4 Review manufacturer's installation instructions and warranty requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

PART 2 PRODUCTS

2.1 FLOOR DRAINS

.1 Floor Drains and Trench Drains: to CSA B79.

.2 Finished Area Floor Drains: Watts #FD-100-C-7-A5-1 Epoxy coated, cast iron body, reversible flashing clamp with primary and secondary weep holes, trap primer connection with plug, 3"Ø (76mm), no hub outlet. Watts #-A5-1 5" (127mm) diameter, nickel bronze, adjustable, round strainer.

.3 Floor drain with heavy duty grate Watts #FD-320-7-6-4 floor drain - epoxy coated, cast iron body, body collar with weep holes and membrane clamp, vandal proof, Trap primer connection with plug, anchor flange, no hub outlet. Watts -4 7-7/8" (200 mm) diameter epoxy coated ductile iron, heel-proof round grate.

.4 Finished Areas Funnel Floor Drain Watts #FD-100-C-EG-50-7-6 - epoxy coated, cast iron body, reversible flashing clamp with primary and secondary weep 22holes, 5" (127 mm) diameter nickel bronze, adjustable round strainer, 4" x 9" (102 mm x 229 mm) oval cast iron funnel, vandal proof, trap primer connection with plug, no hub outlet.

2.2 CLEANOUTS

.1 Watts #CO-200-R-1-34G Cleanout - Cleanout Plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.

.2 Access Covers:

.1 Wall Access: face or wall type, polished nickel bronze or stainless steel, square or round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.

.2 Floor Access: round cast iron body and frame with adjustable secured nickel bronze top and:

.1 Plugs: bolted bronze with neoprene gasket.

.2 Cover for Unfinished Concrete Floors: nickel bronze round or square, gasket, vandal-proof screws.

.3 Cover for Tile and Linoleum Floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.

.4 Cover for Terrazzo Floors: polished nickel bronze with recessed cover for Terrazzo infill, complete with vandal-proof locking screws.

.5 Cover for Carpeted Floors: polished nickel bronze with deep flange cover for carpet infill, complete with carpet retainer vandal-proof locking screws.

2.3 WATER HAMMER ARRESTORS

.1 Copper construction, bellows type: to PDI-WH201.

2.4 BACK FLOW PREVENTERS

.1 Preventers: to CSA-B64 Series, application for domestic water service entry 50mm, double check valve assembly back flow preventer with intermediate atmospheric vacuum breaker.

2.5 VACUUM BREAKERS

.1 Breakers: to CSA-B64 Series, vacuum breaker atmospheric.

2.6 BACKWATER VALVES

.1 Coated extra heavy cast iron body with bronze seat, revolving bronze flapper and threaded cover.

.2 Access:

.1 Surface access.

.2 Access pipe with cover: maximum 300 mm depth.

.3 Steel housing with gasket steel cover.

.4 Concrete access pit with cover, as indicated.

2.7 WALL HYDRANT NON FREEZE: (NFHB)

.1 Watts #HY-725 Hydrant non-freeze hydrant, all bronze head, seat casting and internal working parts, wall mount hydrant, concealed, bronze wall casing, chrome plated face, integral vacuum breaker, nickel bronze box and door, loose key, 3/4"Ø (19 mm) hose connection, 3/4"Ø (19 mm) female x 1"Ø (25 mm) male pipe connection.

2.8 WALL HYDRANT INDOOR (HB)

.1 Watts #SC8-6 Hydrant **-** cast brass, wall mount, Watts Model 8B tamper-proof hose end vacuum breaker with break-away screw, adjustable packing nut cartridge, no kink faucet, 3/4" (19 mm) male NPT, hex shoulder with tee handle.

2.9 LAUNDRY WALL BOX (WB)

.1 Oatey #38995 or approved equal., 20 gg steel wall box, 18 gg screw on faceplate.

.2 2 support brackets.

.3 12mm knockouts

.4 50mm drain opening

.5 ¼ turn brass valves copper sweat, 50mm rubber tailpiece.

2.10 EXPANSION TANK POTABLE WATER

.1 Expansion Tank For Potable Water System Watts DETA 12**,** prime painted, carbon steel shell, FDA approved butyl bladder, 0.301"-32 charging valve connection, 40 psi pre-charge pressure, 150 psi maximum pressure, 240°F maximum temperature, tank volume of 5 gallons (18.93 liters) with an acceptance volume of 3.3 gallons (12.49 liters), 12"Ø (305 mm) x 14" (356 mm) height, 3/4"Ø (19 mm) valve, NPT type, stainless steel system connection

2.11 TRAP SEAL PRIMERS

.1 P.P.P. #PT-6 Trap Seal Primer serving up to 6 drains, activated by a 3/4" (19 mm) normally closed solenoid valve, designed to interface with low voltage energy management systems control, 3/4" (19 mm) diameter connection anti-siphon atmospheric vacuum breaker.

2.12 GREASE INTERCEPTOR

.1 Epoxy coated steel, Grease Interceptor, PDI Certified Grease Interceptor, 15 GPM, no hub (standard) connections, external cast iron flow control fitting, epoxy coated steel.

.2 Basis of Design:

.1 Watts WD-15

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 INSTALLATION

.1 Install in accordance with Ontario Building Code and local authority having jurisdiction.

.2 Install in accordance with manufacturer's instructions and as specified.

3.3 CLEANOUTS

.1 Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required code, and as indicated.

.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 NPS4.

3.4 WATER HAMMER ARRESTORS

.1 Install on branch supplies to fixtures or group of fixtures where required.

3.5 BACK FLOW PREVENTORS

.1 Install in accordance with CSA-B64 Series, where indicated and elsewhere as required by code.

.2 Provide new backflow preventer at new HWT-1.

.3 Pipe discharge to terminate over nearest drain or service sink.

3.6 BACKWATER VALVES

.1 Install in main sewer lines and at weeping tile connection in pit, elevator pit drain and at building cleanout.

3.7 TRAP SEAL PRIMERS

.1 Install for new floor drains.

.2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed accessible space.

.3 Install plastic tubing to floor drain.

3.8 START-UP

.1 Timing: start-up only after:

.1 Pressure tests have been completed.

.2 Disinfection procedures have been completed.

.3 Certificate of static completion has been issued.

.4 Water treatment systems operational.

.2 Provide supervision during start-up.

3.9 TESTING AND ADJUSTING

.1 Timing:

.1 After start-up deficiencies rectified.

.2 After certificate of completion has been issued.

.2 Application tolerances:

.1 Pressure at fixtures: +/-70kPa.

.2 Flow rate at fixtures: +/- 20%.

.3 Adjustments:

.1 Verify that flow rate and pressure meet design criteria.

.2 Make adjustments while flow rate or withdrawal is (1) maximum and (2) 25% of maximum and while pressure is (1) maximum and (2) minimum.

.4 Floor drains:

.1 Verify operation of trap seal primer.

.2 Prime, using trap primer. Adjust flow rate to suit site conditions.

.3 Check operations of flushing features.

.4 Check security, accessibility, removability of strainer.

.5 Clean out baskets.

.5 Vacuum breakers, backflow preventers, backwater valves:

.1 Test tightness, accessibility for O&M of cover and of valve.

.2 Simulate reverse flow and back-pressure conditions to test operation of vacuum breakers, backflow preventers.

.3 Verify visibility of discharge from open ports.

.6 Roof drains:

.1 Check location at low points in roof.

.2 Check security, removability of dome.

.3 Adjust weirs to suit actual roof slopes, meet requirements of design.

.4 Clean out sumps.

.5 Verify provisions for movement of roof systems.

.7 Access doors:

.1 Verify size and location relative to items to be accessed.

.8 Cleanouts:

.1 Verify covers are gas-tight, secure, yet readily removable.

.9 Water hammer arrestors:

.1 Verify proper installation of correct type of water hammer arrester.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 22 13 17 – Drainage Waste Vent Cast Iron & Copper.

.2 22 13 18 – PVC Drainage Waste Vent – Plastic.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.

.2 CAN/CSA-B125.3-05, Plumbing Fittings.

.3 CAN/CSA-B651-04, Accessible Design for the Built Environment.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for washroom fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Indicate fixtures and trim:

.1 Dimensions, construction details, roughing-in dimensions.

.2 Factory-set water consumption per flush at recommended pressure.

.3 (For water closets, urinals): minimum pressure required for flushing.

.4 Shop Drawings:

.1 Provide drawings pre-checked stamped and signed by the General Contractor and the mechanical Contractor.

1.4 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for washroom fixtures, for incorporation into manual specified in Section 01 70 00 – Execution.

.2 Include:

.1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.

.2 Details of operation, servicing, maintenance.

.3 List of recommended spare parts.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates paddling and packaging materials.

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.

.2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.

.3 Exposed plumbing brass to be chrome plated.

.4 Number, locations: as indicated on the plumbing plans M400.

.5 Fixtures in any one location to be product of one manufacturer and of same type.

.6 Trim in any one location to be product of one manufacturer and of same type.

2.2 W1 - FLOOR MOUNTED TANK TYPE TOILET - VITREOUS CHINA - TANK TYPE

.1 CADET® PRO™, Tank type Toilet, Floor mounted with floor outlet, High Efficiency HET 4.8 LPF (1.28 GPF), White finish Vitreous china, EverClean® antimicrobial surface, Elongated bowl, Minimum 305 mm (12") rough-in from wall to the center of waste outlet, Siphon jet flush action, Manual, Polished chrome left-hand trip lever (7381231-200.0020A), Tank not lined, Without tank cover locking device, Gravity-assisted flush, Cadet® flushing system, 76 mm (3") flush valve, Tank coupling components, 229 x 203 mm (9" x 8") water surface area, Fully-glazed 54 mm (2-1/8") trapway, PowerWash™ rim scrubs bowl with pressurized water every flush, Includes EZ-Install Tools, Trade exclusive tank, Toilet seat not included, Colour-matched bolt caps, 441 mm (17-3/8") wide, 765 mm (30-1/8") from finished wall, 733 mm (28-7/8") high Compliances: ASME A112.19.2 compliant, CSA B45.1 compliant, EPA WaterSense® compliant.

.1 Basis of Design: American Standard 215CA104.020

.2 Seat

.1 Polypropylene, Heavy duty, 25 mm (1") high, Toilet seat, Open front, With seat cover, For commercial applications, 470 mm (18-1/2") long, 362 mm (14-1/4") wide

.2 Basis of Design: Centoco 820STSS-001

.3 Supply

.1 Lead free, Premiere heavy loose supply, Chrome-plated finish, 10 mm (3/8") I.P.S. x 10 mm (3/8") outer Ø heavy stop valve, 304 mm (12") steel braided risers, Convertible loose key handle, Toilet, Shallow steel flange

.2 Basis of Design: McGuire LFH166LK.

2.3 W2 - FLOOR MOUNTED TANK TYPE TOILET - VITREOUS CHINA - TANK TYPE

.1 CADET® PRO™, Tank type Toilet, Floor mounted with floor outlet, Low consumption 6.0 LPF (1.6 GPF), White finish Vitreous china, EverClean® antimicrobial surface, Elongated bowl, Right Height® rim at 419 mm (16-1/2"), Minimum 305 mm (12") rough-in from wall to the center of waste outlet, Siphon jet flush action, Manual, Polished chrome left-hand trip lever (7381231-200.0020A), Tank with Aquaguard liner, Without tank cover locking device, Gravity-assisted flush, Cadet® flushing system, 76 mm (3") flush valve, metal shank fill valve, Tank coupling components, 229 x 203 mm (9" x 8") water

surface area, Fully-glazed 54 mm (2-1/8") trapway, PowerWash™ rim scrubs bowl with pressurized water every flush, Includes EZ-Install Tools, Trade exclusive tank, Toilet seat not included, Colour-matched bolt caps, 441 mm (17-3/8") wide, 765 mm (30-1/8") from finished wall, 772 mm (30-3/8") high Compliances: ASME A112.19.2 compliant, CSA B45.1 compliant.

.1 Basis of Design: American Standard 215AA054.020

.2 Seat:

.1 Polypropylene, Light duty, 22 mm (7/8") high, Toilet seat, Open front, With seat cover, For commercial applications, 476 mm (18-3/4") long, 371 mm (14-5/8") wide

.2 Basis of Design: Centoco 620-001

.3 Supply:

.1 Lead free, Premiere heavy loose supply, Chrome-plated finish, 10 mm (3/8") I.P.S. x 10 mm (3/8") outer Ø heavy stop valve, 304 mm (12") steel braided risers, Convertible loose key handle, Toilet, Shallow steel flange

.2 Basis of Design: McGuire LFH166LK.

2.4 FIXTURE PIPING:

.1 Hot and cold water supplies to fixtures:

.1 Chrome plated flexible supply pipes with screwdriver stop, reducers, escutcheon.

.2 Waste:

.1 Brass P trap with clean out on fixtures not having integral trap.

.2 Chrome plated in exposed places.

.3 Safety covers for exposed drainage piping.

.2 Chair carriers:

.1 Factory manufactured floor-mounted carrier systems for wall-mounted fixtures.

PART 3 EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Mounting heights:

.1 Standard: to manufacturer's recommendations, measured from finished floor.

.2 Wall-hung fixtures: measured from finished floor.

.3 Barrier free: to most stringent CAN/CSA B651.

3.3 ADJUSTING

.1 Conform to water conservation requirements specified this section.

.2 Adjustments:

- .1 Adjust water flow rate to design flow rates.
- .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
- .3 Adjust flush valves to suit actual site conditions.
- .4 Adjust urinal flush timing mechanisms.
- .5 Set controls of automatic flush valves for WCs and urinals to prevent unnecessary flush cycles.

.3 Checks:

- .1 Water closets, urinals: flushing action.
- .2 Aerators: operation, cleanliness.
- .3 Vacuum breakers, backflow preventers: operation under all conditions.

.4 Thermostatic controls:

- .1 Verify temperature settings, operation of control, limit and safety controls.

3.4 CLEANING

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.

.2 CAN/CSA-B125.3-05, Plumbing Fittings.

.3 CAN/CSA-B651-04, Accessible Design for the Built Environment.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittals.

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data in accordance with Section 01 70 00 – Contract Closeout and Takeover Procedures.

.2 Include:

.1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.

.2 Details of operation, servicing, maintenance.

.3 List of recommended spare parts.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.

.2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.

.3 Exposed plumbing brass to be chrome plated.

.4 Number, locations: architectural drawings to govern.

.5 Fixtures to be product of one manufacturer.

.6 Trim to be product of one manufacturer.

.7 Acceptable fixture manufacturers: American Standard, Acorn, Crane, Kindred, Franke, Fiat, Kohler, Toto, Sloan.

2.3 L-1 – WALL MOUNTED BASIN

.1 White finish, Vitreous china, Wall-hung, DECORUM®, Single hole centerset, 508 mm (20") long, 464 mm (18-1/4") wide, Rear overflow, EverClean® antimicrobial surface, Soap dispenser, ANSI A117.1 compliant, 127 mm (5") deep, With faucet ledge, 187 mm (7-3/8") high, 354 mm (13-15/16") long, 325 mm (12-13/16") wide, Lavatory, No shroud.

.1 Basis of Design: American Standard 9024001EC.020

.2 Faucet

.1 Manual, Counter mounted, Single hole centerset, Vandal-resistant brass construction, Lavatory faucet, Polished chrome finish, 1.9 LPM (0.5 GPM) maximum flowrate, Integrated pedestal spout, Vandal-resistant pressure compensating non-aerated spray outlet, 106 mm (4-3/16") spout reach, 130 mm (5-1/8") high, Mechanical mixing valve, Flexible supply hose with 3/8" compression connection, Metering cartridge, Less drain, ANSI A117.1 compliant

.2 Basis of Design: American Standard 1340M107.002

.3 Fixture Drain

.1 Grid drain, For sinks, Brass construction, Polished chrome finish, 6-3/8" (162 mm) height, With overflow, 32 mm (1-1/4") tailpiece.

.2 Basis of Design: American Standard 2411.015.002

.4 Supply

.1 Lead free, Premiere heavy loose supply, Chrome-plated finish, Two 10 mm (3/8") I.P.S. x 10 mm (3/8") outer Ø heavy stop valve, 304 mm (12") steel braided risers, Convertible loose key handle, Lavatory, Shallow steel flange, 76 mm (3") long nipple.

.2 Basis of Design: McGuire LFH165LKN3SS12

.5 P-Trap

.1 Heavy cast brass, Adjustable p-trap, 292 mm (11-1/2") distance, With cleanout plug, Steel shallow flange, Neoprene gasket, Slipnuts, 17 gauge seamless tubular wall bend, ASME A112.18.2 CSA B125.2, CSA compliant.

.2 Basis of Design: McGuire 8872C.

.6 Carrier

.1 Wall mounted concealed Arm lavatory carrier with Back plate, Plated hardware.

.2 Basis of Design: Watts CA-461.

2.4 L-2 – BARRIER-FREE WALL MOUNTED BASIN

.1 White finish, Vitreous china, Wall-hung, MURRO, 102 mm (4") centerset, 545 mm (21-7/16") long, 540 mm (21-1/4") wide, Rear overflow, EverClean® antimicrobial surface, When installed with a below deck electronics faucet which has the control box, the accessories will not fit under the shroud and will need to be installed outside the shroud, Soap dispenser, ANSI A117.1 compliant, 127 mm (5") deep, Faucet ledge with recessed self-draining deck, 152 mm (6") high,

394 mm (15-1/2") long, 540 mm (21-1/4") wide, Lavatory, Vitreous china shroud/knee contact guard with EverClean (0059020EC).

.2 Basis of Design: American Standard 0954004EC.020 0059020EC.020

.3 Faucet:

.1 Manual, Counter mounted, 102 mm (4") centerset, Metal body, Lavatory faucet, Polished chrome finish, 4.5 LPM (1.2 GPM) maximum flowrate, Mid-arc spout, Pressure compensating aerator, 114 mm (4-1/2") spout reach, 108 mm (4-1/4") high, Less supply, Ceramic disc cartridge, metal drain, ANSI A117.1 compliant

.2 Basis of Design: American Standard 7075200.002

.4 Mixing Valve:

.1 The point of use mechanical mixing valve with thermostatic limit stop, MECHANICAL MIXING VALVE, Lead free brass body construction, The temperature adjusting dial is located on the cold inlet. Turning the dial clockwise will lower the outlet temperature, turning the dial counter-clockwise will raise it. The valve cannot be adjusted above its shut-off temperature of 120F, 1.8 LPM (0.5 GPM) tempered flowrate @ 5 PSI pressure drop, Compression Fitting, 84 mm (3-5/16") high, 3/8" MNPT (9.5 mm) inlet, 3/8" MNPT (9.5 mm) outlet, Iintegral rubber duck-bill backflow checks, ASSE 1070 approved ASSE lead free Certified for ASSE 1070 applications, High temperature limit stop, Automatically shuts down flow of water when temperature reaches 120 °F, 125 PSI max supply pressure, 5 PSI Minimum Operating pressure, 140 °F max, 8 LPM (2.1 GPM) flowrate @ 45 PSI, 118 °F ±3 °F, Protects against scalding and chilling

.2 Basis of Design: Lawler TMM-1070-87500

.5 Fixture Drain:

.1 Straight drain, Cast brass, Chrome-plated finish, Open grid PO plug, 7/32" (5.5 mm) Ø holes size, 17 gauge 32 mm (1-1/4") Ø tailpiece diameter, 17 gauge 17152 mm (6") long

.2 Basis of Design: McGuire 155A

.6 Supply:

.1 Lead free, 76 mm (3") long nipple, Convertible quarter-turn supply, Chrome-plated finish, Two 13 mm (1/2") I.P.S. x 10 mm (3/8") Ø brass ball valve, 304 mm (12") copper flexible risers, Convertible loose key handle, Lavatory, Two steel shallow flanges

.2 Basis of Design: McGuire LFBV2165N3

.7 P-Trap

.1 Heavy cast brass, Adjustable p-trap, 292 mm (11-1/2") distance, With cleanout plug, Steel shallow flange, Neoprene gasket, Slipnuts, 17-gauge seamless tubular wall bend, ASME A112.18.2 CSA B125.2, CSA compliant

.2 Basis of Design: McGuire 8872C

.8 Carrier

.1 Basis of Design: Watts WCA-411-CA-481

2.5 L-3 – WALL MOUNT BASIN, CORNER

.1 Canvas white finish, Fine fire clay, Wall-hung, COSSU™, Mounting kit supplied, Single hole centerset, 432 mm (17") long, 432 mm (17") wide, With overflow, ANSI A117.1 compliant, 108 mm (4-1/4") deep, With faucet ledge, 141 mm (5-9/16") high, 337 mm (13-1/4") long, 235 mm (9-1/4") wide, Lavatory, No shroud.

.1 Basis of Design: DXV D20040001.415

.2 Faucet:

.1 Manual, Counter mounted, Single hole centerset, Metal body, Lavatory faucet, Polished chrome finish, 4.5 LPM (1.2 GPM) maximum flowrate, Mid-arc spout, Pressure compensating aerator, 111 mm (4-3/8") spout reach, 157 mm (6-3/16") high, 610 mm (24") colour-coded braided flexible supply hoses with 10 mm (3/8") compression connections, Ceramic disc cartridge, 50/50 pop-up drain, ANSI A117.1 compliant

.3 Basis of Design: American Standard 7075102.002

.4 Mixing Valve:

.1 The point of use mechanical mixing valve with thermostatic limit stop, MECHANICAL MIXING VALVE, Lead free brass body construction, The temperature adjusting dial is located on the cold inlet. Turning the dial clockwise will lower the outlet temperature, turning the dial counter-clockwise will raise it. The valve cannot be adjusted above its shut-off temperature of 120F, 1.8 LPM (0.5 GPM) tempered flowrate @ 5 PSI pressure drop, Compression Fitting, 84 mm (3-5/16") high, 3/8" MNPT (9.5 mm) inlet, 3/8" MNPT (9.5 mm) outlet, Iintegral rubber duck-bill backflow checks, ASSE 1070 approved ASSE lead free Certified for ASSE 1070 applications, High temperature limit stop, Automatically shuts down flow of water when temperature reaches 120 °F, 125 PSI max supply pressure, 5 PSI Minimum Operating pressure, 140 °F max, 8 LPM (2.1 GPM) flowrate @ 45 PSI, 118 °F ±3 °F, Protects against scalding and chilling

.2 Basis of Design: Lawler TMM-1070-87500

.5 Fixture Drain:

.1 Grid drain, For wheelchair lavatory, Brass construction, Polished chrome finish, 267 mm (10-1/2") high, 4-3/4" to 5" offset, With overflow, 32 mm (1-1/4") tailpiece

.2 Basis of Design: American Standard 7723.018.002

.6 Supply:

.1 Lead free, 76 mm (3") long nipple, Convertible quarter-turn supply , Chrome-plated finish, Two 13 mm (1/2") I.P.S. x 10 mm (3/8") Ø brass ball valve, 304 mm (12") copper flexible risers, Convertible loose key handle, Lavatory, Two steel shallow flanges

.2 Basis of Design: McGuire LFBV2165N3

.7 P-Trap

.1 Heavy cast brass, Adjustable p-trap, 292 mm (11-1/2") distance, With cleanout plug, Steel shallow flange, Neoprene gasket, Slipnuts, 17 gauge seamless tubular wall bend, ASME A112.18.2 CSA B125.2, CSA compliant

.2 Basis of Design: McGuire 8872C

.8 Carrier

.1 Wall mounted concealed Arm lavatory carrier with Back plate, Plated hardware

.2 Basis of Design: Watts CA-461

2.6 L4 – WALL MOUNT BASIN

.1 White finish, Vitreous china, Wall-hung, PENLYN, 102 mm (4") centerset, 457 mm (18") long, 403 mm (15-7/8") wide, Front overflow, 127 mm (5") deep, With faucet ledge, 276 mm (10-7/8") high, 340 mm (13-3/8") long, 216 mm (8-1/2") wide, Lavatory, No shroud.

.1 Basis of Design: American Standard 0373027.020

.2 Faucet

.1 Manual, Counter mounted, 102 mm (4") centerset, Metal body, Lavatory faucet, Polished chrome finish, 4.5 LPM (1.2 GPM) maximum flowrate, Mid-arc spout, Pressure compensating aerator, 114 mm (4-1/2") spout reach, 108 mm (4-1/4") high, Less supply, Ceramic disc cartridge, metal drain, ANSI A117.1 compliant

.2 Basis of Design: American Standard 7075200.002

.3 Mixing Valve:

.1 The point of use mechanical mixing valve with thermostatic limit stop, mechanical mixing valve, Lead free brass body construction, The temperature adjusting dial is located on the cold inlet. Turning the dial clockwise will lower the outlet temperature, turning the dial counter-clockwise will raise it. The valve cannot be adjusted above its shut-off temperature of 120F, 1.8 LPM (0.5 GPM) tempered flowrate @ 5 PSI pressure drop, Compression Fitting, 84 mm (3-5/16") high, 3/8" MNPT (9.5 mm) inlet, 3/8" MNPT (9.5 mm) outlet, Iintegral rubber duck-bill backflow checks, ASSE 1070 approved ASSE lead free Certified for ASSE 1070 applications, High temperature limit stop, Automatically shuts down flow of water when temperature reaches 120 °F, 125 PSI max supply pressure, 5 PSI Minimum Operating pressure, 140 °F max, 8 LPM (2.1 GPM) flowrate @ 45 PSI, 118 °F ±3 °F, Protects against scalding and chilling

.2 Basis of Design: Lawler TMM-1070-87500

.4 Fixture Drain:

.1 offset drain, offset lavatory strainer, Lavatory, Cast brass, Chrome-plated finish, Inorganic microbial compound, 7/32" (5.5 mm) Ø holes size, Polished chrome, Cast brass elbow, 17 gauge 32 mm (1-1/4") Ø tailpiece diameter, 146 mm (5-3/4") offset

.2 Basis of Design: McGuire 155WC

.5 Supply

.1 Lead free, 127 mm (5") length, Convertible quarter-turn supply , Chrome-plated finish, 13 mm (1/2") copper sweat x 10 mm (3/8") outer Ø brass ball valve, 304 mm (12") copper flexible risers, Convertible loose key handle, Lavatory, One deep bell flange

.2 Basis of Design: McGuire LFBV170

.6 P-Trap

.1 Heavy cast brass, Adjustable p-trap, 292 mm (11-1/2") distance, With cleanout plug, Steel shallow flange, Neoprene gasket, Slipnuts, 17 gauge seamless tubular wall bend, ASME A112.18.2 CSA B125.2, CSA compliant

.2 Basis of Design: McGuire 8872C

.7 Carrier

.1 Basis of Design: Watts CA-462

2.7 S-1 SINGLE BOWL COUNTERTOP MOUNT SINK STAINLESS STEEL

.1 Counter mounted, Stainless steel, Polished to #4 satin finish, Topmount commercial sinks, Single compartment, 3 faucet holes; 1-1/2" diameter; 4" centers; 8" centerset, 127 mm (5") deep, 508 mm (20") long, 356 mm (14") wide, 127 mm (5") high, 478 mm (18-13/16") wide, With faucet ledge, Center back waste location, Factory applied rim seal

.1 Basis of Design: Franke Commercial ALBS4005P-1-3-1300G

.2 Faucet:

.1 Manual, Counter mounted, 203 mm (8") centerset, Metal body, Sink faucet, Polished chrome finish, 8.3 LPM (2.2 GPM) maximum flowrate, High-arc spout, Pressure compensating spray outlet, Adjustable spray pattern, 222 mm (8-3/4") spout reach, 138 mm (5-7/16") high, Braided flexible stainless steel supply hoses with 10 mm (3/8") compression connections, Ceramic disc cartridges, Less drain, ANSI A117.1 compliant

.2 Basis of Design: American Standard 4433300.002

.3 Mixing Valve

.1 The point of use mechanical mixing valve with thermostatic limit stop, MECHANICAL MIXING VALVE, Lead free brass body construction, The temperature adjusting dial is located on the cold inlet. Turning the dial clockwise will lower the outlet temperature, turning the dial counter-clockwise will raise it. The valve cannot be adjusted above its shut-off temperature of 120F, 1.8 LPM (0.5 GPM) tempered flowrate @ 5 PSI pressure drop, Compression Fitting, 84 mm (3-5/16") high, 3/8" MNPT (9.5 mm) inlet, 3/8" MNPT (9.5 mm) outlet, Iintegral rubber duck-bill backflow checks, ASSE 1070 approved ASSE lead free Certified for ASSE 1070 applications, High temperature limit stop, Automatically shuts down flow of water when temperature reaches 120 °F, 125 PSI max supply pressure, 5 PSI Minimum Operating pressure, 140 °F max, 8 LPM (2.1 GPM) flowrate @ 45 PSI, 118 °F ±3 °F, Protects against scalding and chilling

.2 Basis of Design: Lawler TMM-1070-87500

.4 Supply:

.1 Lead free, Pipe to compression, Integral check supply kit, Chrome-plated finish, 3/8" I.P.S x 3/8" O.D, 305 mm (12") chrome-plated risers, Loose key, Faucet, Shallow wall flange

.2 Basis of Design: McGuire LFCK165LK

.5 P-Trap:

.1 Heavy cast brass, Adjustable p-trap, 349 mm (13-3/4") length, With cleanout plug, Shallow steel flange, Seamless tubular brass bend, Slipnuts

.2 Basis of Design: McGuire 8903C.

.6 Mounting elevation shall be per architect's plans and details.

2.8 S2 SINGLE BOWL CONTERTOP MOUNT SINK, STAINLESS STEEL.

.1 Counter mounted, Stainless steel, Polished to #4 satin finish, Topmount commercial sinks, Single compartment, 1 faucet hole; 1-1/2" diameter, 127 mm (5") deep, 508 mm (20") long, 356 mm (14") wide, 127 mm (5") high, 478 mm (18-13/16") wide, With faucet ledge, Center back waste location, Factory applied rim seal

.1 Basis of Design: Franke Commercial ALBS4005P-1-1-1300G

.2 Faucet

.1 Automatic no-touch, Counter mounted, Single hole centerset, Brass spout, Sink/lavatory faucet, Polished chrome finish, 5.7 LPM (1.5 GPM) maximum flowrate, Gooseneck spout, Laminar spray outlet, 147 mm (5-7/8") spout reach, 355 mm (13-31/32") high, Battery powered, Without mechanical mixing valve, Water supply connection with flexible high pressure hose, Double infrared sensor, Less drain, ANSI A117.1 compliant

.2 Basis of Design: Sloan EAF-750

.3 Mixing Valve

.1 The point of use mechanical mixing valve with thermostatic limit stop, MECHANICAL MIXING VALVE, Lead free brass body construction, The temperature adjusting dial is located on the cold inlet. Turning the dial clockwise will lower the outlet temperature, turning the dial counter-clockwise will raise it. The valve cannot be adjusted above its shut-off temperature of 120F, 1.8 LPM (0.5 GPM) tempered flowrate @ 5 PSI pressure drop, Compression Fitting, 84 mm (3-5/16") high, 3/8" MNPT (9.5 mm) inlet, 3/8" MNPT (9.5 mm) outlet, Iintegral rubber duck-bill backflow checks, ASSE 1070 approved ASSE lead free Certified for ASSE 1070 applications, High temperature limit stop, Automatically shuts down flow of water when temperature reaches 120 °F, 125 PSI max supply pressure, 5 PSI Minimum Operating pressure, 140 °F max, 8 LPM (2.1 GPM) flowrate @ 45 PSI, 118 °F ±3 °F, Protects against scalding and chilling

.2 Basis of Design: Lawler TMM-1070-87500

.4 Supply

.1 Lead free, Pipe to compression, Integral check supply kit, Chrome-plated finish, 3/8" I.P.S x 3/8" O.D, 305 mm (12") chrome-plated risers, Loose key, Faucet, Shallow wall flange

.2 Basis of Design: McGuire LFCK165LK

.5 P-Trap

.1 Heavy cast brass, Adjustable p-trap, 349 mm (13-3/4") length, With cleanout plug, Shallow steel flange, Seamless tubular brass bend, Slipnuts

.2 Basis of Design: McGuire 8903C.

2.9 S-3 TRIPLE BOWL COUNTERTOP MOUNT SINK, STAINLESS STEEL.

.1 Bottom grid (BG10S) (112.0044.785), Counter mounted, Stainless steel, Polished to satin finish, Kitchen sink, Triple compartment, Single hole centerset, Left bowl is 203 mm (8") deep, middle bowl is 152 mm (6") deep and right bowl is 203 mm (8") deep, Left bowl is 356 mm (14") long, middle bowl is 235 mm (9-1/4") long and right bowl is 356 mm (14") long, Left bowl is 406 mm (16") wide, middle bowl is 295 mm (11-5/8") wide and right bowl is 406 mm (16") wide, 203 mm (8") high, 460 mm (18-1/8") wide, With faucet ledge, Center back waste location, Mirror finish

.1 Basis of Design: Kindred QTCM1841-8-1-BG10S

.2 Faucet

.1 Manual, Counter mounted, Single hole centerset, Metal body, Bar sink faucet, Polished chrome finish, 5.7 LPM (1.5 GPM) maximum flowrate, High-arc spout, Pressure compensating spray outlet, 164 mm (6-7/16") spout reach, 356 mm (14") high, Braided flexible stainless steel supply hoses with 10 mm (3/8") compression connections, Ceramic disc cartridges, Less drain, ANSI A117.1 compliant

.2 Basis of Design: American Standard 4433410F15.002

.3 Mixing Valve

.1 The point of use mechanical mixing valve with thermostatic limit stop, MECHANICAL MIXING VALVE, Lead free brass body construction, The temperature adjusting dial is located on the cold inlet. Turning the dial clockwise will lower the outlet temperature, turning the dial counter-clockwise will raise it. The valve cannot be adjusted above its shut-off temperature of 120F, 1.8 LPM (0.5 GPM) tempered flowrate @ 5 PSI pressure drop, Compression Fitting, 84 mm (3-5/16") high, 3/8" MNPT (9.5 mm) inlet, 3/8" MNPT (9.5 mm) outlet, Iintegral rubber duck-bill backflow checks, ASSE 1070 approved ASSE lead free Certified for ASSE 1070 applications, High temperature limit stop, Automatically shuts down flow of water when temperature reaches 120 °F, 125 PSI max supply pressure, 5 PSI Minimum Operating pressure, 140 °F max, 8 LPM (2.1 GPM) flowrate @ 45 PSI, 118 °F ±3 °F, Protects against scalding and chilling

.2 Basis of Design: Lawler TMM-1070-87500

.4 Supply

.1 Lead free, Pipe to compression, Integral check supply kit, Chrome-plated finish, 3/8" I.P.S x 3/8" O.D, 305 mm (12") chrome-plated risers, Loose key, Faucet, Shallow wall flange

.2 Basis of Design: McGuire LFCK165LK

.5 P-Trap

.1 Heavy cast brass, Adjustable p-trap, 349 mm (13-3/4") length, With cleanout plug, Shallow steel flange, Seamless tubular brass bend, Slipnuts

.2 Basis of Design: McGuire 8903C

PART 3 EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Mounting heights:

.1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.

.2 Wall-hung fixtures: measured from finished floor.

.3 Physically handicapped: to comply with most stringent of either OBC or CAN/CSA-B651.

3.3 ADJUSTING

.1 Conform to water conservation requirements specified this section.

.2 Adjustments:

.1 Adjust water flow rate to design flow rates.

.2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.

.3 Checks:

.1 Aerators: operation, cleanliness.

.2 Vacuum breakers, backflow preventers: operation under all conditions.

.3 Wash fountains: operation of flow-actuating devices.

.4 Thermostatic controls:

.1 Verify temperature settings, operation of control, limit and safety controls.

3.4 CLEANING

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse or recycling.

END OF SECTION

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Division 23 - Heating, Ventilating and Air Conditioning (HVAC)

END OF TABLE

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Use of mechanical systems during construction.

1.2 USE OF SYSTEMS

.1 Use of new permanent heating and ventilating systems for supplying temporary heat or ventilation is permitted only under following conditions:

.1 Entire system is complete, pressure tested, cleaned, flushed out.

.2 Building has been closed in, areas to be heated/ventilated are clean and will not thereafter be subjected to dust-producing processes.

.3 Portable heating and cooling systems have been removed from the area.

.4 There is no possibility of damage.

.5 Supply ventilation systems are protected by 60% filters, inspected daily, changed every week or more frequently as required.

.6 Return systems have approved filters over openings, inlets, outlets.

.7 Systems will be:

.1 Operated as per manufacturer's recommendations and instructions.

.2 Operated by Contractor.

.3 Monitored continuously by Contractor.

.8 Warranties and guarantees are not relaxed.

.9 Regular preventive and other manufacturers recommended maintenance routines are performed by Contractor at own expense and under supervision of the Consultant.

.10 Refurbish entire system before static completion; clean internally and externally, restore to "as- new" condition, replace filters in air systems.

.2 Filters specified in this Section are over and above those specified in other Sections of this project.

.3 Exhaust systems are not included in approvals for temporary ventilation.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181-[99], Ready-Mixed Organic Zinc-Rich Coating.

.2 Ontario Fire Code (OFC 2007)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 21 05 01 Common Work Results for Mechanical.

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheets for piping and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for re-use, recycling.

PART 2 PRODUCTS

2.1 MATERIAL

.1 Paint: zinc-rich to CAN/CGSB-1.181.

.1 Primers, Paints, in accordance with manufacturer's recommendations for surface conditions.

.2 Sealants: in accordance with Section 07 90 00 – Sealants.

.3 Fire Stopping: in accordance with Section 07 85 00 - Fire Stopping.

PART 3 EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage, installation instructions, and datasheets.

3.2 CONNECTIONS TO EQUIPMENT

.1 In accordance with manufacturer's instructions unless otherwise indicated.

.2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.

.3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

3.3 CLEARANCES

.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer and Ontario Fire Code.

.2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer, without interrupting operation of other system, equipment, components.

3.4 DRAINS

.1 Install piping with grade in direction of flow except as indicated.

.2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.

.3 Pipe each drain valve discharge separately to above floor drain.

.1 Discharge to be visible.

.4 Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

3.5 AIR VENTS

.1 Install automatic air vents to at high points in piping systems.

.2 Install isolating valve at each automatic air valve.

.3 Install drain piping to approved location and terminate where discharge is visible.

3.6 DIELECTRIC COUPLINGS

.1 General: compatible with system, to suit pressure rating of system.

.2 Locations: where dissimilar metals are joined.

.3 NPS 2 and under: isolating unions or bronze valves.

.4 Over NPS 2: isolating flanges.

3.7 PIPEWORK INSTALLATION

.1 Install pipework to CSA B139.

.2 Screwed fittings jointed with Teflon tape.

.3 Protect openings against entry of foreign material.

.4 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.

.5 Assemble piping using fittings manufactured to ANSI standards.

.6 Saddle type branch fittings may be used on mains if branch line is no larger than half size of main.

.1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.

.7 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.

.8 Install concealed pipework to minimize furring space, maximize headroom, and conserve space.

.9 Slope piping, except where indicated, in direction of flow for positive drainage and venting.

.10 Install, except where indicated, to permit separate thermal insulation of each pipe.

.11 Group piping wherever possible.

.12 Ream pipes, remove scale and other foreign material before assembly.

.13 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.

.14 Provide for thermal expansion as indicated.

.15 Valves:

.1 Install in accessible locations.

.2 Remove interior parts before soldering.

.3 Install with stems above horizontal position unless indicated.

.4 Valves accessible for maintenance without removing adjacent piping.

.5 Install globe valves in bypass around control valves.

.6 Use ball valves at branch take-offs for isolating purposes except where specified.

.16 Check Valves:

.1 Install silent check valves on discharge of pumps.

3.8 SLEEVES

.1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and as indicated.

.2 Material: schedule 40 black steel pipe.

.3 Construction: use annular fins continuously welded at mid-point at foundation walls and where sleeves extend above finished floors.

.4 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Installation:

.1 Concrete, masonry walls, concrete floors on grade: terminate flush with finished surface.

.2 Other floors: terminate 25 mm above finished floor.

.3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.

.6 Sealing:

.1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.

.2 Elsewhere:

.1 Provide space for fire-stopping.

.2 Maintain fire rating integrity.

.3 Sleeves installed for future use: fill with lime plaster or other easily removable filler.

.4 Ensure no contact between copper pipe or tube and sleeve.

3.9 ESCUTCHEONS

.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.

.2 Construction: one piece type with set screws.

.1 Chrome or nickel plated brass or type 302 stainless steel..

.3 Sizes: outside diameter to cover opening or sleeve.

.1 Inside diameter to fit around pipe or outside of insulation if so provided.

3.10 PREPARATION FOR FIRE STOPPING

.1 Install fire-stopping within annular space between pipes, ducts, insulation and adjacent fire separation in accordance with Section 07 85 00 - Fire Stopping.

.2 Insulated pipes and ducts: ensure integrity of insulation and vapour barriers.

3.11 FLUSHING OUT OF PIPING SYSTEMS

.1 Before start-up, clean interior of piping systems in accordance with requirements of Section 01 70 00 – Execution Requirements, supplemented as specified in relevant mechanical sections.

.2 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.12 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

.1 Advise Consultant 48 hours minimum prior to performance of pressure tests.

.2 Pipework: test as specified in relevant sections of heating, ventilating and air conditioning work.

.3 Maintain specified test pressure without loss for 4 hours minimum unless specified for longer period of time in relevant mechanical sections.

.4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.

.5 Pay costs for repairs or replacement, retesting, and making good.

.6 Insulate or conceal work only after approval and certification of tests by Consultant.

3.13 CLEANING

.1 Clean in accordance with Section 01 70 00 – Execution Requirements.

.2 Remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Separate waste materials for reuse, recycling.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation for thermometers and pressure gauges in piping systems.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 70 00 - Execution Requirements

.3 Section 23 05 53 - Mechanical Identification.

.4 Section 23 52 00 – Heating Boilers

1.3 REFERENCES

.1 American Society of Mechanical Engineers (ASME).

.1 ASME B40.100-01, Pressure Gauges and Gauge Attachments.

.2 ASME B40.200-01, Thermometers, Direct Reading and Remote Reading.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-14.4-M88, Thermometers, Liquid-in-Glass, Self-Indicating, Commercial/Industrial Type.

.2 CAN/CGSB-14.5-M88, Thermometers, Bimetallic, Self-Indicating, Commercial/Industrial Type.

1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit shop drawings and product data.

.3 Submit manufacturer's product data for following items:

.1 Thermometers.

.2 Pressure gauges.

.3 Stop cocks.

.4 Siphons.

.5 Wells.

PART 2 PRODUCTS

2.1 GENERAL

.1 Design point to be at mid-point of scale or range.

.2 Ranges: as indicated.

2.2 DIRECT READING THERMOMETERS

.1 Industrial, variable angle type, liquid filled, 125mm scale length: to CAN/CGSB14.4 ASME B40.200.

2.3 REMOTE READING THERMOMETERS

.1 100 mm diameter mercury-free liquid filled vapour activated dial type: to CAN/CGSB-14.5 ASME B40.200 , accuracy within one scale division, brass movement, stainless steel capillary, stainless steel spiral armour, stainless steel bulb and polished brass or stainless steel case for wall mounting.

2.4 THERMOMETER WELLS

.1 Copper pipe: copper or bronze.

.2 Steel pipe: brass or stainless steel.

2.5 PRESSURE GAUGES

.1 112 mm, dial type: to ASME B40.100, Grade 2A, stainless steel phosphor bronze bourdon tube having 0.5% accuracy full scale unless otherwise specified.

.2 Provide:

.1 Snubber for pulsating operation.

.2 Gasketted pressure relief back with solid front.

.3 Bronze stop cock.

.4 Oil filled for high vibration applications.

PART 3 EXECUTION

3.1 GENERAL

.1 Install so they can be easily read from floor or platform. If this cannot be accomplished, install remote reading units.

.2 Install between equipment and first fitting or valve.

3.2 THERMOMETERS

.1 Install in wells on piping. Provide heat conductive material inside well.

.2 Install in locations as indicated and on inlet and outlet of:

.1 DHW tanks

.2 Central mixing valves.

.3 Install wells for balancing purposes.

.4 Use extensions where thermometers are installed through insulation.

3.3 PRESSURE GAUGES

.1 Install in following locations:

.1 Outlet of domestic hot water tank.

.2 Install gauge cocks for balancing purposes, elsewhere as indicated.

.3 Use extensions where pressure gauges are installed through insulation.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Bronze - valves.

.2 Related Sections:

.1 Section 01 33 00 - Submittals.
.2 Section 01 70 00 – Execution Requirements.
.3 Section 23 05 01 - Installation of Pipework.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/ American Society of Mechanical Engineers (ASME).

.1 ANSI/ASME B1.20.1-1983(R2001), Pipe Threads, General Purpose (Inch).
.2 ANSI/ASME B16.18-2001, Cast Copper Alloy Solder Joint Pressure Fittings.

.2 American Society for Testing and Materials International, (ASTM).

.1 ASTM A276-04, Specification for Stainless Steel Bars and Shapes.
.2 ASTM B62-02, Specification for Composition Bronze or Ounce Metal Castings.
.3 ASTM B283-99a, Specification for Copper and Copper Alloy Die Forgings (Hot-Pressed).
.4 ASTM B505/B505M-02, Specification for Copper-Base Alloy Continuous Castings.

.3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).

.1 MSS-SP-25-1998, Standard Marking System for Valves, Fittings, Flanges and Unions.
.2 MSS-SP-80-2003, Bronze Gate Globe, Angle and Check Valves.
.3 MSS-SP-110-1996, Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.3 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit data for valves specified in this section.

.3 Closeout Submittals:

.1 Submit maintenance data for incorporation into manual specified in Section 01 70 00 - Execution Requirements.

1.4 QUALITY ASSURANCE

.1 Provide Quality Assurance in accordance with section 01450 Quality Control.

1.5 MAINTENANCE

.1 Extra Materials:

.2 Furnish following spare parts:

.1 Valve seats: one for every 10 valves each size, minimum 1.

.2 Discs: one for every 10 valves, each size. Minimum 1.

.3 Stem packing: one for every 10 valves, each size. Minimum 1.

.4 Valve handles: 2 of each size.

.5 Gaskets for flanges: one for every 10 flanged joints.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Valves:

.1 Except for specialty valves, to be single manufacturer.

.2 All products to have CRN registration numbers.

.2 End Connections:

.1 Connection into adjacent piping/tubing:

.1 Steel pipe systems: Screwed ends to ANSI/ASME B1.20.1.

.2 Copper tube systems: Solder ends to ANSI/ASME B16.18.

.3 Lockshield Keys:

.1 Where lock shield valves are specified, provide 10 keys of each size: malleable iron cadmium plated.

.4 Gate Valves:

.1 Requirements common to gate valves, unless specified otherwise:

.1 Standard specification: MSS SP-80.

.2 Bonnet: union with hexagonal shoulders.

.3 Connections: screwed with hexagonal shoulders.

.4 Inspection and pressure testing: to MSS SP-80. Tests to be hydrostatic.

.5 Packing: non-asbestos.

.6 Handwheel: non-ferrous.

.7 Handwheel Nut: bronze to ASTM B62.

.2 NPS 2 and under, rising stem, solid wedge disc, Class 125:

.1 Body: with long disc guides, screwed bonnet.

.2 Operator: Handwheel.

.5 Globe Valves:

.1 Requirements common to globe valves, unless specified otherwise:
- .1 Standard specification: MSS SP-80.
- .2 Bonnet: union with hexagonal shoulders.
- .3 Connections: screwed with hexagonal shoulders.
- .4 Pressure testing: to MSS SP-80. Tests to be hydrostatic.
- .5 Stuffing box: threaded to bonnet with gland follower, packing nut, high grade non-asbestos packing.
- .6 Handwheel: non-ferrous.
- .7 Handwheel Nut: bronze to ASTM B62.

.2 NPS 2 and under, composition disc, Class 125:
- .1 Body and bonnet: screwed bonnet.
- .2 Operator: Handwheel Lockshield .

.6 Check Valves:

.1 Requirements common to check valves, unless specified otherwise:
- .1 Standard specification: MSS SP-80.
- .2 Connections: screwed with hexagonal shoulders.

.2 NPS 2 and under, swing type, bronze disc, Class 125:
- .1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.
- .2 Disc and seat: renewable rotating disc, two-piece hinge disc construction; seat: regrindable.

.3 NPS 2 and under, swing type, bronze disc:
- .1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.
- .2 Disc and seat: renewable rotating disc, two-piece hinge disc construction; seat: regrindable.

.4 NPS 2 and under, vertical lift type, bronze disc, Class 125:
- .1 Disc: rotating disc having guides top and bottom, disc guides, retaining rings.

.7 Silent Check Valves:

.1 NPS 2 and under:
- .1 Body: cast high tensile bronze to ASTM B62 with integral seat.
- .2 Pressure rating: Class 125 .
- .3 Connections: screwed ends to ANSI B1.20.1 and with hex. shoulders.
- .4 Disc and seat: renewable rotating disc.
- .5 Stainless steel spring, heavy duty for vertical down flow applications
- .6 Seat: re-grindable.

.8 Ball Valves:

.1 NPS 2 and under:
- .1 Body and cap: cast high tensile bronze to ASTM B62.
- .2 Pressure rating: Class125

.3 Connections: Screwed ends to ANSI B1.20.1 and with hexagonal shoulders.

.4 Stem: tamperproof ball drive.

.5 Stem packing nut: external to body.

.6 Ball and seat: replaceable stainless steel hard chrome solid ball and teflon seats.

.7 Stem seal: TFE with external packing nut.

.8 Operator: removable lever handle.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install rising stem valves in upright position with stem above horizontal.

.2 Remove internal parts before soldering.

.3 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance, and equipment removal.

.4 Provide isolation ball valves at each hose reel water supply.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Valves Cast Steel, gate, globe, and check.

.2 Sustainable requirements for construction and verification.

.1 .

.3 Related Sections:

.1 Section 21 05 01 Common Work Results for Mechanical.

.2 Section 23 05 01 - Installation of Pipework.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME).

.1 ANSI/ASME B16.5-2003, Pipe Flanges and Flanged Fittings.

.2 ANSI/ASME B16.10-1992, Face-to-Face and End-to-End Dimensions Valves.

.3 ANSI/ASME B16.34-1996, Valves - Flanged, Threaded and Welding End.

.2 American Petroleum Institute (API).

.1 API 598-1996, Valve Inspection and Testing.

.3 American Society for Testing and Materials International, (ASTM).

.1 ASTM A49-01, Specification for Heat-Treated Carbon Steel Joint Bars.

.2 ASTM A193/A193M-04, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.

.3 ASTM A194/A194M-03b, Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.

.4 ASTM A216/A216M-1993(03), Specification for Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service.

.5 ASTM B85-03, Specification for Aluminum-Alloy Die Castings.

.4 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).

.1 MSS SP-25-1998, Standard Marking System for Valves, Fittings, Flanges and Unions.

.2 MSS SP-61-2003, Pressure Testing of Steel Valves.

1.3 SUBMITTALS

.1 Submit product data in accordance Section 21 05 01 Common Work Results for Mechanical.

.2 Closeout Submittals:

.1 Submit maintenance data for incorporation into manual.

1.4 QUALITY ASSURANCE

1.5 DELIVERY STORAGE AND DISPOSAL

.1 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

1.6 MAINTENANCE

.1 Extra Materials:

.2 Furnish following spare parts:

.1 Valve seats: one for every 10 valves each size, minimum 1 .

.2 Discs: one for every 10 valves, each size, minimum 1 .

.3 Stem packing: one for every 10 valves, each size. Minimum 1 .

.4 Valve handles: 2 of each size.

.5 Gaskets for flanges: one for every 10 flanged joints.

PART 2 PRODUCTS

2.1 MATERIAL

.1 Valves:

.1 Except for specialty valves, to be of single manufacturer.

.2 Valves to be individually tested.

.2 Requirements common to valves, unless specified otherwise:

.1 Pressure-temperature ratings: to ANSI B16.34.

.2 Inspections and tests: to API 598.

.3 Pressure Testing: to MSS SP-61.

.4 Flanged valves:

.1 Face-to-face dimensions: to ANSI B16.10.

.2 Flange dimensions: to ANSI B16.5 with 1.6 mm raised face.

.5 Butt-weld valves:

.1 End-to-end dimensions: to ANSI B16.10.

.2 End dimensions: to ANSI B16.25 bored for standard pipe schedule .

.6 Handwheel: non-heating type with raised rim of die-cast aluminum alloy to ASTM B85 or malleable iron to ASTM A49.

.7 Markings: to MSS SP-25.

.8 Identification:

.1 Plate showing catalogue number, size, material of body disc, stem seat, fluid, pressure-temperature rating.

.2 Body markings: manufacturer, size, primary service rating, material symbol.

.9 CRN registration number required for all products.

2.2 GATE VALVES

.1 NPS 2 1/2 - 12, rising stem, OS&Y, solid wedge disc, flanged ends, Class 150 :

.1 Body and multiple-bolted integral yoke and bonnet: cast steel to ASTM A216/A216M WCB, with full length disc guides designed to ensure correct re-assembly.

.2 Body/bonnet joint: Flat Male-female face with corrugated metallic gasket.

.3 Bonnet studs: to ASTM A193/A193M Type B7.

.4 Bonnet nuts: to ASTM A194/A194M Type 2H.

.5 Stuffing box: including non-galling two-piece ball jointed packing gland, with swing-type eye bolts and nuts.

.6 Gland packing: containing corrosion inhibitor to prevent stem pitting.

.7 Yoke sleeve: Ni-Resist, minimum melting point above 954 degrees C.

.8 Hydraulic grease fitting: for lubrication of yoke sleeve bearing surfaces.

.9 Disc: with disc stem ring to connect to stem, guided throughout its travel.

.1 NPS 2 1/2 - 6: Solid corrosion and heat resistant 13% chromium steel with minimum hardness of 350 HB.

.2 NPS 8 and larger: Carbon steel faced with corrosion and heat resistant 13 chromium steel with minimum hardness of 350 HB.

.10 Seat ring: seamless carbon steel with hard-faced cobalt-chromium-tungsten alloy seating surface, slipped in, seal welded, ground to match disc.

.11 Stem: heat treated corrosion and heat resistant 13% chromium steel with accurately-cut precision-machined Acme or 60 degrees V threads, top screwed for handwheel nut, T-head disc-stem connection.

.12 Operator: see elsewhere this section.

2.3 GLOBE VALVES

.1 NPS 2 1/2 - 12, rising stem, OS&Y, flanged butt-weld ends, Class 150 :

.1 Body and multiple-bolted integral yoke and bonnet: cast steel to ASTM A216/A216M WCB.

.2 Body/bonnet joint: Flat face with corrugated metallic gasket.

.3 Bonnet studs: to ASTM A193/A193M Type B7.

.4 Bonnet nuts: to ASTM A194/A194M Type 2H.

.5 Stuffing box: including non-galling two-piece ball-jointed packing gland, with swing-type eye bolts and nuts.

.6 Gland packing: containing corrosion inhibitor to prevent stem pitting.

.7 Yoke bushing: Ni-Resist, minimum melting point above 954 degrees C.

.8 Hydraulic grease fitting: for lubrication of yoke sleeve bearing surfaces.

.9 Disc: ball type with 35 degrees taper seat.

.10 Seat rings: with 1.6 mm thick cobalt-chromium-tungsten alloy facings with minimum hardness of 375 HB (cold), slipped in, seal welded, ground to match disc.

.11 Stem: heat treated corrosion and heat resistant 13% chromium steel with bonnet bushing, long engagement with yoke bushing for accurate seating,

accurately-cut precision-machined Acme or 60 degrees V threads, top screwed for handwheel nut.

.12 Operator: see elsewhere this section.

2.4 VALVE OPERATORS

.1 Handwheel: on all valves except as specified.

.2 Handwheel with chain operators: on valves installed more than 2400 mm above floor in Boiler Rooms and Mechanical Equipment Rooms.

2.5 CHECK VALVES

.1 NPS 2 1/2 and over, flanged ends, Class150 : swing check.

.1 Body and multiple-bolted cap: cast steel to ASTM A216/A216M WCB.

.2 Cap studs: to ASTM A193/A193M Type B7.

.3 Cap nuts: to ASTM A194/A194M Type 2H.

.4 Body/cap joint: male-female face with corrugated metallic gasket.

.5 Disc: heat treated corrosion and heat resistant 13% chromium steel.

.6 Seat rings: heat treated corrosion and heat resistant 13% chromium steel, slipped in, seal welded, ground to match disc.

2.6 SILENT CHECK VALVES

.1 Construction:

.1 Body: Cast steel to ASTM with integral seat.

.2 Pressure rating: Class 125, .

.3 Connections: Flanged ends.

.4 Double bronze disc with SS seat and stem. Renewable disc, seat, stem and spring. Spring rating must match system design for silent operation and installation.

.5 Stainless steel spring, heavy duty.

.6 Seat: re-grind able.

2.7 BACKFLOW PREVENTION VALVES

.1 Construction:

.1 Body: Cast steel to ASTM with integral seat.

.2 Pressure rating: Class 125, .

.3 Connections: Flanged ends.

.4 Double bronze disc with SS seat and stem. Renewable disc, seat, stem and spring. Spring rating must match system design for silent operation and installation.

.5 Stainless steel spring, heavy duty.

.6 Seat: re-grind able.

.7

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install in accordance with manufacturer's recommendations in upright position with stem above horizontal.

3.2 COMMISSIONING

.1 As part of commissioning activities, develop schedule of valves and record thereon identifier, location, service, purchase order number and date, manufacturer, identification data specified above.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Concrete housekeeping pads, hangers and supports for mechanical piping, ducting and equipment.

.2 Related Sections:

.1 22 11 16 – Domestic Water Piping

.2 22 13 17 – Drainage, Waster, Vent Piping – Copper and Cast Iron

.3 22 13 18 – Drainage, Waste and Vent Piping – Plastic.

.4 22 30 05 – Domestic Hot Water tanks

.5 23 05 48 – Vibration Isolation and Seismic Restraint

1.2 REFERENCES

.1 American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME)

.1 ANSI/ASME B31.1-04, Power Piping.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A125-1996(R2001), Specification for Steel Springs, Helical, Heat Treated.

.2 ASTM A307-04, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A563-04a, Specification for Carbon and Alloy Steel Nuts.

.3 Factory Mutual (FM)

.4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)

.1 MSS SP58-2002, Pipe Hangers and Supports - Materials, Design and Manufacture.

.2 ANSI/MSS SP69-2003, Pipe Hangers and Supports - Selection and Application.

.3 MSS SP89-2003, Pipe Hangers and Supports - Fabrication and Installation Practices.

.5 Underwriters Laboratories of Canada (ULC)

1.3 SYSTEM DESCRIPTION

.1 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 MSS SP58.ASME B31.1 or

.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 conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipe work or connected equipment.

.5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58.

.2 Performance Requirements:

.1 Design supports, platforms, hangers, to withstand seismic events as required by the Ontario Building Code and by the owner.

1.4 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures .

.2 Shop drawings: submit drawings pre-checked and signed by the mechanical contractor and the General Contractor.

.3 Submit shop drawings and product data for following items:

.1 Bases, hangers and supports.

.2 Connections to equipment and structure.

.3 Structural assemblies.

.4 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures .

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

.1 Provide 1 copy of systems supplier's installation instructions.

.5 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 70 00 – Execution Requirements .

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 60 00 – Product Requirements .

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling.

PART 2 PRODUCTS

2.1 GENERAL

.1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP58.

.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: galvanized painted with zinc rich paint after manufacture.

.2 Use electroplating galvanizing process hot dipped galvanizing process.

.3 Ensure steel hangers in contact with copper piping are copper plated epoxy coated.

.2 Upper attachment structural: suspension from lower flange of I Beam:

.1 Cold piping NPS 2 maximum: malleable iron C clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip .

.1 Rod: 9 mm UL listed 13 mm FM approved.

.2 Cold piping NPS 2 1/2 or greater, 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 to MSS-SP58 and MSS-SP69 .

.3 Upper attachment structural: suspension from upper flange of I Beam:

.1 Cold piping NPS 2 maximum: ductile iron top of beam C clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed FM approved to MSS SP69.

.2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron top of beam jaw clamp with hooked rod, spring washer, plain washer and nut UL listed FM approved.

.4 Upper attachment to concrete:

.1 Ceiling: carbon steel welded eye rod, clevis plate, clevis pin and cotters with weld-less forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.

.2 Concrete inserts: wedge shaped body with knockout protector plate UL listed FM approved to MSS SP69.

.5 Shop and field fabricated assemblies:

.1 Trapeze hanger assemblies: .

.2 Steel brackets: .

.3 Sway braces for seismic restraint.

.6 Hanger rods: threaded rod material to MSS SP58:

.1 Ensure that hanger rods are subject to tensile loading only.

.2 Provide linkages where lateral or axial movement of pipe work is anticipated.

.3 Do not use 22 mm or 28 mm rod.

.7 Pipe attachments: material to MSS SP58:

.1 Attachments for steel piping: carbon steel black.

.2 Attachments for copper piping: copper plated black steel.

.3 Use insulation shields for hot pipe work.

.4 Oversize pipe hangers and supports.

.8 Adjustable clevis: material to MSS SP69 UL listed FM approved, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.

.1 Ensure "U" has hole in bottom for riveting to insulation shields .

.9 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP69.

.10 U bolts: carbon steel to MSS SP69 with 2 nuts at each end to ASTM A563.

.1 Finishes for steel pipe work: black .

.2 Finishes for copper, glass, brass or aluminum pipe work: black , with formed portion plastic coated epoxy coated.

.11 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP69.

2.3 RISER CLAMPS

.1 Steel or cast iron pipe: black carbon steel to MSS SP58, type 42, UL listed FM approved.

.2 Copper pipe: carbon steel copper plated to MSS SP58, type 42.

.3 Bolts: to ASTM A307.

.4 Nuts: to ASTM A563.

2.4 INSULATION PROTECTION SHIELDS

.1 Insulated cold piping:

.1 64 kg/m3 density insulation plus insulation protection shield to: MSS SP69, galvanized sheet carbon steel. Length designed for maximum 3 m span.

.2 Insulated hot piping:

.1 Curved plate 300 mm long, with edges turned up, welded in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP69.

2.5 CONSTANT SUPPORT SPRING HANGERS

.1 Springs: alloy steel to ASTM A125, shot peened, magnetic particle inspected, with +/-5% spring rate tolerance, tested for free height, spring rate, loaded height and provided with Certified Mill Test Report (CMTR).

.2 Load adjustability: 10 % minimum adjustability each side of calibrated load. Adjustment without special tools. Adjustments not to affect travel capabilities.

.3 Provide upper and lower factory set travel stops.

.4 Provide load adjustment scale for field adjustments.

.5 Total travel to be actual travel + 20%. Difference between total travel and actual travel 25 mm minimum.

.6 Individually calibrated scales on each side of support calibrated prior to shipment, complete with calibration record.

2.6 VARIABLE SUPPORT SPRING HANGERS

.1 Vertical movement: 13 mm minimum, 50 mm maximum, use single spring pre-compressed variable spring hangers.

.2 Vertical movement greater than 50 mm: use double spring pre-compressed variable spring hanger with 2 springs in series in single casing.

.3 Variable spring hanger complete with factory calibrated travel stops. Provide certificate of calibration for each hanger .

.4 Steel alloy springs: to ASTM A125, shot peened, magnetic particle inspected, with +/-5 % spring rate tolerance, tested for free height, spring rate, loaded height and provided with CMTR.

2.7 EQUIPMENT SUPPORTS

.1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting. Submit structural calculations with shop drawings where required by the Authorities Having Jurisdiction. .

2.8 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

.1 Provide templates to ensure accurate location of anchor bolts.

2.9 HOUSE-KEEPING PADS

.1 Provide 100 mm high concrete housekeeping pads for base-mounted equipment; size pads 50 mm larger than equipment; chamfer pad edges, paint “Caution Yellow” band at perimeter on top and sides.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install in accordance with:

.1 manufacturer's instructions and recommendations.

.2 Vibration Control Devices:

.1 Install on piping systems at pumps, boilers, chillers, cooling towers, and as indicated.

.3 Clamps on riser piping:

.1 Support independent of connected horizontal pipe work using riser clamps and riser clamp lugs welded to riser.

.2 Bolt tightening torques to industry standards.

.3 Steel pipes: install below coupling or shear lugs welded to pipe.

.4 Cast iron pipes: install below joint.

.4 Clevis plates:

.1 Attach to concrete with 4 minimum concrete inserts, one at each corner.

.5 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

.6 Use approved constant support type hangers where:

.1 vertical movement of pipe work is 13 mm or more,

.2 transfer of load to adjacent hangers or connected equipment is not permitted.

.7 Use variable support spring hangers where:

.1 transfer of load to adjacent piping or to connected equipment is not critical.

.2 variation in supporting effect does not exceed 25 % of total load.

3.3 HANGER SPACING

.1 Plumbing piping: to Ontario Building Code .

.2 Fire protection: to applicable fire code.

.3 Gas piping: up to NPS 1/2: every 1.8 m.

.4 Copper piping: up to NPS 1/2: every 1.5 m.

.5 Flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.

.6 Within 300 mm of each elbow.

Maximum Pipe Size : NPS	Maximum Spacing Steel	Maximum Spacing Copper
up to 1-1/4	2.1 m	1.8 m
1-1/2	2.7 m	2.4 m
2	3.0 m	2.7 m
2-1/2	3.6 m	3.0 m
3	3.6 m	3.0 m
3-1/2	3.9 m	3.3 m
4	4.2 m	3.6 m

3.4 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.

3.5 HORIZONTAL MOVEMENT

.1 Angularity of rod hanger resulting from horizontal movement of pipe work from cold to hot position not to exceed 4 degrees from vertical.

.2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.6 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.

.5 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Vibration isolation materials, components.

.2 Related Sections:

.1 23 05 93 - Testing, Adjusting and Balancing for HVAC.

.2 22 30 05 – Domestic Water Heaters

.3 Provide vibration isolation for suspended equipment, base mounted equipment, HVAC equipment and systems in accordance with manufacturers' recommendations.

1.2 REFERENCES

.1 Ontario Building Code – 2012 and applicable amendments to 2020.

1.3 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - 0.

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.

.2 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.1 Shop drawings: submit drawings pre-checked and approved by the mechanical contractor and the general contractor. .

.2 Provide separate shop drawings for each isolated system complete with performance and product data.

.3 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 60 00 –Product Requirements .

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling.

PART 2 PRODUCTS

2.1 GENERAL

.1 Size and shape of bases type and performance of vibration isolation as indicated.

2.2 ELASTOMERIC PADS

.1 Type EP1 - neoprene waffle or ribbed; 9 mm minimum thick; 50 durometer; maximum loading 350 kPa.

.2 Type EP2 - rubber waffle or ribbed; 9 mm minimum thick; 30 durometer natural rubber; maximum loading 415 kPa.

.3 Type EP3 - neoprene-steel-neoprene; 9 mm minimum thick neoprene bonded to 1.71 mm steel plate; 50 durometer neoprene, waffle or ribbed; holes sleeved with isolation washers; maximum loading 350 kPa.

.4 Type EP4 - rubber-steel-rubber; 9 mm minimum thick rubber bonded to 1.71 mm steel plate; 30 durometer natural rubber, waffle or ribbed; holes sleeved with isolation washers; maximum loading 415 kPa.

2.3 ELASTOMERIC MOUNTS

.1 Type M1 - colour coded; neoprene in shear; maximum durometer of 60 ; threaded insert and two bolt down holes; ribbed top and bottom surfaces.

2.4 SPRINGS

.1 Design stable springs: ratio of lateral to axial stiffness is equal to or greater than 1.2 times ratio of static deflection to working height. Select for 50% travel beyond rated load. Units complete with levelling devices.

.2 Ratio of height when loaded to diameter of spring between 0.8 to 1.0.

.3 Cadmium plate for outdoor installations.

.4 Colour code springs.

2.5 SPRING MOUNT

.1 Zinc or cadmium plated hardware; housings coated with rust resistant paint.

.2 Type M2 - stable open spring: support on bonded 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad.

.3 Type M3 - stable open spring: 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad, bonded under isolator and on isolator top plate; levelling bolt for rigidly mounting to equipment.

.4 Type M4 - restrained stable open spring: supported on bonded 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad; built-in resilient limit stops, removable spacer plates.

.5 Type M5 - enclosed spring mounts with snubbers for isolation up to 950 kg maximum.

.6 Performance: as required for equipment supported in accordance with manufacturers recommendations.

2.6 **HANGERS**

.1 Colour coded springs, rust resistant, painted box type hangers. Arrange to permit hanger box or rod to move through a 30 degrees arc without metal to metal contact.

.2 Type H1 - neoprene - in-shear, moulded with rod isolation bushing which passes through hanger box.

.3 Type H2 - stable spring, elastomeric washer, cup with moulded isolation bushing which passes through hanger box.

.4 Type H3 - stable spring, elastomeric element, cup with moulded isolation bushing which passes through hanger box.

.5 Type H4 - stable spring, elastomeric element with pre-compression washer and nut with deflection indicator .

.6 Performance: as required for equipment supported in accordance with manufacturers recommendations.

2.7 **ACOUSTIC BARRIERS FOR ANCHORS AND GUIDES**

.1 Acoustic barriers: between pipe and support, consisting of 25 mm minimum thick heavy duty neoprene isolation material.

2.8 **HORIZONTAL THRUST RESTRAINT**

.1 Spring and elastomeric element housed in box frame; assembly complete with rods and angle brackets for equipment and ductwork attachment; provision for adjustment to limit maximum start and stop movement to 9 mm.

.2 Arrange restraints symmetrically on either side of unit and attach at centerline of thrust.

2.9 **SEISMIC CONTROL MEASURES**

.1 General:

.1 All building systems and equipment shall engage seismic controls measures as required by the Ontario Building Code for the specific area.

.2 Refer to the architects seismic assessment on the Ontario Building Code Matrix.

.3 Seismic control systems to work in every direction.

.4 Fasteners and attachment points to resist same maximum load as seismic restraint.

.5 Drilled or power driven anchors and fasteners not permitted.

.6 No equipment, equipment supports or mounts to fail before failure of structure.

.7 Supports of cast iron or threaded pipe not permitted.

.8 Seismic control measures not to interfere with integrity of fire stopping.

.2 Static equipment:

.1 Anchor equipment to equipment supports. Anchor equipment supports to structure.

.2 Suspended equipment:

.1 Use one or more of following methods depending upon site conditions.

.1 Install tight to structure.

.2 Cross brace in every direction.

.3 Brace back to structure.

.4 Cable restraint system.

.3 Seismic restraints:

.1 Cushioning action gentle and steady.

.2 Never reach metal-like stiffness.

.3 Vibration isolated equipment:

.1 Seismic control measures not to jeopardize noise and vibration isolation systems. Provide 6 to 9 mm clearance during normal operation of equipment and systems between seismic restraint and equipment.

.2 Incorporate seismic restraints into vibration isolation system to resist complete isolator unloading.

.3 As indicated.

.4 Piping systems:

.1 Piping systems: hangers longer than 300 mm; brace at each hanger.

.2 Compatible with requirements for anchoring and guiding of piping systems.

.5 Bracing methods:

.1 Approved by Structural Engineer.

.2 Structural angles or channels.

.3 Cable restraint system incorporating grommets, shackles and other hardware to ensure alignment of restraints and to avoid bending of cables at connection points. Incorporate neoprene into cable connections to reduce shock loads.

.6 Include gas service and domestic utilities entrance into building.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install vibration isolation equipment in accordance with manufacturer’s 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 minimum static deflection as follows:

.1 Up to NPS4: first 3 points of support. NPS5 to NPS8: first 4 points of support. NPS10 and Over: first 6 points of support.

.2 First point of support: static deflection of twice deflection of isolated equipment, but not more than 50 mm.

.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 rigid system at operating level, before isolator adjustment is made. Ensure that there is no physical contact between isolated equipment and building structure.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Arrange with manufacturer's representative to review work of this Section and submit written reports to verify compliance with Contract Documents.

.2 Manufacturer's Field Services: consisting of product use recommendations and periodic site visits to review installation, scheduled as follows:

.1 Upon completion of installation.

.3 Submit manufacturer's reports to Consultant within 3 days of manufacturer representative's review.

.4 Make adjustments and corrections in accordance with written report.

.2 Inspection and Certification:

.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 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

.2 Provide Consultant with notice 24 h in advance of commencement of tests.

.3 Establish adequacy of equipment isolation and acceptability of noise levels in occupied areas and where appropriate, remedial recommendations (including sound curves).

.4 Submit complete report of test results including sound curves.

3.4 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

.1 SUMMARY

.1 Section Includes:

.1 Materials and requirements for the identification of piping systems, duct work, valves and controllers, including the installation and location of identification systems.

.2 Related Sections:

.1 21 07 19 – Thermal Insulation for Piping

.2 23 05 05 – Installation of Pipework

.3 23 07 17 – Duct insulation

.4 23 21 16 – Hydronics Steel

.5 23 31 13 – Metal Ducts.

1.2 REFERENCES

.1 Canadian Gas Association (CGA)

.1 CSA/CGA B149.1-05, Natural Gas and Propane Installation Code.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.60-97, Interior Alkyd Gloss Enamel.

.2 CAN/CGSB-24.3-92, Identification of Piping Systems.

.3 National Fire Protection Association (NFPA)

.1 NFPA 13-2002, Standard for the Installation of Sprinkler Systems.

1.3 SUBMITTALS

.1 Product Data:

.2 Submittals: in accordance with Section 01 33 00 - Submittal Procedures .

.3 Product data to include paint colour chips, other products specified in this section.

.4 Samples:

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures .

.2 Samples to include nameplates, labels, tags, lists of proposed legends.

1.4 QUALITY ASSURANCE

.1 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures .

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 67 00 – Material and Product Requirements .

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

PART 2 PRODUCTS

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

.1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.

.2 Lettering and numbers 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, horsepower.

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 thick laminated plastic or white anodized aluminum, matte finish, with square corners, letters accurately aligned and machine engraved into core.

.3 Sizes:

.1 Conform to following table:

Size # mm	Sizes (mm)	No. of Lines	Height of Letters (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

.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 .

2.3 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 Pictograms:

.1 Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.

.3 Legend:

.1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.

.4 Arrows showing direction of flow:

.1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.

.2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.

.5 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

.2 Length to accommodate pictogram, full length of legend and arrows.

.6 Materials for background colour marking, legend, arrows:

.1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.

.2 Other pipes: pressure sensitive plastic-coated cloth vinyl with protective over-coating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.

.7 Colours and Legends:

.1 Where not listed, obtain direction from Owner & Consultant .

.2 Colours for legends, arrows: to following table:

Background colour:	Legend, arrows:
Yellow	BLACK
Green	WHITE
Red	WHITE

.3 Background colour marking and legends for piping systems:

Contents	Background colour marking	Legend
City water	Green	CITY WATER
Domestic hot water supply	Green	DOM. HW SUPPLY

Contents	Background colour marking	Legend
Dom. HWS recirculation	Green	DOM. HW CIRC
Domestic cold water supply	Green	DOM. CWS
Heating Supply	Orange	HWS
Heating Return	Orange	HWR
Glycol Heating Supply	Orange-Green	GHWS
Glycol Heating Return	Orange Green	HWR
Storm water	Green	STORM
Sanitary	Green	SAN
Plumbing vent	Green	SAN. VENT
Natural gas	Yellow - to Codes	
Gas regulator vents	to Codes	

2.4 IDENTIFICATION DUCTWORK SYSTEMS

.1 50 mm high stencilled letters and directional arrows 150 mm long x 50 mm high.

.2 Colours: back, or co-ordinated with base colour to ensure strong contrast.

2.5 VALVES, CONTROLLERS

.1 Brass tags with 12 mm 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.

2.6 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.

2.7 LANGUAGE

.1 Identification in English.

.2 Use one nameplate and label for each language .

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 TIMING

.1 Provide identification only after painting specified Section 09 91 23 - Interior Painting has been completed.

3.3 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.

3.4 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.

3.5 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

.1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m 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 where 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, confined spaces, at entry and exit points, and at access openings.

.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, and dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.

.9 Identification easily and accurately readable from usual operating areas and from access points.

.1 Position of identification 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.

3.6 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.

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 00 - Cleaning .

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.

.2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

1.2 QUALIFICATIONS OF TAB PERSONNEL

.1 Submit names of personnel to perform TAB to Consultant within 90 days of award of contract.

.2 Provide documentation confirming qualifications, successful experience.

.3 TAB: shall be performed in accordance with the requirements of standard that the TAB Firm's qualifications are approved:

.1 Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1-2002 .

.2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems-1998 .

.3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing-2002 .

.4 Recommendations and suggested practices contained in the TAB Standard: mandatory.

.5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.

.6 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.

.7 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.

.8 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.

.1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.

.2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

.9 Comply with the general conditions of the contract, supplementary conditions, and the requirements of the contract documents. Pre-qualified TAB contracts are as follows:

Designtest & Balancing Company.
#35 - 70 East Beaver Creek Road
Richmond Hill, ON L4B 3B2
Mr. Surrinder Sahota
(416) 886-6513

Flowset Balancing.
431 Willis Dr,
Oakville L6L 4V6, ON
(416) 410 9793

VPG Associates Ltd.
2062 King Road,
King City, Ontario L7B 1K9
(905) 833-4334

Air Adjustments & Balancing Inc.
P.O. Box 176. Schomberg, ON L0G 1T0
(416) 254-3004

1.3 PURPOSE OF TAB

.1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads

.2 Adjust and regulate equipment and systems to meet specified performance requirements indicated in these specifications and on the drawings and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.

.3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

1.4 EXCEPTIONS

.1 TAB of systems and equipment regulated by codes, standards to satisfaction of authority having jurisdiction.

1.5 CO-ORDINATION

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule 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.

1.6 PRE-TAB REVIEW

.1 Review contract documents before project construction is started and confirm in writing to Consultant adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.

.2 Review specified standards and report to Consultant in writing proposed procedures which vary from standard.

.3 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

1.7 START-UP

.1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.

.2 Follow special start-up procedures specified elsewhere in Division 23.

1.8 OPERATION OF SYSTEMS DURING TAB

.1 Operate systems for length of time required for TAB and as required by Consultant for verification of TAB reports.

1.9 START OF TAB

.1 Notify Consultant 7 days prior to start of TAB.

.2 Start TAB when building is essentially completed, including:

.1 Installation of ceilings, doors, windows, other construction affecting TAB.

.2 Application of weather stripping, sealing, and caulking.

.3 Pressure, leakage, other tests specified elsewhere Division 23.

.3 Provisions for TAB installed and operational.

.4 Start-up, verification for proper, normal and safe operation of 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, 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 Outlets installed, volume control dampers open.

1.10 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:

.1 Hydronic systems: plus or minus 10 %.

1.11 ACCURACY TOLERANCES

.1 Measured values accurate to within plus or minus 2 % of actual values.

1.12 INSTRUMENTS

.1 Prior to TAB, submit to Consultant list of instruments 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 Departmental Representative Engineer Consultant .

1.13 SUBMITTALS

.1 Submit, prior to commencement of TAB:

.2 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.14 PRELIMINARY TAB REPORT

.1 Submit for checking and approval of Consultant , prior to submission of formal TAB report, sample of rough TAB sheets. Include:

.1 Details of instruments used.

.2 Details of TAB procedures employed.

.3 Calculations procedures.

.4 Summaries.

1.15 TAB REPORT

.1 Format in accordance with referenced standard .

.2 TAB report to show results in SI units and to include:

.1 Project record drawings.

.2 System schematics.

.3 Submit 6 copies of TAB Report to Consultant for verification and approval, in D-ring binders, complete with index tabs.

1.16 VERIFICATION

.1 Reported results subject to verification by Consultant .

.2 Provide personnel and instrumentation to verify up to 30 % of reported results.

.3 Number and location of verified results as directed by Consultant .

.4 Pay costs to repeat TAB as required to satisfaction of Consultant .

1.17 SETTINGS

.1 After TAB is completed to satisfaction of Consultant , replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.

.2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

1.18 COMPLETION OF TAB

.1 TAB considered complete when final TAB Report received and approved by Consultant.

1.19 HYDRONIC SYSTEMS

.1 Standard: TAB to most stringent of standards of AABC NEBB SMACNA ASHRAE.

.2 Do TAB of systems including but not limited to equipment, components, controls specified in Divisions 22 and 23:

.1 New domestic water lines.

.2 New domestic hot water recirculating pumps.

.3 New hydronic cabinet unit heaters.

.4 New hydronic reheat coils.

.5 Existing rooftop unit.

.3 Good standing of AABC or NEBB and qualified to standards of AABC or NEBB.

.4 Quality assurance: perform TAB under direction of supervisor qualified by AABC or NEBB.

.5 Measurements: to include as appropriate for systems, equipment, components, controls: pressure, flow rate, pressure drop (or loss), temperatures, RPM, electrical power, voltage, noise, vibration.

.6 Locations of equipment measurements: to include as appropriate:

.1 Control valves, other equipment causing changes in conditions.

1.20 AIR SYSTEMS

.1 Standard: TAB to most stringent of standards of AABC, NEBB, SMACNA ASHRAE.

.2 Do TAB of systems including but not limited to equipment, components, controls specified in Divisions 22 and 23:

.1 New duct systems, splitter dampers, volume control dampers.

.2 Supply and return ducts, diffusers, economisers, powered exhaust fans for the new roof mounted AC units.

.3 New sanitary & general roof mounted and in-line exhaust fans.

.4 Existing rooftop unit.

.3 Qualifications: personnel performing TAB current member in good standing of AABC or NEBB and qualified to standards of AABC or NEBB.

.4 Quality assurance: perform TAB under direction of supervisor qualified by AABC or NEBB.

.5 Measurements: to include as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dew point), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.

.6 Locations of equipment measurements: to include as appropriate:

.1 Inlet and outlet of dampers, filter, coil, humidifier, fan, other equipment causing changes in conditions.

.2 At controllers, controlled device.

.7 Locations of systems measurements to include as appropriate: main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

1.21 OTHER TAB REQUIREMENTS

.1 General requirements applicable to work specified this paragraph:

.1 Qualifications of TAB personnel: as for air systems specified this section.

.2 Quality assurance: as for air systems specified this section.

.2 Building pressure conditions:

.1 Adjust HVAC systems, equipment, controls to ensure neutral pressure conditions in boiler rooms at all times.

.3 Zone pressure differences:

.1 Adjust systems, equipment, controls to establish specified air pressure differentials, with systems in every possible combinations of normal operating modes.

1.22 POST-OCCUPANCY TAB

.1 Participate in systems checks twice during Warranty Period - #1 approximately 3 months after acceptance and #2 within 1 month of termination of Warranty Period.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 GENERAL

.1 Submit a test report listing the following measured data versus design data:

.1 For new HVAC Package rooftop systems:

- fan r/s (rpm)
- motor r/s (rpm)
- motor voltage to all phases
- motor current to all phases
- static pressure across fan
- cfm through fan

.2 For existing fan powered VAV systems:

- fan r/s (rpm)
- motor r/s (rpm)
- motor voltage to all phases
- motor current to all phases
- static pressure across fan
- cfm through fan

- return plenum and fresh air cfm.

.3 For new and existing diffusers and grilles:

- CFM (l/s) at each outlet

.4 For new and existing systems hydronic:

- Flow rate through control valve for full-open position.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 23 33 53 – Duct Liners.

1.2 REFERENCES

.1 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" - means "not concealed" as previously defined.

.3 Insulation systems - insulation material, fasteners, jackets, and other accessories.

.2 TIAC Codes:

.1 CRD: Code Round Ductwork,

.2 CRF: Code Rectangular Finish.

.2 Reference Standards:

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ANSI/ASHRAE/IESNA 90.1-04, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 ASTM International Inc.

.1 ASTM C335-05ae1, Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.2 ASTM C411-05, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.3 ASTM C547-07e1, Standard Specification for Mineral Fiber Pipe Insulation.

.4 ASTM C553-02e1, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.5 ASTM C612-04e1, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

.6 ASTM C921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Canadian General Standards Board (CGSB)

.1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.4 Thermal Insulation Association of Canada (TIAC): Best Practices Guide 2013 including specifications.

.5 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102-03, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures .

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for duct insulation, and include product characteristics, performance criteria, physical size, finish and limitations.

.1 Description of equipment giving manufacturer's name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

.2 Provide sample for exterior duct insulation including jacketing, fastening system.

.3 Shop Drawings:

.1 Provide drawings stamped and signed by the General Contractor and the Mechanical Contractor.

.4 Manufacturers' Instructions:

.1 Provide manufacture's written duct insulation jointing recommendations. and special handling criteria, installation sequence, cleaning procedures and .

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: 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 member of TIAC.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address and ULC markings .

.2 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates paddling and packaging materials.

1.6 SCOPE OF WORK

.1 Insulate all supply air ducting.

.2 Insulate first 3.0m of all ductwork penetrating the building envelope.

PART 2 PRODUCTS

2.1 FIRE AND SMOKE RATING

.1 To CAN/ULC-S102:

.1 Maximum flame spread rating: 25 .

.2 Maximum smoke developed rating: 50 .

2.2 INSULATION

.1 Mineral fibre: as specified includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.

.3 TIAC Code C-1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this Section).

.4 TIAC Code C-2: Mineral fibre blanket to ASTM C553 faced with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this section).

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to ASTM C553.

2.3 ACCESSORIES

.1 Vapour retarder lap adhesive:

.1 Water based, fire retardant type, compatible with insulation.

.1 Maximum VOC limit 50 170 200 g/L to SCAQMD Rule 1168 GSES GS-36.

.2 Indoor Vapour Retarder Finish:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C449.

.4 ULC Listed Canvas Jacket:

.1 220 gm/m2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921 untreated.

.5 Outdoor Vapour Retarder Mastic:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.2 Reinforcing fabric: Fibrous glass, untreated 305 g/m2.

.6 Tape: self-adhesive, aluminum, plain reinforced, 50 75 mm wide minimum.

.7 Tie wire: 1.5 mm stainless steel.

.8 Banding: 12-19 mm wide, 0.5 mm thick stainless steel.

.9 Facing: 25 mm stainless galvanized steel hexagonal wire mesh stitched on one face both faces of insulation one face of insulation with expanded metal lath on other face.

.10 Fasteners: 2 4 mm diameter pins with35 mm diameter square clips, length to suit thickness of insulation.

PART 3 EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

.2 Provide duct insulation for concealed ducts and services where not acoustically lined.

.3 Provide insulation for exhaust ducts within 3m of building exterior.

3.2 PRE-INSTALLATION REQUIREMENTS

.1 Seal and Pressure test ductwork systems complete, witness and certify.

.2 Ensure surfaces are clean, dry, free from foreign material.

3.3 INSTALLATION

.1 Install in accordance with TIAC Best Practices Guide 2013.

.2 Apply materials in accordance with manufacturers instructions and as indicated.

.3 Use 2 layers with staggered joints when required nominal thickness exceeds 75 mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Ensure hangers, and supports are outside vapour retarder jacket.

.5 Hangers and supports in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment .

.1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.

.6 Fasteners: install at 300 mm on centre in horizontal and vertical directions, minimum 2 rows each side.

3.4 CLEANING

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation procedures for heating and cooling controls.

1.2 RELATED SECTIONS

.1 Section 23 21 14 – Hydronic Specialties.

.2 Section 23 34 25 – Packaged Roof Exhaust.

.3 Section 23 33 00 – Duct Accessories.

.4 Section 23 33 15 – Dampers – Operating.

.5 Section 23 82 39 – Cabinet Unit Heaters.

1.3 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 – Submittal Procedures. Include product characteristics, performance criteria, and limitations.

.2 Quality assurance submittals: submit following in accordance with Section 01 45 00 – Quality Control.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling.

1.5 SCOPE OF WORK

.1 Power supplies for BAS and controls equipment:

.1 Supply low voltage transformers for owners BAS control power.

.2 Transformers shall be installed by the electrical division.

.3 Electrical power shall be installed by the electrical division adjacent to electrical panels.

.2 Provide all loose starters and related electrical devices for the work of this division, installed by the electrical division.

.3 Contact the SDSB BAS control contractor at SetPoint Controls, Mr. Jim Bowie for the work involved in extending the existing BAS to the new systems and devices.

PART 2 PRODUCTS

2.1 STARTERS

.1 Provide all loose starters for the work of this division.

2.2 THERMOSTAT (LINE VOLTAGE, HEATING)

.1 Line voltage wall mounted integral electric heating thermostat with:

.1 Full load rating: 22 A at 120 V.
.2 Temperature setting range: 5 degrees C to 30 degrees C.
.3 Single and double pole as required.
.4 Thermometer range: 5 degrees C to 30 degrees C.
.5 Scale markings: Off-5-10-15-20-25 degrees C.
.6 Reverse acting where specified.

2.3 THERMOSTAT (LOW VOLTAGE)

.1 Low voltage wall thermostat:

.1 For use on 24 V circuit at 1.5 A capacity.
.2 With heat anticipator adjustable 0.1 to 1.2 A.
.3 Temperature setting range: 10 degrees C to 25 degrees C.
.4 Direct or reverse acting dependant on function.
.5 Without sub-base.

2.4 THERMOSTAT (REMOTE BULB)

.1 Line voltage remote bulb type thermostat with:

.1 30 A rating on 120 V.
.2 3 m copper capillary tube nylon coated.
.3 Moisture and dust-resistant enclosure.

2.5 THERMOSTAT GUARDS

.1 Thermostat guards: lockable, clear plastic. Slots for air circulation to thermostat.

2.6 LOW LIMIT TEMPERATURE ALARM

.1 Low limit temperature alarm with:

.1 Rating: 10.2 A at 120 V 6.5 A at 240 V.
.2 Sensing bulb and 1.5 6 m long capillary tube.
.3 Switching action: manual.
.4 Temperature setting range: 0 degrees C to 15 degrees C.

2.7 HIGH LIMIT TEMPERATURE ALARM

.1 High limit temperature alarm with:

.1 Rating 10 A at 120 V 6 A at 240 V.

.2 Positive lock-out.

.3 Manual reset only after 14 degrees C drop-in temperature.

.4 Cut-out setting: 50 degrees C.

2.8 SAIL SWITCH

.1 Sail switch, Polyester film sail mounted on a micro switch snap switch, NO contacts, adjustable range set for ir velocity of 1.3 m/s (makes), .38 m/s (breaks). Full load: 2.0 A at 120 V. Maximum ambient temperature: 82 degrees C.

2.9 FLOW SWITCH

.1 Flow switch for water/glycol, pipe size as indicated, CSA Enclosure, rated at 16] A at 120 V. Maximum liquid temperature: 121 degrees C. Maximum liquid gauge pressure of 1034 kPa ambient temperature range 5 degrees C to 82 degrees C.

2.10 PRESSURE SWITCH

.1 Pressure switch for water/glycol at range of 24 kPa to gauge pressure of 1034 kPa with auto reset, contacts open on rise. Maximum allowable gauge pressure of 1.2MPa. Full load 16A at 120V, ULC rated.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install control devices.

.2 On outside wall, mount thermostats on bracket or insulated pad 25 mm from exterior wall.

.3 Install remote sensing device and capillary tube in metallic conduit. Conduit enclosing capillary tube must not touch heater or heating cable.

3.3 CLEANING

.1 Proceed in accordance with Section 01 70 00 – Execution Requirements.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 21 05 01 – Common Work Results for Mechanical

.2 23 21 16 Hydronics - Steel.

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ASME-04(2007), Boiler and Pressure Vessel Code.

.2 ASTM International Inc.

.1 ASTM A47/A47M-99(2004), Standard Specification for Ferritic Malleable Iron Castings.

.2 ASTM A278/A278M-01(2006), Standard Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures up to 650 degrees F (350 degrees C).

.3 ASTM A516/A516M-06, Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate - and Lower - Temperature Service.

.4 ASTM A536-84(2004), Standard Specification for Ductile Iron Castings.

.5 ASTM B62-02, Standard Specification for Composition Bronze or Ounce Metal Castings.

.3 Canadian Standards Association (CSA International)

.1 CSA B51-03(R2003), Boiler, Pressure Vessel, and Pressure Piping Code.

.2 CSA B51-03(R2005), Boiler, Pressure Vessel, and Pressure Piping Code, Supplement #1.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 21 05 01 – Common Work Results for Mechanical

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for expansion tanks, air vents, separators, valves, and strainers and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Provide drawings stamped and signed by the Mechanical Contractor

1.4 SCOPE OF WORK

.1 Provide duct reheat coils as outlined by the mechanical schedule on drawing MXXX.

1.5 CLOSEOUT SUBMITTALS

.1 Submit maintenance and operation data in accordance with Section 21 05 01 – Common Work Results for Mechanical.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates paddling and packaging materials.

PART 2 PRODUCTS

2.1 DIAPHRAGM TYPE EXPANSION TANK

.1 Provide a new expansion tanks in mechanical room, M100, M302. Amtrol, Armstrong, Watts, or Expanflex as equal.

.2 ET1: Domestic Heating Water

.1 Basis of Design: Amtrol ST-12-C

.2 Pipe mounted expansion tank with threaded pipe connections.

.3 Capacity: 24.2 L.

.4 Size: 500 mm long x 305 mm diameter mm plate thickness as indicated.

.5 Diaphragm sealed in butyl suitable for 93°C operating temperature.

.6 Maximum working pressure: 862kPa

.7 Air pre-charged to 378 kPa (initial fill pressure of system).

2.2 AUTOMATIC AIR VENT

.1 Standard float vent: brass body and NPS 1/8 connection and rated at 310 620 690 kPa working pressure.

2.3 COMBINATION LOW PRESSURE RELIEF AND REDUCING VALVE

.1 Adjustable pressure setting: 206 kPa relief, 55 to 172 kPa reducing.

.2 Low inlet pressure check valve.

.3 Removable strainer.

2.4 PIPE LINE STRAINER

.1 NPS 1/2 to 2: bronze body to ASTM B62, solder end screwed connections, Y pattern.

.2 NPS 2 1/2 to 12: cast steel body to ASTM A278/A278M, Class 30, cast iron body to ASTM A278/A278M, Class 30 flanged connections.

.3 NPS 2 to 12: T type with ductile iron body to ASTM A536 malleable iron body to ASTM A47M, grooved ends.

.4 Blowdown connection: NPS 1.

.5 Screen: stainless steel brass with 1.19 mm perforations.

.6 Working pressure: 860 kPa.

2.5 BALANCING AND CONTROL VALVE

.1 Victaulic, Armstrong IMI Hydronics, Pressure Independent Balancing Control Valve or approved equal.

.2 Flow balancing, isolation, and two-way control valve and differential pressure controller in the same valve body.

.3 Suitable for working temperatures to +194°F (+90°C).

.4 Maximum working pressure ½" to 2", 230 psi (1600 kPa),

.5 2-1/2" to 3", 365 psi (2517 kPa).

.6 NPT female threaded or flanged ends.

.7 ½" to 2" valve sizes: non-ferrous brass copper alloy body.

.8 2-1/2" to 3"sizes: ductile iron body.

.9 EPDM o-ring seat and 10-position setting dial.

.10 EQM control valve characteristic, integrated differential pressure controller.

.11 Startup pressure of no more than 2.2 psi (½" and ¾"), 3.3 psi (1" and 1 ¼") and 4.3 psi (1-1/2" to 3").

.12 Manual adjustment to pre-set maximum flow values in the field in a conventional manner.

2.6 HYDRONIC COILS

.1 Acceptable manufactures:

.1 Modine.

.2 Trane.

.3 Engineered Air.

.4 JCI.

.2 Performance as outlined on mechanical drawings M.101.

.3 Certification

.1 Acceptable coils are to have ARI Standard 410 certification and bear the ARI symbol. Coils exceeding the scope of the manufacturer's certification and/or the range of ARI's standard rating conditions will be considered provided the manufacturer is a current member of the ARI Air-Cooling and Air-Heating Coils certification program and the coils have been rated in accordance to ARI Standard 410. Manufacturer must be ISO 9002 certified.

.4 Fluid Coil Design Pressures And Temperatures

.1 Coils shall be designed to withstand 250 psi maximum operating pressures and a maximum fluid temperature of 300°F for standard duty copper tube coils. Optional high-pressure construction will include

cupronickel tubes and headers to increase maximum operating pressure to 350 psi and maximum operating temperature to 450°F. For cleanable coils with removable heads, coils shall be designed to withstand 100 psi maximum operating pressures and a maximum fluid temperature of 150°F. Higher limits are available, depending on coil construction and/or materials used.
For High Pressure/Normal temperature fluid coils, the following Schedule should be used:

.1 0-150 psi Standard Construction-5/8” x 0.020” copper tubing, 0.065” wall copper headers, copper end caps, vent and drain located as required, coil tubes extended into the header.

.2 150-300 psi 5/8” x 0.025 copper tubing, 0.095” copper headers, Monel end caps, vent and drain located on the face (locating on end caps is not allowed), 5/8” x 0.049” adapter tube construction

.3 300-400 psi 5/8” x 0.035” copper tubing, 0.187” wall brass pipe headers, Monel end caps, vent and drain located on the face (located on end caps not allowed), 5/8” x 0.049” adapter tube construction

.5 Factory Testing Requirements

.1 Coils shall be submerged in water and tested with a minimum of 315 psi air pressure for standard copper tube coils and 125 psi for cleanable coils with removable heads. A 500 psig hydrostatic and shock test is required for high pressure cupronickel construction. Coils must display a tag with the inspector's identification as proof of testing.

.6 Fins

.1 Coils shall be of plate fin type construction providing uniform support for all coil tubes. Stainless steel fins shall be constructed of 304 & 316 stainless. Carbon steel fins shall be constructed of ASTM A109-83. Coils are to be manufactured with die-formed aluminum, copper, stainless steel or carbon steel fins with self-spacing collars which completely cover the entire tube surface. The fin thickness shall be 0.0075 +/- 5% unless otherwise specified. Manufacturer must be capable of providing self-spacing die-formed fins 4 through 14 fins/inch with a tolerance of +/- 4%.

.7 Tubing

.1 Tubing and return bends shall be constructed from UNS 12200 seamless copper conforming to ASTM B75 and ASTM B251 for standard pressure applications. High pressure construction shall use seamless 90/10 Cupronickel alloy C70600 per ASTM B111. Stainless steel tubes shall be ASTM A249. Carbon steel tubes shall be W&D / ASTM A214 & seamless A179. Copper tube temper shall be light annealed with a maximum grain size of 0.040 mm and a maximum hardness of Rockwell 65 on the 15T scale.

.2 Design permits in-tube water velocities up to 6 ft/s for the standard seamless copper tubing, and up to 8 ft/s for optional seamless alloy C70600 cupronickel tubing.

.3 Tubes are to be mechanically expanded to form an interference fit with the fin collars. Coil tube size and wall thickness' are 5/8"x0.020 and 1/2"x0.016 and 1"x.035 standard for copper, with other options available. Steel tubes are offered as 5/8"x0.035 or 0.049.

.8 Headers

.1 Headers shall be constructed from UNS 12200 seamless copper conforming to ASTM B75 and ASTM B251 for standard pressure applications. High-pressure construction is to incorporate seamless 90/10 Cupronickel alloy C70600 per ASTM B111. Stainless steel will be constructed of 304L & 316L (ASTM-A240) Sch-5 or Sch-10. Carbon steel headers shall be constructed of Sch-10 (ASTM-A135A) or Sch-40 (ASTM A53A) pipe.

.2 Coil return headers are to be equipped with factory-installed 1/2” fpt air vent connection placed at the highest point available on face of the header.

.3 Tube-to-header holes are to be intruded inward such that the landed surface area is three times the core tube thickness to provide enhanced header to tube joint integrity. all core tubes shall evenly extend within the inside diameter of the header no more than 0.12 inch.

.4 End caps shall be die-formed and installed on the inside diameter of the header such that the landed surface area is three times the header wall thickness.

.9 Connections

.1 Standard construction fluid connections are male pipe thread (MPT) and constructed from red brass conforming to ASTM B43 or Schedule 40 steel pipe as a minimum. Stainless steel will be304L or 316L (ASTM-A240) Sch-40 or Sch 80. Carbon steel will be A53A Sch-40, A106A Sch-40 or Sch-80 or A53B Sch-80 pipe.

.10 Cleaning

.1 All residual manufacturing oils and solid contaminants are removed internally and externally by completely submersing the coil in an environmentally and safety approved type degreasing solution, which is also chemically compatible with the coil material. This may vary for steel tube coils, depending on the application and/or customer specifications.

.11 Brazing

.1 Oxyfuel gas brazing, using fillet rod material of minimum 5% silver, is used for all non-ferrous tube joints to headers and connections. Depending on the application, ferrous to non-ferrous brazing material may contain upwards of 35% silver, or may be Tobin bronze.

.1 Welding
Gas shielded arc welding is used for welded vessels constructed of stainless steel. Gas welding is used for welded vessels constructed of carbon steel.

.12 Casing

.1 Coil casing and endplate shall be fabricated from Galvanized steel, as a standard construction, meeting ASTM and UL G90U requirements, Aluminum, 0.080" thick, optional, Copper, 0.063 " thick, optional,16- or 14-gauge carbon steel or stainless steel, optional. double-flange casing shall be provided when coils are specified as vertical stacking. Standard coil intermediate tube sheets (center tube supports) shall be fabricated from the same gauge sheet stock and material as the end plates, and to the following schedule:

Finned Length (inches)	Number of Tubes Sheets
6.00 – 48.00	0
48.01 – 96.00	1
96.01 – 144.00	2
144.01 and larger	4

.13 Certification

.1 Performance certified coils that are ARI Standard 410 listed bear the ARI symbol. Coils exceeding the scope of the certification and/or the range of standard rating conditions are also rated to the extent possible by the ARI Std. 410 method. Modine continues as a current and active member of the ARI Air-Cooling and Air-Heating Coils certification program, with original coil line certification and computerized selections dating back to 1969.

.14 Agency Approval

.1 Modine Grenada LLC was facility registered by UL in 1994 to ISO 9002 (ANSI/ASQC Q92). Applicable commercial coil models are UL Standard 207 registered as Refrigerant Containing Components and Accessories; non-electrical. CRN, category H. Note: Modine Grenada LLC can provide ASME code stamped vessels.

.15 Installation

.1 Coils to be installed in accordance with manufacturer's instructions and any applicable piping codes.

.16 Lead Time

.1 Standard lead-time for custom made retrofit fluid coils of standard construction with OEM circuiting shall be 11-15 working days, with reduced lead-time emergency shipment options of 10 working days and 5 working days from order placement date and based upon production approval.

.2 Standard lead-time for custom made fluid coils of manufacturer's own standard design and circuiting shall be 10 working days, with reduced lead-time emergency shipment options for 5 working days, 48-hours and 24-hours from order placement date.

.3 All coils shall be quoted and offered as FOB Factory, Full Freight Allowed to any and all destinations within the Continental United States.

PART 3 EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 GENERAL

.1 Run drain lines and blow off connections to terminate above nearest drain.

.2 Maintain adequate clearance to permit service and maintenance.

.3 Should deviations beyond allowable clearances arise, request and follow Departmental Representative's Engineer's Consultant's directive.

.4 Check shop drawings for conformance of tappings for ancillaries and for equipment operating weights.

.5 Install duct coils so that they are accessible for service and removal.

3.3 STRAINERS

.1 Install in horizontal or down flow lines.

.2 Ensure clearance for removal of basket.

.3 Install ahead of each pump.

.4 Install ahead of each automatic control valve larger than NPS 1 and radiation except at radiation and as indicated.

3.4 AIR VENTS

.1 Install at high points of systems.

.2 Install gate valve on automatic air vent inlet. Run discharge to nearest drain or service sink.

3.5 EXPANSION TANKS

.1 Adjust expansion tank pressure as indicated to suit design criteria.

.2 Install lockshield type valve at inlet to tank.

3.6 PRESSURE SAFETY RELIEF VALVES

.1 Run discharge pipe to terminate above nearest drain.

3.7 CLEANING

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation of low-pressure metallic ductwork, joints and accessories.

.2 Related Sections:

.1 Section 01 33 00 – Submittal Procedures.

.2 09 90 00 Painting.

.3 Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

.3 Include removing of oil and grease for rectangular non-insulated or insulated duct on exterior.

.4 Include prime painting, first coat, ready for finishing by division 09.

.5 Exposed spiral ductwork to be painted with direct to metal paint shall be stripped of any oils or grease used in the forming process and primed.

1.2 REFERENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).

.2 American Society for Testing and Materials International, (ASTM).

.1 ASTM A480/A480M-03c, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.

.2 ASTM A635/A635M-02, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot Rolled.

.3 ASTM A653/A653M-03, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Annealed) by the Hot-Dip Process.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

.4 National Fire Protection Association (NFPA).

.1 NFPA 90A-02, Standard for the Installation of Air-Conditioning and Ventilating Systems.

.2 NFPA 90B-02, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.

.5 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).

.1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2nd Edition 1995 and Addendum No. 1, 1997.

.2 SMACNA HVAC Air Duct Leakage Test Manual, 1985, 1st Edition.

1.3 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets for the following:

.1 Sealants.

.2 Tape.

.3 Proprietary Joints.

1.4 QUALITY ASSURANCE

.1 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.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

1.6 SEAL CLASSIFICATION

.1 Classification as follows:

Maximum Pressure Pa	SMACNA Seal Class
500	B
250	B
125	C
125	Unsealed

.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 tape or combination thereof.

.3 Class C: transverse joints and connections made air tight with sealant or combination thereof . Longitudinal seams unsealed.

1.7 SEALANT

.1 Sealant: oil resistant, water borne, polymer type flame resistant duct sealant. Temperature range of minus 30 degrees C to plus 93 degrees C.

1.8 TAPE

.1 Tape: polyvinyl treated, open weave fibreglass tape, 50 mm wide.

1.9 DUCT LEAKAGE

.1 In accordance with SMACNA HVAC Air Duct Leakage Test Manual.

1.10 FITTINGS

.1 Fabrication: to SMACNA .

.2 Radiused elbows.

.1 Rectangular: standard radius short radius with single thickness turning vanes Centreline radius: 1.5 times width of duct .

.2 Round: smooth radius five piece . Centreline radius: 1.5 times diameter.

.3 Mitred elbows, rectangular:

.1 To 400 mm: with single double thickness turning vanes.

.2 Over 400 mm: with double thickness turning vanes.

.4 Branches:

.1 Rectangular main and branch: with radius on branch 1.5 times width of duct 45 degrees entry on branch .

.2 Round main and branch: enter main duct at 45 degrees with conical connection .

.3 Provide volume control damper in branch duct near connection to main duct.

.4 Main duct branches: with splitter damper.

.5 Transitions:

.1 Diverging: 20 degrees maximum included angle.

.2 Converging: 30 degrees maximum included angle.

.6 Offsets:

.1 Full short radiused elbows as indicated .

.7 Obstruction deflectors: maintain full cross-sectional area.

.1 Maximum included angles: as for transitions .

1.11 FIRE STOPPING

.1 Retaining angles around duct, on both sides of fire separation in accordance with Section 07 84 00 - Fire stopping .

.2 Fire stopping material and installation must not distort duct.

1.12 GALVANIZED STEEL

.1 Lock forming quality: to ASTM A653/A653M, Z90 zinc coating.

.2 Thickness, fabrication and reinforcement: to ASHRAE SMACNA .

.3 Joints: to ASHRAE SMACNA proprietary manufactured duct joint . Proprietary manufactured flanged duct joint to be considered to be a class A seal .

1.13 HANGERS AND SUPPORTS

.1 Hangers and Supports: in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment .

.1 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct.

.2 Maximum size duct supported by strap hanger: 500mm .

.3 Hanger configuration: to ASHRAE and SMACNA.

.4 Hangers: black galvanized steel angle with black galvanized steel rods to ASHRAE and SMACNA following table :

Duct Size (mm)	Angle Size (mm)	Rod Size (mm)
up to 750	25 x 25 x 3	6
751 to 1050	40 x 40 x 3	6
1051 to 1500	40 x 40 x 3	10
1501 to 2100	50 x 50 x 3	10
2101 to 2400	50 x 50 x 5	10
2401 and over	50 x 50 x 6	10

.5 Upper hanger attachments:

.1 For concrete: manufactured concrete inserts.

.2 For steel joist: manufactured joist clamp steel plate washer .

.3 For steel beams: manufactured beam clamps:

PART 2 NOT USED

PART 3 EXECUTION

3.1 GENERAL

.1 Do work in accordance with NFPA 90A NFPA 90B ASHRAE SMACNA as indicated .

.2 Do not break continuity of insulation vapour barrier with hangers or rods.

.1 Insulate strap hangers 100 mm beyond insulated duct Ensure diffuser is fully seated .

.3 Support risers in accordance with ASHRAE SMACNA as indicated .

.4 Install breakaway joints in ductwork on sides of fire separation.

.5 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions .

.6 Manufacture duct in lengths and diameter 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 as follows:

Duct Size (mm)	Spacing (mm)
to 1500	3000

Duct Size	Spacing
1501 and over	2500

3.3 SEALING AND TAPING

.1 Apply sealant to outside of joint to manufacturer's recommendations.

.2 Bed tape in sealant and recoat with minimum of one coat of sealant to manufacturers recommendations.

3.4 LEAKAGE TESTS

.1 In accordance with SMACNA HVAC Duct Leakage Test Manual.

.2 Do leakage tests in sections.

.3 Make trial leakage tests as instructed to demonstrate workmanship.

.4 Do not install additional ductwork until trial test has been passed.

.5 Test section minimum of 30 m long with not less than three branch takeoffs and two 90 degrees elbows.

.6 Complete test before performance insulation or concealment Work.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for duct accessories including flexible connections, access doors, vanes and collars.

.2 Section 01 33 00 – Submittal Procedures.

.3 Section 01 70 00 – Execution Requirements.

1.2 REFERENCES

.1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).

.1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible, 95.

1.3 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet. Indicate the following:

.1 Flexible connections.

.2 Duct access doors.

.3 Turning vanes.

.4 Instrument test ports.

.2 Certification of ratings: catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

.3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.4 Instructions: submit manufacturer's installation instructions.

.5 Manufacturer's Field Reports: manufacturer's field reports specified.

.6 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 70 00 – Execution Requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

PART 2 PRODUCTS

2.1 GENERAL

.1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

2.2 FLEXIBLE CONNECTIONS

.1 Frame: galvanized sheet metal frame mm thick with fabric clenched by means of double locked seams.

.2 Material:

.1 Fire resistant, self-extinguishing, neoprene coated glass fabric, temperature rated at minus 40 degrees C to plus 90 degrees C, density of 1.3 kg/m2.

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 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 thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.

.3 Gaskets: neoprene .

.4 Hardware:

.1 Up to 300 x 300 mm: two sash locks complete with safety chain .

.2 301 to 450 mm: four sash locks complete with safety chain .

.3 451 to 1000 mm: piano hinge and minimum two sash locks.

.4 Doors over 1000 mm: piano hinge and two handles operable from both sides.

.5 Hold open devices.

.6 300 x 300 mm glass viewing panels .

2.4 TURNING VANES

.1 Factory or shop fabricated single thickness without trailing edge , to recommendations of SMACNA and as indicated.

2.5 SPIN-IN COLLARS

.1 Conical galvanized sheet metal spin-in collars with lockable butterfly damper.

.2 Sheet metal thickness to co-responding round duct standards.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 INSTALLATION

.1 Flexible Connections:

.1 Install in following locations:

.1 Inlets and outlets to supply air units and fans.

.2 Inlets and outlets of exhaust and return air fans.
.3 As indicated.

.2 Length of connection: 100 mm.
.3 Minimum distance between metal parts when system in operation: 75 mm.
.4 Install in accordance with recommendations of SMACNA.
.5 When fan is running:
.1 Ducting on sides of flexible connection to be in alignment.
.2 Ensure slack material in flexible connection.

.2 Access Doors and Viewing Panels:

.1 Size:
.1 600 x 600 mm for person size entry.
.2 300 x 300 mm or as allowed by duct dimension for servicing entry.
.3 200 x 200 mm for viewing.

.2 Locations:
.1 Fire and smoke dampers.
.2 Control dampers.
.3 Devices requiring maintenance.
.4 Required by code.
.5 Reheat coils.
.6 Elsewhere as indicated.

.3 Turning vanes:

.1 Install in accordance with recommendations of SMACNA and as indicated.

.4 Silencers:

.1 Install in accordance with Manufacturers written instructions
.2 Observe all directional arrows.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Manufacturer's Field Services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.4 CLEANING

.1 Perform cleaning operations in accordance with manufacturer's recommendations.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Balancing dampers for mechanical forced air ventilation and air conditioning systems..

.2 Related Sections:

.1 23 31 13 – Metal Ducts.

1.2 REFERENCES

.1 Sheet Metal and Air Conditioning National Association (SMACNA)

.1 SMACNA HVAC Duct Construction Standards, Metal and Flexible-1985.

1.3 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 – Submittal Procedures. Include product characteristics, performance criteria, and limitations.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling.

PART 2 PRODUCTS

2.1 GENERAL

.1 Manufacture to SMACNA standards.

2.2 SPLITTER DAMPERS

.1 Fabricate from same material as duct but one sheet metal thickness heavier, with appropriate stiffening.

.2 Single thickness construction.

.3 Control rod with locking device and position indicator.

.4 Rod configuration to prevent end from entering duct.

.5 Pivot: piano hinge.

.6 Folded leading edge.

2.3 SINGLE BLADE DAMPERS

.1 Fabricate from same material as duct, but one sheet metal thickness heavier. V-groove stiffened.

.2 Size and configuration to recommendations of SMACNA. ,

.3 Locking quadrant with shaft extension to accommodate insulation thickness .

.4 Inside and outside nylon end bearings.

.5 Channel frame of same material as adjacent duct, complete with angle stop.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install balance dampers where required by good practice and as indicated on the plans.

.2 Provide splitter dampers at all major duct intersections.

.3 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.4 Locate balancing dampers in each branch duct, for supply, return and exhaust systems.

.5 Run-outs to registers and diffusers: install single blade damper located as close as possible to main ducts.

.6 Dampers: shall be vibration free.

.7 Ensure damper operators are observable and accessible.

.8 Make corrections and adjustments as directed by the air balance contractor and Engineer.

3.3 CLEANING

.1 Proceed in accordance with Section 01 74 00 – Cleaning.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation of flexible ductwork, joints and accessories.

.2 Related Sections:

.1 Section 01 33 00 – Submittal Procedures.

1.2 REFERENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).

.2 National Fire Protection Association (NFPA).

.1 NFPA 90A-02, Standard for the Installation of Air-Conditioning and Ventilating Systems.

.2 NFPA 90B-02, Standard for Installation of Warm Air Heating and Air-Conditioning Systems.

.3 Sheet Metal and Air-Conditioning Contractors' National Association (SMACNA).

.1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 95 (Addendum No.1, November 1997).

.2 SMACNA IAQ Guideline for Occupied Buildings under Construction, 1st Edition 1995.

.4 Underwriters' Laboratories Inc. (UL).

.1 UL 181-96, Standard for Factory-Made Air Ducts and Air Connectors.

.5 Underwriters' Laboratories of Canada (ULC).

.1 CAN/ULC-S110-1986 (R2001), Fire Tests for Air Ducts.

1.3 SUBMITTALS

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

.2 Product Data: submit the following:

.1 Thermal properties.

.2 Friction loss.

.3 Acoustical loss.

.4 Leakage.

.5 Fire rating.

.3 Samples: submit samples with product data of different types of flexible duct being used in accordance with Section 01 33 00 - Submittal Procedures.

1.4 QUALITY ASSURANCE

.1 Certification of Ratings:

.1 Catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

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 Type 1: spiral wound flexible aluminium, as indicated.

.2 Performance:

.1 Factory tested to 2.5kPa without leakage.

.2 Maximum relative pressure drop coefficient: 3

2.3 METALLIC - INSULATED

.1 Type 2: spiral wound flexible aluminum with factory applied, 37 mm thick flexible glass fibre thermal insulation with vapour barrier and vinyl jacket, as indicated.

.2 Performance:

.1 Factory tested to 2.5kPa without leakage.

.2 Maximum relative pressure drop coefficient: 3

2.4 NON-METALLIC - UNINSULATED

.1 Type 3: non-collapsible, coated aluminium foil mylar type, mechanically bonded to, and helically supported by, external steel wire, as indicated.

.2 Performance:

.1 Factory tested to 2.5 kPa without leakage.

.2 Maximum relative pressure drop coefficient: 3 .

2.5 NON-METALLIC - INSULATED

.1 Type 4: non-collapsible, aluminium foil mylar type mechanically bonded to, and helically supported by, external steel wire with factory applied, 37 mm thick flexible mineral fibre thermal insulation with vapour barrier and vinyl jacket, as indicated.

.2 Performance:

.1 Factory tested to 2.5 kPa without leakage.

.2 Maximum relative pressure drop coefficient: 3.

PART 3 EXECUTION

3.1 DUCT INSTALLATION

.1 Install in accordance with: Manufacturers Instructions and CAN/ULC-S110 UL-181 NFPA 90A NFPA 90B SMACNA .

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation for acoustic duct lining.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittals.

.2 Section 23 31 13 – Metal Ducts.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).

.1 ASTM C423-02a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

.2 ASTM C916-85(2001)e1, Standard Specification for Adhesives for Duct Thermal Insulation.

.3 ASTM C1071-00, Standard specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).

.4 ASTM C1338-00, Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.

.5 ASTM G21-96(2002), Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

.2 National Fire Protection Association (NFPA).

.1 NFPA 90A-02, Standard for the Installation of Air Conditioning and Ventilating Systems.

.2 NFPA 90B-02, Standard for the Installation of Warm Air Heating and Air Conditioning Systems.

.3 North American Insulation Manufacturers Association (NAIMA).

.1 NAIMA AH116-5th Edition, Fibrous Glass Duct Construction Standards.

.4 Sheet Metal and Air Conditioning Contractor's National Association (SMACNA).

.1 SMACNA, HVAC DCS, HVAC, Duct Construction Standards, Metal and Flexible-95 (Addendum No.1, Nov. 97).

.2 SMACNA IAQ Guideline for Occupied Buildings 95.

.5 Underwriter's Laboratories of Canada (ULC).

.1 CAN/ULC-S102-03-EN, Methods of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.4 SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or install absorptive material for protection from moisture damage.

1.6 SCOPE OF WORK

.1 Provide duct lining on supply and return ducts within 3 metres of air handling equipment including but not limited to RTU-1, RTAC-9, fan powered VAV box at Trinity, and roof mounted exhaust fans.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

PART 2 PRODUCTS

2.1 DUCT LINER

.1 General:

.1 Mineral Fibre duct liner: air surface coated mat facing .

.2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50 when tested in accordance with CAN/ULC-S102 and NFPA 90A NFPA 90B.

.3 Recycled Content: Eco-Logo certified with minimum 35 % by weight recycled content.

.4 Fungi resistance: to ASTM C1338 ASTM G21.

.2 Rigid:

.1 Use on flat surfaces where indicated .

.2 25 mm thick, to ASTM C1071 ,Type 2 , fibrous glass rigid board duct liner.

.3 Density: 48 kg/m3 minimum.

.4 Thermal resistance to be minimum 0.76 (m2. degrees C)/W for 25 mm thickness 1.15 (m2.degrees C)/W for 38 mm thickness 1.53 (m2.degrees C)/W for 50 mm thickness when tested in accordance with ASTM C177, at 24 degrees C mean temperature.

.5 Maximum velocity on faced air side: 20.3 m/sec .

.6 Minimum NRC of 0.70 at 25 mm thickness based on Type A mounting to ASTM C423.

.7 Recycled Content: Eco-Logo certified containing minimum 45 % by weight recycled content.

2.2 ADHESIVE

.1 Adhesive: to NFPA 90A and NFPA 90B ASTM C916.

.2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50. Temperature range minus 29 degrees C to plus 93 degrees C.

.3 Water-based fire retardant type.

2.3 FASTENERS

.1 Weld pins 2.0 mm diameter, length to suit thickness of insulation. Polymer Nylon Metal retaining clips, 32 mm square.

2.4 JOINT TAPE

.1 Poly-Vinyl treated open weave fiberglass membrane 50 mm wide.

2.5 SEALER

.1 Meet requirements of NFPA 90A and NFPA 90B.

.2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50. Temperature range minus 68 degrees C to plus 93 degrees C.

PART 3 EXECUTION

3.1 GENERAL

.1 Do work in accordance with SMACNA HVAC DCS.

.2 Line inside of ducts where indicated.

.3 Duct dimensions, as indicated, are clear inside duct lining.

3.2 DUCT LINER

.1 Install in accordance with manufacturer's recommendations, and as follows:

.1 Fasten to interior sheet metal surface with 90 100 % coverage of adhesive to ASTM C916

.1 Exposed leading edges and transverse joints to be factory coated or coated with adhesive during fabrication.

.2 In addition to adhesive, install weld pins not less than 2 rows per surface and not more than 425 mm on centres impact driven mechanical fasteners to compress duct liner sufficiently to hold it firmly in place.

.1 Spacing of mechanical fasteners in accordance with SMACNA.

.2 In systems, where air velocities exceeds 20.3 m/sec, install galvanized sheet metal noising to leading edges of duct liner.

3.3 JOINTS

.1 Seal butt joints, exposed edges, weld pin and clip penetrations and damaged areas of liner with joint tape and sealer. Install joint tape in accordance with manufacturer's written recommendations, and as follows:

.1 Bed tape in sealer.

.2 Apply two coats of sealer over tape.

.2 Replace damaged areas of liner at discretion of the Consultant.

.3 Protect leading and trailing edges of duct sections with sheet metal nosing having 15 mm overlap and fastened to duct.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 New exhaust fans EF-1, EF-2.

.2 Related Sections:

.1 23 09 33 – Electronic Controls.

.3 Provide new equipment and support as required.

1.2 SYSTEM DESCRIPTION

.1 Provide exhaust fans for systems as noted on the exhaust fan schedule.

1.3 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 – Submittal Procedures. Include product characteristics, performance criteria, and limitations for replacement roof curbs only.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

.3 Closeout Submittals

.1 Provide operation and maintenance data for incorporation into manual specified in Section 21 05 01 Common Work Results for Mechanical.

1.4 QUALITY ASSURANCE

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for recycling.

1.6 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 70 00 – Execution requirement.

.2 Furnish list of individual manufacturer's recommended spare parts for equipment, include:

.1 Addresses of suppliers.

.2 List of specialized tools necessary for adjusting, repairing or replacing.

PART 2 PRODUCTS

2.1 ROOF MOUNTED EXHAUST FANS GENERAL PURPOSE, EF6

.1 Refer to exhaust fan schedule on drawing M100.

.2 Acceptable products shall be Greenheck G -x- VG1/6 series, or equal by Penn, Cook, 120/1/60.

.3 Include disconnect switches, roof curbs, back draft dampers where noted.

.4 Centrifugal, direct driven.

.1 Refer to exhaust fan schedule on drawing M100.

.2 Acceptable products shall be Greenheck G series, Penn, Cook.

.3 Centrifugal direct driven.

.4 Housings: spun aluminum complete with resilient mounted motor and fan.

.5 Impeller: aluminum non-overloading.

.6 Adjustable motor sheave.

.7 12 mm mesh aluminum bird screen.

.8 Automatic gasketed aluminum backdraft dampers.

.9 Disconnect switch within fan housing.

.10 Continuous curb gaskets, stainless steel securing bolts and screws, and sound insulating 450 mm high curbs.

.11 Sound curbs: of same manufacturer as fan and built to suit model specified.

.5 Include reverse acting thermostat for EF-5 located in mechanical/electrical room room #122 at OLP.

2.2 Range Hood Fan, RH

.1 Refer to exhaust fan schedule on drawing M100.

.2 Acceptable products shall be Broan QT236SSN, Greenheck CW series, Penn, Cook.

.3 Under cabinet mount range hood as follows:

.1 120/1/60 1.4 Amps, 3 speed push button, Delay Off.

.2 Filter Clean reminder, Heat sentry.

.3 3 level LED lighting.

.4 Installation brackets, 175mm ducted outlet, BP87Q.

.5 Stainless steel finish.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Confirm mounting location for fan controllers.

.2 Install the fan according to the manufacturer’s Installation Guide, including acceptable structural dimensions, proper sizing and placement of supports for bar joist applications.

.3 Minimum Distances:

.1 Airfoils must be at least 10 ft (3 m) above the floor.

.2 Installation area must be free of obstructions such as lights, cables, sor other building structures with the airfoils at least 2 ft (0.61 m) clear of all obstructions.

.3 The structure the fan is attached to shall be capable of supporting a torque load of up to 300 ft·lb (407 N·m) of torque

.4 The fan shall not be located where it will be in close proximity to the outputs of HVAC systems or radiant heaters.

3.3 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Supply, return and exhaust grilles and registers, diffusers, for commercial use.

1.2 SYSTEM DESCRIPTION

.1 Performance Requirements:

.1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards.

1.3 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.

.2 Indicate following:

.1 Capacity.

.2 Throw and terminal velocity.

.3 Noise criteria.

.4 Pressure drop.

.5 Neck velocity.

.2 Samples:

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.3 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling

1.5 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 73 00 – Operations and Maintenance data .

.2 Include:

.1 Keys for volume control adjustment.

.2 Keys for air flow pattern adjustment.

PART 2 PRODUCTS

2.1 ACCEPTABLE PRODUCTS;

.1 Acceptable products E.H. Price, Nailor, Titus, Kruger.

2.2 GENERAL

.1 To meet capacity, pressure drop, terminal velocity, throw, noise level, neck velocity as indicated .

.2 Frames:

.1 Full perimeter gaskets.

.2 Plaster frames where set into plaster or gypsum board and as specified.

.3 Concealed fasteners.

.3 Concealed manual volume control damper operators.

.4 Colour: standard as directed by the architect.

2.3 MANUFACTURED UNITS

.1 Grilles, registers and diffusers of same generic type, products of one manufacturer.

2.4 SUPPLY GRILLES AND REGISTERS

.1 General: with opposed blade dampers .

.2 Type SG: steel 32 mm border, double deflection with airfoil shape, horizontal face and vertical rear bars. Finish: To be confirmed with architect. Model: 620D/L.

.3 Type RG: Return Grilles, steel, parallel blade, 635 series, concealed mount, double deflection, horizontal face and vertical rear bars. Finish to be confirmed with architect.

2.5 FIRE RATED DOOR GRILLE:

.1 Type DG: Size as shown on plans. Model #STG or approved equal.

.2 Color to be confirmed with architect.

.3 Mount from inside to conceal screws.

2.6 RETURN AND EXHAUST GRILLES AND REGISTERS

.1 General: with opposed blade dampers .

.2 Type EG: steel 19 mm border, size as noted, egg crate type face bars. Finish: To be confirmed with Vallee Group. Model: 80.

2.7 DIFFUSERS

.1 General: Flow straightening devices and gaskets.

.2 Type SD: steel 600x600 square type, having adjustable pattern, lay-in and or surface mounted. Finish: To be confirmed with architect. E.H. Price Model: SCDA.

.3 Type SD2: steel 300x300 square type, having adjustable pattern, lay-in and or surface mounted. Finish: To be confirmed with architect. E.H. Price Model: SCDA.

2.8 EXTERIOR LOUVRES

.1 Type OL, E.H. Price Model:ZE439.

.2 Complete with bird screen, motor operated damper, to suit louvre size.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install in accordance with manufacturer’s instructions.

.2 Install with stainless steel screws in countersunk holes where fastenings are visible.

.3 Bolt grilles, registers and diffusers, in place.

.4 Provide concealed safety chain on each diffuser.

.5 Provide balancing dampers at ducted return and exhaust intakes.

3.3 CLEANING

.1 Proceed in accordance with Section 01 70 00 – Execution Requirements.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Cabinet convector heaters, controls and installation.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 23 09 33 - Electronic Control System for HVAC.

.3 Section 26 05 00 - Common Work Results - Electrical.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.46- Electric Air-Heaters.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.4 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.

.2 Submit product data sheets for cabinet convector heaters. Include:

.1 Product characteristics.

.2 Performance criteria.

.3 Mounting methods.

.4 Physical size.

.5 kW rating, voltage, phase.

.6 Cabinet material thicknesses.

.7 Limitations.

.8 Colour and finish.

.2 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

.3 Closeout Submittals:

.1 Submit operation and maintenance data for cabinet convector heaters in accordance with Section 013300 - Submittal Procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

PART 2 PRODUCTS

2.1 MANUFACTURERS

.1 Acceptable products:

.1 Basis of Design: Engineered Air # CUH-1 Series.

.2 Equivalent:

.1 Trane.

.2 Modine.

2.2 CABINET CONVECTOR HEATERS

.1 Casings shall be constructed of 16-gauge (1.5mm) satin coat steel throughout with electrostatically applied powder coat prime fi nish. Casing shall incorporate an integral piping pocket, removable front panel, and hinged access door to electrical junction box. Recessed units shall be furnished with a recessing frame.

.2 Coils shall be 1/2” (13mm) copper tube with rippled aluminum fi ns and sweat connections. Coils to be factory tested with air at 300 psig (2070 kPa).

.3 Fans shall be double width, double inlet, forward curved centrifugal type, balanced for quiet vibration free operation.

.4 Motors shall be 3-speed permanent split capacitor, open type, resiliently mounted, incorporating sleeve bearings and internal automatic re-set overload protection.

.5 Units must be CSA approved and bear the CSA label.

.6 Provide factory installed options:

.1 Key lock access door

.7 Wall mounted thermostat and/or switches, where required, to be provided by Building Automation System contractor.

.8 Units shall be Airtex Hydronic Systems, model numbers and sizes as follows:

.1 CUH1:

.1 Model # CUH-1.
.2 EWT = 82.2°C (180°F).
.3 ∆T = 11.1 °C (20°F).
.4 Capacity = 4.7kW (16.10MBH)
.5 Flow rate = 0.10L/s (1.62gpm)
.6 WPD = 6.35kPa (2.13 ft-H_2O)

.9 Refer to Electric Heater Schedule on drawing M100, CUH-1.

.10 Fully recessed ceiling mounted cabinet: to CSA C22.2 No. 46, pre-drilled back for securing to structure:

.1 Front inlet/front outlet.

.11 Elements: mineral insulated with copper sheath and pressed-on or welded fins, secured and free-floating for expansion.

2.3 CONTROLS

.1 Wall mounted thermostats: type low voltage, electronic to Section 23 09 33 - Electronic Control System for HVAC.

.2 Remote thermostat: 2 pole with tamperproof screws and cover and auxiliary relays, transformer.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install cabinet convectors as indicated.

.2 Locate floor drop-in heaters not closer than 150 mm from wall. For 350 mm units, fit between floor joists. For larger units frame- in as indicated. Flange of heater case must rest on finished floor. Fix rigidly with wood screws.

.3 Install wall mounted thermostats in locations indicated.

.4 Make power and control connections.

3.3 FIELD QUALITY CONTROL

.1 Tests:

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.

3.4 CLEANING

.1 Proceed in accordance with Section 01700 – Execution Requirements.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION